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FROM THE EDITOR'S DESK

Greetings of the season.

The readers of this issue will find a list of new executive Committee of The Home Science Association of India(2025-2029).

The field of Home Science has always contributed significantly through the knowledge and expertise from the grass root level to the apex bodies and organizations for the betterment of society. The critical situation of the world at present calls for the experts from our field to suggest families to cope up with crisis. The educational institutions must re-emphasize the importance of conservation of resources not only to the students but also to the community. Surely, each college and institution will take up such action programmes.

Best Wishes,

PROF. MANEESHA SHUKUL

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EMERGING TRENDS ON THE CHOICES OF WEDDING ATTIRE AMONG PLUS-SIZE WOMEN

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ABSTRACT

Increasing digital employment and easy accessible eatables made the life style changes among individual's leads to increase in the body weight, these results to the preferences for plus-size wear. Most expected and anticipated joyous occasion for each adult in their life time is their big fat wedding, the wedding attire plays very essential role for the wedding bride, but the purchase of wedding attire among plus-size women is hard and stressful, due to available products in the market is unfit in design, style and drape. Plus-size consumers ready to spend more for this emotionally connected occasion. There are studies which target on the plus-size casual and formal attire but not much study related to the plus-size wedding attire, this study highlights on the "Emerging trends on the choices of wedding attire among plus-size women" in Chennai city. A survey conducted among 110 plus-size women from Chennai, who are recently married. The findings reveal that emotional connection plays a crucial role in bridal outfit selection opting for variety in styles, design and fabric that harmonize with their personality. Brides influenced with the celebrity wedding attire, but hesitate to try due to body shaming. Exceeded the budget allotted for the attire due to less collection, to source special fabric, spend for specialized bridal studio and to add surface ornamentation towards their wedding attire. Prefer custom-made wear for its durability, finishing, styles and fitting when compared to ready-to-wear. The study will help the designers and promoters to identify the requirement of the plus-size women buying practices, AI-driven design tool, and virtual fitting for the plus-size women customers for their satisfying purchase.

Keywords: Choices, Custom-made, Plus-size, Ready-to-wear, Wedding attire

INTRODUCTION

Plus-size brides always prefer to purchase the best wedding attire based on their body type, so that it makes comfortable throughout the celebration. Plus-size women are often forced to prefer the accessible products than unique choices. Every bride looks gorgeous and elegant on her big day irrespective of her body type. Wearing the right kind of outfits on the wedding helps to flaunt the curves. To give stunning impression to the spouse and the invitees when added with confidence and a smile to the desired style. To be attractive and glamorous, wearer prefers to have a suitable fit, trendy and pleasing to the eye and to make sure that the bride's vision to be fulfilled. Plus-size women are the most disappointed buyers towards the wedding attire, facing much difficulties when purchase due to high price, outdated collection, less variety and design details, unsuitable fabric,

fitting issues (Alba.et.al.,1997). The overweight and obesity rate has been raised in the fast-moving world its vital and necessary for the manufacturer to include the garments which suits the larger women (Hemanth Kumar.et.al., 2019)

LITERATURE REVIEW

According to Amanpreet Kaur, (2019) the study shows that heavy investment (1–20 lakhs) in wedding apparel and the preference for designer boutiques over mass-market retail for bridal wear.

According to Choy.et.al., (2004) a research website was developed to study mass customization of wedding gowns. A sample of 100 young women aged 18-32 was recruited via email. Results showed a high interest in wedding gown design involvement, with those with more personal technological devices and internet usage being more willing to purchase the designed gown. Four categories of bridal websites were identified: marketing, browsing, advice and customizing. The study suggests identifying potential customers, evaluating product types and using internet customization strategies.

Matthews and Romeo (2018) conducted a study to examine the apparel needs of plus-size women and how these needs influence their shopping behaviours, motivations, apparel demands, and cultural perspectives among 31 participants. The results revealed that plus-size women felt underprivileged by the limited availability of appealing apparel options in the retail market.

According to Rana, (2020) the study shows that, shoppers are exposed to multiple brands and have options to buy through various channels, both online and offline. Amid these options, the plus-size apparel segment remains a niche that is still underexplored. With the increase in body positivity and self-acceptance, consumers are seeking plus-size options in ready-to-wear clothing, rather than relying on custom-made.

OBJECTIVES

1. To assess the age group of the plus-size married women.
2. To examine the choices of ready-to-wear and custom-made plus-size wedding attire.
3. To study the problems faced towards wedding attire among plus-size women.

METHODOLOGY

To conduct this study, a self-developed questionnaire tool was used. Secondary data collected from the research papers, theses, dissertations, E- resources, magazines, text books and journal articles. The obtained data was presented by tables and figures.

SAMPLES AND SAMPLING METHOD

The area of the study was in Chennai of South India. 110 plus-size married women were selected by purposive sampling method from north, south and central part of the Chennai city.

TOOLS USED

To study on the “Emerging trends on the choice of wedding attire among plus-size women” a self-developed questionnaire was used. The tool consists of various questions related to the age group, choices of ready-to-wear and custom-made wedding attire and problems faced by plus-size women towards wedding attire. The data gathered was presented using figures and tables in simple percentage.

RESULTS AND DISCUSSION

Objective 1: To assess the age group of the plus-size married women

Table 1: Age group of the plus-size married women

S. No	Age (in years)	n=110	Percentage (%)
1	Below 20	10	9
2	20-24	40	36
3	25-29	43	39
4	Above 30	17	16
TOTAL		110	100

Interpretation

From the above Table 1, it represents that the most of the plus-size married women belong to age group 25-29 years (39%), followed by 20-24 years (36%), above 30 years (16%) and below 20 years (9%).

Objective 2: To examine the choices of ready-to-wear and custom-made plus-size wedding attire

Table 2: Choices of ready-to-wear and custom-made plus-size wedding attire

S. No	Choices of ready-to-wear and custom-made plus-size wedding attire	n=110	Percentage (%)	
1.	Long lasting and durability	Ready-to-wear	31	28
		Custom-made	79	72
2.	Cost effective	Ready-to-wear	69	63
		Custom-made	41	37
3.	Desired styles, colour & design	Ready-to-wear	38	35
		Custom-made	72	65
4.	Perfect fitting	Ready-to-wear	31	28
		Custom-made	79	72
5.	Good finishing	Ready-to-wear	32	29

		Custom-made	78	71
6.	Surface embellishments & ornamentation	Ready-to-wear	60	55
		Custom-made	50	45
7.	Overall satisfaction	Ready-to-wear	38	35
		Custom-made	72	65

Interpretation

From the above Table 2, it represents that most of the plus-size women preferred custom-made wedding attire due to long lasting and durability (72%), perfect fitting (72%) good finishing (71%) and overall satisfaction (65%), whereas plus-size women preferred ready-to-wear wedding attire for the cost effective (63%) and surface embellishments & ornamentation (55%).

Below figures show the choices towards the ready-to-wear and custom-made plus size wedding attire.

Figure1

Ready-to-wear plus-size wedding attire



Figure 2

Custom-made plus-size wedding attire



Objective 3: To study the problems faced towards wedding attire among plus-size women

Table 3: Problems faced towards wedding attire among plus-size women

S. No	Problems faced towards wedding attire among plus-size women		n=110	Percentage (%)
1.	Emotionally connected towards wedding attire	Yes	86	78
		No	24	22
2.	Shopping for a plus-size wedding dress is hard & stressful	Yes	90	82
		No	20	18
3.	Dreamt to have celebrity styles wedding attire	Yes	75	68
		No	35	32
4.	Hesitate to try on celebrity styles due to body shaming	Yes	81	74
		No	29	26
5.	Prefer sarees for the big day due to fluctuation in size	Yes	61	55
		No	49	45
6.	Plus size wedding attire is very expensive than standard size wedding attire	Yes	85	77
		No	25	23
7.	Exceeded the budget allotted for my wedding dress	Yes	73	66
		No	37	34
8.	Varieties & cost effective in online compared to offline	Yes	66	60
		No	44	40
9	All sizes are available in stores	Yes	32	29
		No	78	71
10	Tons of research and review before shopping the wedding attire	Yes	70	64
		No	40	36
11	Promotions on plus size wedding attire available	Yes	30	27
		No	80	73
12	Plus size wedding attires are outdated in stores	Yes	80	73
		No	30	27

Interpretation

From the above Table 3, it represents that the wedding attire is emotionally connected among plus-size wearer (78%) and agreed to the statement that shopping for a plus-size wedding dress is hard & stressful (82 %) dreamt to have celebrity styles (68%), hesitate to try on celebrity styles due to body shaming (74%), preferred sarees for their big fat day due to fluctuation in size (55%), plus size wedding attires are very expensive (77%), exceeded the budget allotted for their wedding attire (66%), varieties and cost effective in online compared to offline (60%), tons of research and review before shopping wedding attire (64%) and plus size wedding attires are outdated in stores (73%) whereas disagreed to the statement all sizes are available in stores (71%) and promotions on plus size wedding attire available (73%).

CONCLUSION

Most awaited and predicted occasion for each grown-up people in their life time is their dream wedding, the wedding attire plays an essential and crucial role for the wedding bride, but the availability and satisfaction among plus-size women wedding attire is hard and stressful. The study on the emerging trends on the choices of wedding attire among plus-size women from the Chennai city who are recently married to understand their purchasing behavior, choices and problems faced towards wedding attire, it shows that most of the respondents belong to the age group 25-29 years followed by 20-24, preferred custom-made attire for the durability, satisfaction, perfect fitting and good finishing whereas plus-size women preferred ready-to-wear attire for cost effective and for the surface embellishments & ornamentation. Wedding attire is emotionally connected among plus-size wearer, shopping for a plus-size wedding dress is hard & stressful, dream for a celebrity style but hesitate to try on the celebrity styles due to body shaming, preferred sarees for their big day due to fluctuation in size. Plus-size wedding attires are very expensive; they exceeded the budget allotted for their wedding attire. The varieties and cost effective in online when compared to offline purchase, brides do tons of research and review before shopping the wedding attire and plus size wedding attires are often outdated in stores and not much promotions available for plus size wedding attire. Garment and apparel designers need to solve the challenges faced by the plus-size brides wear and produce garments that suit the wearer in the design details, fabric, perfect fitting by considering proper body measurements using AI measuring system and apply virtual fitting for the customers and give satisfaction during purchase.

SCOPE OF THE STUDY

1. This study will help to recognize the demand for plus-size wedding attire and to design and stock more plus-size collections in bridal studios and retail stores using AI tool and measuring system.
2. This research can help to identify styles and options in the bridal industry.
3. This study will help to contribute towards inclusive fashion and size acceptance in the textile and garment industry.

RECOMMENDATION FOR THE FUTURE STUDY

1. A study on the wedding attire among plus-size men in Tamil Nadu.
2. To analyse the hair styles and accessories preferences to fit the attire among plus-size women.

REFERENCES

- Amanpreet Kaur, (2019), A Study of Buying Behaviour of Apparel and Accessories by the Girls of Punjab for Their Wedding. *Review of Research journal*, Volume 8, Issue 9, June 2019.
- Alba, J., Lynch, J., Weitz, B., Janiszewski, C., Lutz, R., Sawyer, A. and Wood, S. (1997), Iterative home shopping: consumer, retailer, and manufacturer incentives to participate in electronic marketplaces. *Journal of Marketing*, vol.61, July, pp.38-53
- Choy, R., & Loker, S., (2004), Mass customization of wedding gowns: Design involvement on the internet. *Clothing and Textiles Research Journal*, 22(1-2), 79-87.
- Dr. Hemanth Kumar. S , Nagendra. B. M & Hemanth S Angadi, (2019), A study on factors influencing plus size fashion apparel. *International Journal of Human Resource Management and*

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- Matthews, D., & Romeo, L. (2018), A qualitative exploration of perceptions, shopping motivations, and demands of plus-size women: An ethnic approach. *Journal of Textile and Apparel, Technology and Management*, 10(4).
- <https://jtatm.textiles.ncsu.edu/index.php/JTATM/article/view/13971>
- Rana, J. (2020). Plus-size brands: A study of consumer attitude and brand preferences with respect to readymade apparel. [Doctoral dissertation, Manav Rachna International Institute of Research and Studies (Deemed to be University)]. *Shodhgangotri*.
- <https://shodhgangotri.inflibnet.ac.in:8443/jspui/bitstream/20.500.14146/15724/1/plus-size%20brands%20a%20study%20of%20consumer%20attitude%20and%20brand%20preferences%20with%20respect%20to%20readymade%20apparel.pdf>

Designing and Digital Printing of Home Furnishing Products Using Motifs Inspired from Red Fort

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ABSTRACT

The Red Fort, a significant part of India's cultural heritage, serves as an inspiration for artists and designers. The architectural and fashion worlds have many overlaps, with architects often applying scale, shape, and proportion to their personal styles. Fashion designers also draw inspiration from architecture, often using individual architects as inspirations. This study aimed to evaluate the acceptance of designs of home furnishing products inspired by Mughal monuments. In this study, the designs of Red Forts were collected from various sources, including books, literature, and the internet. Computer-aided design software were used in this study to create motifs and different designs of cushion cover, curtains and diwan sets. A panel of thirty members evaluated the designs, selecting the best design for product development. The design of the cushion cover (Design No. CC 2) received the highest score in visual evaluation and was developed into a product through digital printing. The developed product was highly acceptable in all parameters, except economic feasibility. This study will inspire designers to collect motifs from the Red Fort and various other monuments to create home furnishings and apparel, ultimately reflecting the rich heritage of India in their designs.

Keywords: Indian monuments, Red Fort, Home Furnishing, Computer Aided Design (CAD), Digital Printing.

INTRODUCTION

India stands out as one of the most stunning countries globally, renowned for its vibrant culture and rich heritage. The northern region is home to numerous forts, palaces, minarets, mausoleums, and tombs that were constructed during the Mughal era. Many of these remarkable structures were erected under the rule of Rajputana, Dravidian, and Mughal emperors. These monuments serve as enduring testaments to the grandeur of India's rulers and the exceptional craftsmanship of its ancient artisans.

The Mughals significantly influenced the Indian subcontinent through their Indo-Islamic-Persian style of art and architecture. Mughal structures are known for their imposing and ornamented architecture, which reflects the legacy of a glorious Mughal era with unique values, beliefs, interests, and tastes. (Jamil and Gulzar, 2017) Shah Jahan, a Muslim emperor, established Delhi in 1638 and built the famous Red Fort, which has become a UNESCO World Heritage site since 2007. The Red Fort is a symbolic monument that has witnessed numerous rulers and milestones in Indian history.

The fields of architecture and fashion offer a wealth of sources of inspiration. Art, architecture, music, culture, and other elements serve as inspiration for many fashion designers. Designers are inspired by the colors, shapes, tones, and structures. The Red Fort is the epitome of elegance and complexity in terms of its forms, textures, and structure.

Nowadays, a lot of textile and fashion designers take inspiration from historical monuments, develop designs through computer-aided designing software, and the designs developed through this software can be printed directly through digital printing techniques, and it is a new paradigm for the textile business.

Therefore, the study was planned to create different motifs by taking inspiration from the Red Fort, the Mughal historic site, in order to design and produce a variety of home furnishings items. This study aims to incorporate unique features in the structure of the Red Fort for designing and developing various home furnishing items. The beauty of the Red Fort will be showcased through the home furnishing products.

OBJECTIVE

The objectives of the study are as follows:

1. · To use computer aided designing software to create motifs inspired from Red Fort.
2. · To use Red Fort motifs in various home furnishings product.
3. · To develop home furnishing products through digital printing techniques.
4. · To access the acceptability of the prepared products.

METHODOLOGY

The materials and methods that were utilized during the process of designing and developing home furnishings are discussed under the following headings:

Collection of designs of Red Fort and development of motifs of Red Fort through CAD:

Various sources, such as books, literature, and the internet, were used in order to collect the pictures of the Red Fort situated in New Delhi. The pictures of the Red Fort were collected from different views, i.e., front view, side views, top view, etc. A total of fifteen motifs of “Red Fort” were developed through computer-aided design software, i.e., Corel Draw and Adobe Illustrator.

Development of designs for home furnishing using CAD:

The motifs developed through computer-aided design software were used for designing various home furnishing items such as cushion covers, curtains, and diwan sets. Five motifs were used for designing five sets of cushion covers, five curtain designs were made by using five different motifs, and similarly, another five motifs were used to develop five designs of the Diwan set.

Visual evaluation of the developed designs:

The designs of home furnishings, such as Cushion covers, Curtains, and Diwan sets, were evaluated by a panel of thirty members of the University of Allahabad who were specialized in fashion designing. The panel member used a five-point ranking proforma (excellent, very good, good, fair, and poor) to evaluate the designs on the parameters: arrangement of motifs, appropriateness of design for product, color combination, and overall appearance. The highest-scored design from each category (Cushion covers, Curtains, and Diwan sets) was identified and was evaluated again by the panel.

Visual evaluation of the selected designs from various categories and product development:

The selected design from each category (Cushion covers, Curtains, and Diwan sets) was evaluated again by the panel of thirty members of the University of Allahabad Prayagraj on the parameters: arrangement of motifs, appropriateness of the design for a particular product, color combinations, and overall appearance using a five-point ranking proforma as discussed in section 2.3. The home furnishing item that scored the highest rank was selected and was developed into a product through a digital printing technique. Thereafter the acceptability of the developed product was assessed.

Assessment for acceptability of the developed product:

The developed product was evaluated by a panel of thirty members, and its acceptability was assessed on the parameters: suitability of fabric used, neatness and clarity of design, economic feasibility, and overall appearance. The acceptance of the developed product was assessed using the Weighted Mean Score (W.M.S.).

Research design:

The study focused on developing motifs by taking inspiration from the Mughal monument, (i.e., the Red Fort) using CAD and applying the developed motifs to create designs of home furnishing products. The evaluation was done by the panel of thirty members of the University of Allahabad, who were specialized in fashion designing. The data was gathered, coded, and tabulated. The visual evaluation of the developed design was analyzed using the mean score, and the acceptance of the product was assessed using the weighted mean score (W.M.S.). The weighted mean score was calculated by the given formula.

$$W.M.S = \frac{\text{No of respondent (HA)} \times 3 + \text{No of respondent (A)} \times 2 + \text{No of respondent (SWA)} \times 1}{\text{Total no of respondent}}$$

The acceptance level of W.M.S was analyzed within specific ranges (**Gagoi et.al**).

- Highly acceptable (HA) : 2.34-3.00
- Acceptable (A) : 1.67-2.33
- Somewhat acceptable (SWA) : 0.0-1.66

RESULT AND DISCUSSION

Developed motifs of “Red Fort” using CAD: The fifteen motifs of the “Red Fort” were created using computer-aided design software, and are shown in Figure 1 (M1-M15).

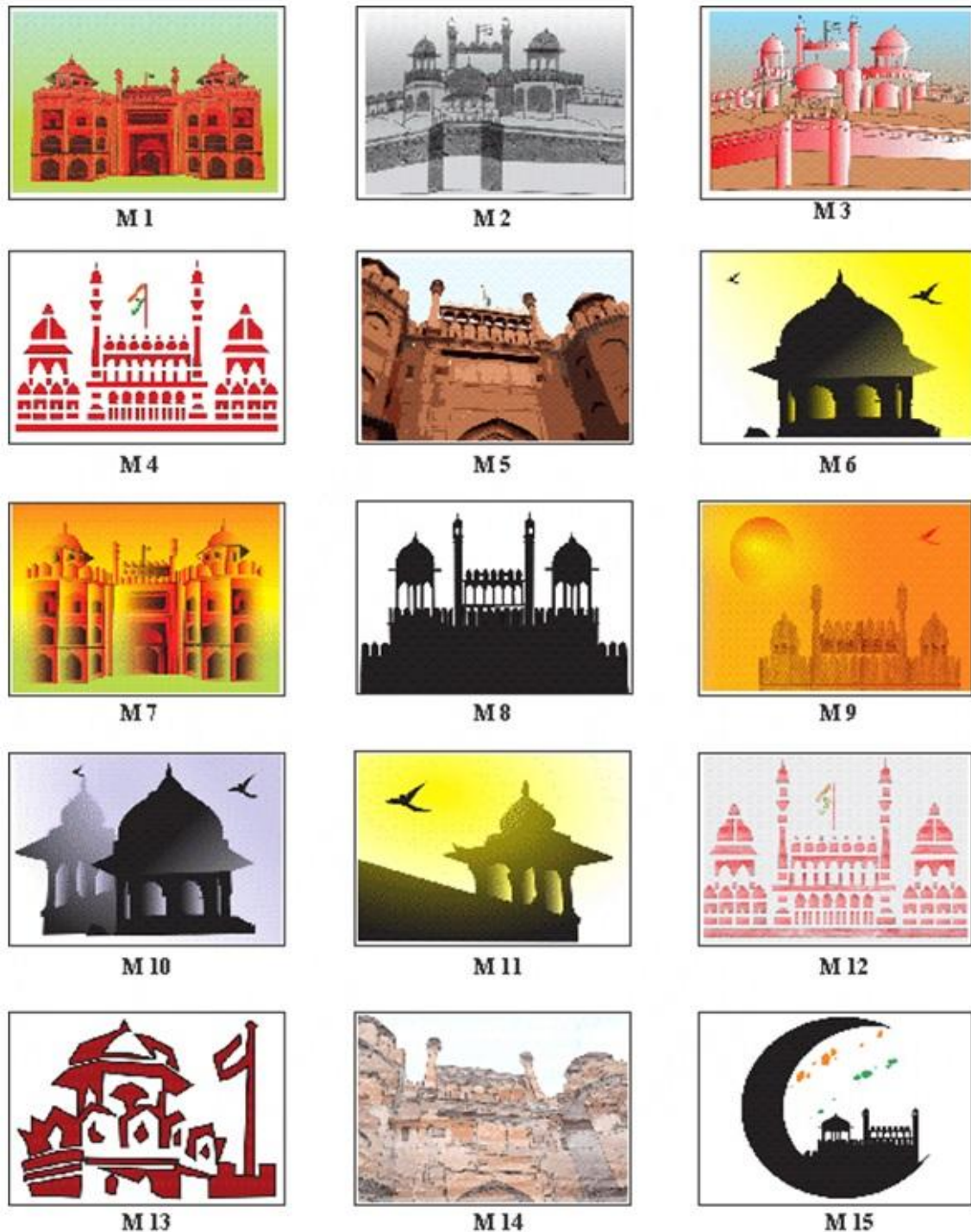


Figure 1 Motifs developed by taking inspiration from Red Fort (M1-M15)

Developed designs for home furnishing items using CAD: A total of fifteen home furnishing designs were created using computer-aided design software, including five for cushion covers, five for curtains, and five for the Diwan set, as shown in Figures 2 to 4.

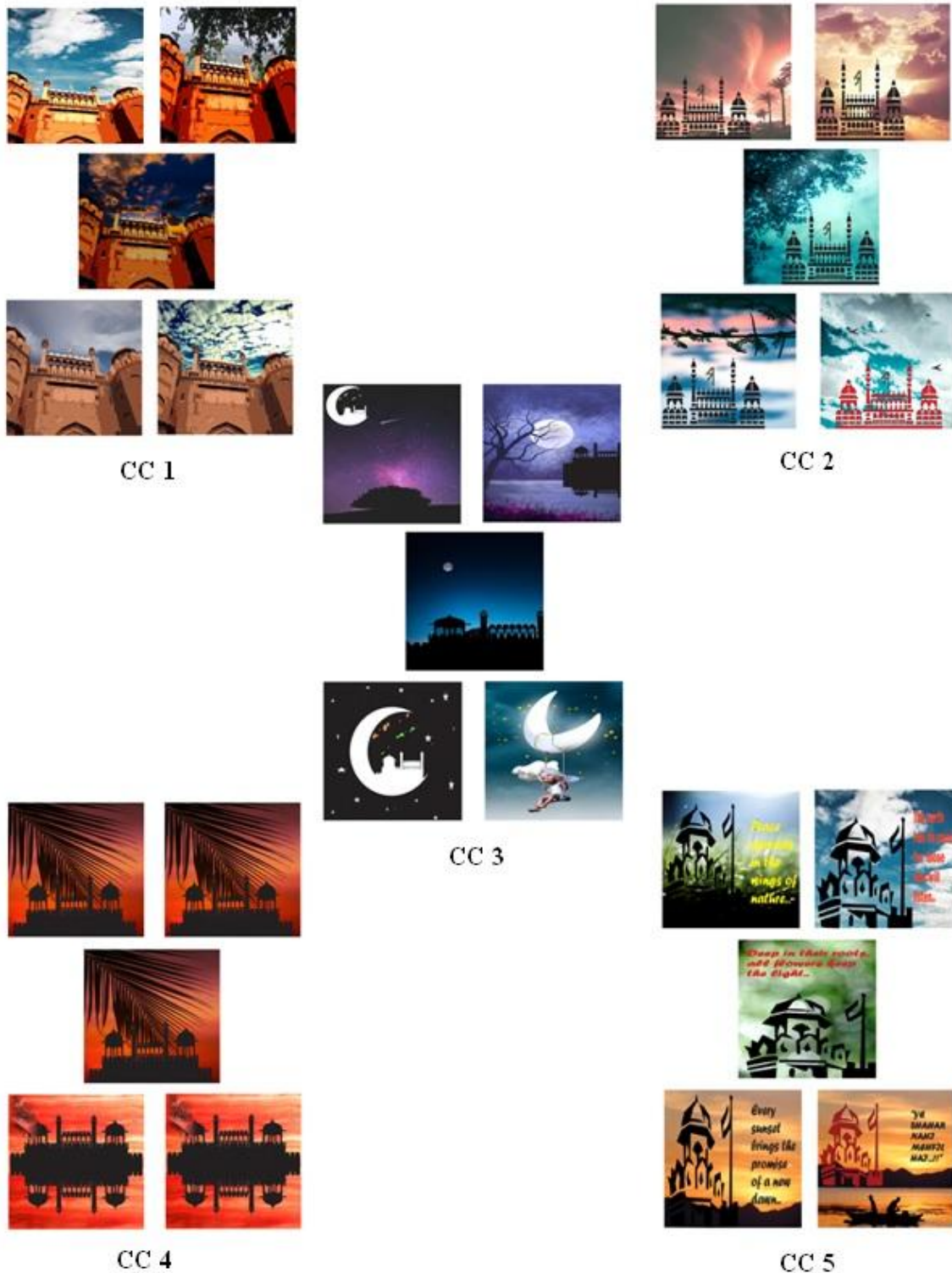


Figure 2 Designs of Cushion Covers



C 1



C 2



C 3



C 4



C 5

Figure 3 Designs of Curtains



Figure 4 Design of Diwan Set

Average scores obtained based on visual evaluation of developed designs: The panel members evaluated all designs for home furnishings, including Cushion covers, Curtains, and Diwan sets, to select the best design from each category. The results are shown in Tables 1 to 3 and are discussed below.

Average scores obtained based on visual evaluation of the design of the cushion cover: In order to determine which of the five created designs of cushion cover was the best, the panel members visually assessed each design. Figure 2 depicts the created designs of the cushion cover, and Table 1 shows the result of the visual evaluation.

Table 1: Average scores of visual evaluations for the designs of the cushion cover

Design Number	Arrangement of motifs	Appropriateness of design for Cushion Cover	Color combination	Overall appearance	Total
CC 1	4.1	3.9	4.1	4.2	16.3
CC 2	4.4	4.4	4.6	4.5	17.9*
CC 3	3.8	3.9	4.0	3.8	15.5
CC 4	4.1	4.2	4.3	4.4	17.0
CC 5	4.1	3.7	3.7	3.7	15.2

*Highest score

Table 1 depicts the average mean scores of the visual evaluation of the five developed designs of the cushion cover. The highest score was achieved by design number CC 2, which received a mean of 17.9. Other designs, CC 4, CC 1, CC 3, and CC 5, received scores of 16.3, 15.5, and 15.2, respectively. Therefore, design CC 2 was chosen for further evaluation.

Average scores obtained based on visual evaluation of the design of curtains: The panel members evaluated five curtain designs in order to decide the best design among the five designs developed for the curtains. Figure 3 shows the developed designs of the curtains, and Table 2 depicts the result of the evaluation.

Table 2: Average scores of visual evaluations for the designs of Curtains

Design Number	Arrangement of motifs	Appropriateness of design for Curtain	Color combination	Overall appearance	Total
C 1	4.0	4.0	4.0	3.9	15.9
C 2	4.1	4.1	4.0	4.1	16.3
C 3	4.0	4.0	4.1	3.9	16.0
C 4	3.5	3.6	3.6	3.5	14.2
C 5	4.1	4.1	4.2	4.2	16.6*

*Highest score

Design number C 5 (Figure 3) scored the highest mean score (16.6), as it is evident from Table 2 that, design number C 2 obtained the second-highest mean score (16.3). The designs C 3, C 1, and C 4

had mean scores of 16.0, 15.9, and 14.2, respectively. Thus, the design with the highest score (C 5) was chosen for further assessment.

Average scores obtained based on visual evaluation of designs of Diwan set: In order to choose the “one” best design of the Diwan set, the panel members visually assessed each design. Figure 4 depicts the designs of the Diwan set, while Table 3 depicts the results of the visual evaluation.

Table 3: Average scores of visual evaluations for the designs of the Diwan set

Design Number	Arrangement of motifs	Appropriateness of design for Diwan Set	Color combination	Overall appearance	Total
D 1	3.6	3.5	3.4	3.4	13.9
D 2	3.8	3.9	4.1	3.9	15.7
D 3	3.5	3.6	3.6	3.5	14.2
D 4	4.0	4.0	3.8	4.1	15.9*
D 5	3.9	3.6	3.8	4.0	15.3

*Highest score

Table 3 shows that design number D 4 (Figure 4) received the highest mean score (15.9) among various designs for the diwan set, followed by design number D 2 (15.7); further designs D 5, D 3, and D 1 scored 15.3, 14.2, and 13.9, respectively; thus, the highest-scored design of the Diwan Set was selected for the further evaluation.

Visual evaluation of the selected designs from various categories for product development: The three selected home furnishing designs (CC 2, C 5, and D 4) were evaluated again by a panel of thirty members to determine the best design for product development. The results of the visual evaluation are presented in Table 4.

Table 4: Average scores of visual evaluations for the selected designs from various categories

Design Number	Arrangement of motifs	Appropriateness of design for particular product	Color combination	Overall appearance	Total
CC 2	4.3	4.5	4.4	4.6	17.8*
C 5	4.0	4.1	4.1	4.0	16.2
D 4	3.7	4.7	3.8	4.5	16.7

*Highest score

Table 4 shows that the cushion cover design (Design no. CC 2) received the highest score (17.8) among the three designs of home furnishings (cushion cover, curtain, and diwan set). The Diwan Set

design (Design no. D4) received the second highest mean score (16.7), and the Curtain design (Design no. C5) received the lowest score (16.3). Therefore, design number CC 2 was selected for product development. A set of cushion covers was developed, including five pieces, and the design was printed digitally through a digital printing technique.



Digital printed cushion cover , Design Number CC 2

Acceptability of the prepared product: The product was evaluated by a panel of thirty members to assess its acceptability, focusing on various parameters. The results of the evaluation are presented in Table 5, which shows the results of the acceptability of the developed products.

Table 5 Acceptability of the developed product

Design No.	Suitability of fabric used	Neatness and clarity of the design	Economic feasibility	Overall appearance
CC 2	2.76	2.86	2.23	2.73

As presented in Table 5, the developed product with design number CC 2 was “highly acceptable,” with a mean score of 2.76 on the parameter “suitability of fabric used.” The WMS comes in the range “highly acceptable,” which means that the panel members extremely liked the fabric used for the development of the cushion cover.

The motifs were printed digitally through a digital printing technique; therefore, the neatness and clarity of the motifs on the cushion cover were assessed. The result of WMS comes in the range of “highly acceptable,” as depicted in Table 5. It means that the motifs were printed very neatly and clearly on the cushion cover.

The judges evaluated the acceptability of the prepared product on the parameter of economic feasibility, and Table 5 shows that the WMS is 2.23, which comes in the range of “acceptable.” Compared to other cushion covers on the market, the cushion cover was slightly expensive. This is

because only one set of cushion covers was created. If it is put into mass production, the cost of the product will significantly decrease.

The overall appearance of the cushion cover was also assessed, and it is depicted in Table 5. The table shows that the WMS of the parameter “overall appearance” is 2.73, which comes in the range of “highly acceptable.”. According to the panel members, the cushion cover was highly liked and appraised by the panel members.

CONCLUSION

The cushion cover with design number CC 2, which features the beautiful Red Fort design transferred through digital printing on home furnishings, was extremely liked by the people. This product is expected to inspire designers to use Red Fort motifs in home furnishings and other textiles using computer-aided design software. It also helps to preserve the rich heritage of the Mughal era and opens doors for other monuments and architecture in textile design.

REFERENCES

- Encyclopedia. (2019). Mughal art and architecture. Encyclopedia.com. [https://www.encyclopedia.com/reference/encyclopedias-almanacs-transcripts-and-maps/mughal-art-and-architecture#:~:text=Mughal%20art%20and%20architecture%2C%20a,empire%20\(1526%E2%80%931857\)](https://www.encyclopedia.com/reference/encyclopedias-almanacs-transcripts-and-maps/mughal-art-and-architecture#:~:text=Mughal%20art%20and%20architecture%2C%20a,empire%20(1526%E2%80%931857))
- Gagoi, N., Chaudhary, S. and Gagoi, M. (2016) Designing and construction of protective clothing for agriculture worker. *International Journal of Engineering and technical research*. 6(3): 59-62
- Jamil and Gulzar (2017). Structural Studies, Repairs and maintenance of heritage architecture XV, WIT Transactions on the built environments press. (171): 97.
- Kiron, I. M. (2021). Application of CAD in Jacquard Designing. Textile Learner one stop solution for textiles. <https://textilelearner.net/cad-in-jacquard-design/>
- Kumar, R. (2020). Monuments of India. A travel website. <https://monumentsofindia.ml/monuments.html>
- Menon, V.; Swetha, R. G. and Bai, S. K. (2016). Studies on influence of Mughal architecture on clothing, *Journal fram Science Special issue*. 29(5): 751-754.
- Przybylek, S. (2022). How are CAD & CAM used in textile? Study.com. <https://study.com/academy/lesson/how-is-cad-cam-used-in-textiles.html>
- Indian Monuments. (2022). Cultural India: Indian Monuments. <https://www.culturalindia.net/monuments/>

FUSION OF FOLK AND FABRIC: INNOVATING BHAGALPURI SILK THROUGH MANJUSHA ART

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ABSTRACT

Traditional Indian crafts embody complex systems of cultural knowledge, symbolic representation, and artisanal practice. These systems offer significant potential for contemporary textile innovation when approached through culturally sensitive design methodologies. This study investigates the integration of *Manjusha art*, an indigenous narrative folk art tradition of Bihar, into the design and production of *Bhagalpuri Tussar silk material and subsequently in sarees*. The research aims to develop innovative textile designs through the systematic translation of selected Manjusha motifs into weaving-compatible structures using graphing and peg-plan techniques. A co-creation framework was employed, involving weavers through the design and sampling process to ensure authenticity and technical feasibility. The outcomes demonstrate that Manjusha art can be effectively adapted at the structural weaving level without compromising its narrative and symbolic essence. The study contributes to craft-based design research by highlighting co-creation as a sustainable strategy for revitalizing traditional handloom practices while enhancing their contemporary market relevance.

Keywords: Manjusha art, Bhagalpuri silk, textile innovation, folk art integration, co-creation, handloom sustainability, Indian crafts

INTRODUCTION

India's traditional crafts and handloom sectors constitute vital cultural and economic systems that sustain regional identities, artisanal livelihoods, and indigenous knowledge transmission. However, these sectors increasingly face challenges arising from industrial competition, market homogenization, and declining generational participation. In response, design-led interventions that balance innovation with cultural continuity have gained scholarly and policy attention (Das, A.2020)

Manjusha art, a lesser-documented folk art tradition from Bihar, is deeply embedded in ritual performance and narrative storytelling associated with the Bishahari cult. Despite its visual richness, the art form remains largely confined to ritual paintings and illustrative formats. Conversely, *Bhagalpuri silk sarees*, woven from Tussar silk, represent one of India's most recognized handloom textiles, valued for their texture, durability, and artisanal quality.

This research explores the integration of Manjusha art into Bhagalpuri silk sarees as a strategy for textile innovation grounded in cultural heritage. The study is guided by a co-creation approach, positioning artisans as active contributors to the design process rather than passive executors. By embedding folk art motifs within the fabric structure, itself, the research moves beyond surface ornamentation toward a deeper form of craft integration.

OBJECTIVES OF THE STUDY

The study was undertaken with the following objectives:

1. To identify and translate selected Manjusha art motifs into weaving-compatible textile designs using graph and peg-plan techniques.
2. To apply these designs to Bhagalpuri Tussar silk through extra-weft weaving methods.
3. To examine the role of co-creation in ensuring cultural authenticity, technical feasibility, and artisan empowerment.

REVIEW OF LITERATURE

Manjusha Art: Cultural Context and Visual Language

Manjusha art originated in the Anga region of Bihar and is traditionally associated with the annual Bishahari festival, which venerates the snake goddess Bishahari. The art is narrative and sequential, employing compartmentalized frames (*manjushas*) to depict mythological episodes, particularly the legend of Bihula and Bala Lakhendra (Singh, 2018). Visually, Manjusha art is characterized by bold outlines, flat chromatic fields, symmetry, and symbolic imagery. Scholars note its cultural significance but also highlight its marginalization in mainstream art and design discourse (Jain, 2014).

Bhagalpuri Silk and Handloom Weaving Traditions

Bhagalpuri silk weaving is an established handloom tradition centered in eastern Bihar, primarily utilizing Tussar silk. The weaving process involves graph-based designs, often executed through jacquard or dobby mechanisms (Mukherjee, 2017). While the tradition demonstrates strong technical resilience, design innovation remains limited, with motifs frequently confined to conventional floral or geometric forms. Scholars argue that sustainable growth in handloom sectors requires diversification through culturally grounded design intervention (Dhamija, 1999; Sethi, 2008).

Folk Art Integration and Co-Creation in Textile Design

Recent studies emphasize the integration of folk art into textile and fashion design as a means of cultural preservation, value addition, and market differentiation (Sinha & Verma, 2019; Vyas & Shah, 2020). Co-creation frameworks, which involve artisans as design collaborators, have been identified as effective strategies for enhancing skill development and craft sustainability (Kumar & Das, 2021). Design research scholars further argue that practice-led and participatory approaches are particularly suited to craft-based contexts (Nimkulrat, 2012).

THEORETICAL FRAMEWORK

This study as planned in an interdisciplinary theoretical framework drawing from **heritage studies**, **co-creation theory**, and **design anthropology**. Together, these perspectives provide a conceptual foundation for understanding the transformation of traditional folk art into contemporary textile practice while maintaining cultural authenticity, artisan agency, and socio-cultural sustainability.

Heritage Studies and Living Craft Traditions

Heritage studies conceptualize traditional crafts not as static relics of the past but as *living, evolving cultural practices* embedded in social relationships, rituals, and local economies (Smith, 2006; UNESCO, 2017). From this perspective, heritage is continuously negotiated through use, reinterpretation, and transmission across generations.

Manjusha art and Bhagalpuri silk weaving are both forms of **cultural heritage**, sustained through embodied knowledge, oral narratives, and practice-based learning. Integrating Manjusha motifs into woven textiles aligns with the notion of *heritage as process* rather than product, allowing the art form to evolve within new material and functional contexts. Rather than treating Manjusha art as a decorative overlay, this study embeds it structurally within the fabric, reinforcing its continuity as a living tradition.

Heritage studies further emphasize the ethical responsibility of researchers and designers to avoid cultural extraction and commodification (Harrison, 2013). By situating design development within artisan communities and respecting symbolic meanings, the present study adopts a culturally responsible approach to heritage-based innovation.

Co-Creation Theory and Participatory Design

Co-creation theory emerges from participatory design and collaborative innovation literature, challenging hierarchical designer–maker relationships and advocating shared authorship between stakeholders (Sanders & Stappers, 2008). In craft contexts, co-creation recognizes artisans as knowledge holders whose experiential expertise is central to sustainable innovation (Kumar & Das, 2021).

Within this framework, artisans are positioned as **co-designers** rather than executors of externally imposed designs. Their tacit knowledge such as loom behavior, yarn response, and weaving constraints shapes the design outcomes at every stage. This approach aligns with social science perspectives on empowerment, agency, and inclusive development.

In the present study, co-creation informed motif selection, graph development, and loom adaptation. Continuous feedback loops between researchers, weavers, and folk artists ensured technical feasibility and cultural appropriateness. The co-creation model thus functions not only as a design strategy but also as a mechanism for capacity building and skill enhancement within the artisan community.

Design Anthropology and Practice-Based Knowledge

Design anthropology bridges ethnographic inquiry with design practice, emphasizing *making as a mode of knowledge production* (Gunn, Otto, & Smith, 2013). This approach values immersive engagement, material experimentation, and reflexivity, particularly in contexts where knowledge is embodied rather than textual.

Craft practices such as handloom weaving operate through tacit, experiential knowledge that cannot be fully captured through conventional research methods alone (Ingold, 2011). Design anthropology legitimizes practice-based experimentation—such as motif graphing, sampling, and loom trials—as valid forms of scholarly inquiry.

In this study, the act of translating Manjusha art into woven structures functions as both a creative and analytical process. The iterative cycles of design, weaving, evaluation, and modification generated insights into the material constraints and cultural possibilities of folk-art integration. This aligns with Nimkulrat's (2012) argument that hands-on craft practice constitutes a form of intellectual engagement essential to design research.

Integrative Framework for Craft Innovation

By combining heritage studies, co-creation theory, and design anthropology, the study adopts a holistic framework that:

- Recognizes traditional crafts as dynamic cultural systems
- Centers artisan agency and collaborative authorship
- Treats making and material experimentation as legitimate research methods

This integrative framework enables a nuanced understanding of how folk-art traditions can be innovated responsibly within contemporary textile production. It also supports the study's broader contribution to craft sustainability discourse by demonstrating how culturally embedded design interventions can strengthen both heritage preservation and economic viability.

RESEARCH METHODOLOGY

The study adopted a **practice-based and qualitative research methodology**, integrating design experimentation with participatory approaches. This methodological framework was selected to address the dual objectives of cultural preservation and textile innovation, particularly within the context of traditional craft practices where tacit knowledge and material engagement are central.

Selection and Analysis of Manjusha Motifs

The selection of Manjusha art motifs was carried out through a **systematic content analysis** of traditional Manjusha paintings, ritual manuscripts, and secondary visual documentation. Emphasis was placed on identifying motifs that hold strong **symbolic, narrative, and cultural relevance** within the Manjusha tradition, particularly those associated with the Bishahari cult and the legend of Bihula–Bala Lakhendra.

Based on frequency of occurrence, symbolic significance, and suitability for textile translation, the following motifs were selected:

- **Snake** – representing protection, divine power, and fertility
- **Bihula** – symbolizing devotion, resilience, and female agency
- **Lotus** – denoting purity, renewal, and spiritual awakening
- **Kalash** – symbol of auspiciousness, abundance, and continuity
- **Bird and Elephant** – representing nature, strength, movement, and harmony

Selected motifs were **hand-traced from original visual sources** to preserve their characteristic linear quality and folk aesthetic. The traced motifs were then **stylized and simplified** to achieve clarity, structural balance, and adaptability for weaving, while retaining their essential symbolic and visual identity.

Development of Graph Motifs for Weaving Translation

The stylized Manjusha motifs were translated into **weaving-compatible graph formats** suitable for execution using the extra-weft technique. This stage involved the conversion of freehand drawings into **grid-based designs**, where each grid unit corresponded to a single warp–weft intersection.

The process included:

- Conversion of motifs into **pixelated grid representations**
- Alignment of motif proportions with loom constraints
- Preparation of **graph motifs** to guide weft insertion
- Development of **multiple design variations** exploring scale, repetition, density, and placement

The graph development process ensured that the motifs could be technically executed on handlooms without compromising the visual essence of Manjusha art. These graphs also functioned as **design communication tools** between designers and weavers.

Sampling and Weaving Process

Pilot textile samples were developed using **traditional handloom weaving techniques** prevalent in the Bhagalpur region. The **extra-weft technique** was employed to incorporate the Manjusha-inspired motifs directly into the fabric structure rather than as surface embellishments.

Key aspects of the sampling process included:

- Use of **raw Bhagalpuri Tussar silk yarn** for warp and weft
- Experimentation with **multiple weft color combinations** to enhance motif visibility and reflect the chromatic character of Manjusha art
- Testing of different **warp–weft densities** to achieve structural stability and visual clarity
- Execution of samples representing **border, body, and pallav placements**

Each sample underwent visual and structural evaluation to assess motif legibility, fabric hand, and aesthetic coherence.

Co-Creation and Artisan Collaboration

A **co-creation approach** formed a core component of the research methodology, emphasizing participatory engagement with local weavers and Manjusha artists in Bhagalpur. This approach recognized artisans as **knowledge holders and co-designers**, contributing technical expertise and cultural insight throughout the process.

The co-creation process involved:

- Conducting **design workshops** to discuss motif symbolism, design intent, and technical feasibility
- Incorporating **artisan feedback** to refine motif complexity, scale, and loom adaptability
- Training weavers to **interpret newly developed extra-weft graphs** and adjust loom settings accordingly
- Facilitating iterative design modifications through continuous dialogue and hands-on experimentation

This collaborative process not only enhanced the quality and authenticity of the final textile samples but also supported **skill development, design literacy, and creative empowerment** among participating artisans.

The methodological approach ensured **cultural sensitivity, technical feasibility, and design innovation**, aligning with established practices in design anthropology and craft-based research. By combining content analysis, practice-led experimentation, and participatory co-creation, the study offers a replicable framework for integrating folk art traditions into contemporary handloom textiles.

FINDINGS AND DISCUSSION

Design Translation and Technical Outcomes

The translation of two-dimensional folk art into woven structures posed challenges related to pixelation, line continuity, and motif density. However, grid-based plotting enabled effective adaptation while preserving narrative identity. The study demonstrates that Manjusha motifs can be structurally embedded within fabric also.

Textile Samples and Aesthetic Evaluation

Following motifs were selected for further study



Snake (symbol of protection)



Lotus



Kalash (auspicious symbol)



Bird



Elephant

Fig. 1 Selected motifs from Manjusha painting

Understanding the symbolic meanings of these motifs is crucial for their responsible adaptation into textile design. When translated into woven structures, these motifs retain their narrative and cultural significance, transforming the textile into a medium of storytelling rather than mere ornamentation.

The motifs employed in Manjusha paintings are not merely decorative elements but symbolic representations that convey moral values, cosmological beliefs, and collective memory. Each motif functions as a visual signifier within the larger narrative structure.

Snake (Nāga): Symbol of Protection and Divine Power

The snake is the most dominant and recurring motif in Manjusha art, owing to the art form's association with the worship of the serpent goddess *Bishahari*. In this context, the snake symbolizes **protection, fertility, regeneration, and divine authority**. Unlike negative connotations often associated with serpents, the snake in Manjusha art represents a guardian force that governs life, death, and rebirth. Its depiction underscores the community's belief in appeasing natural and supernatural forces to ensure well-being and protection from misfortune. The coiled or symmetrical representation of snakes also signifies balance and cosmic order.

Lotus: Purity, Renewal, and Spiritual Awakening

The lotus motif in Manjusha art carries pan-Indian symbolic meanings while being locally contextualized. It represents **purity, spiritual awakening, and renewal**, emerging unstained from

muddy waters. Within Manjusha narratives, the lotus signifies divine presence and auspicious beginnings, often associated with sacred spaces or moments of transformation. Its geometric symmetry complements the structured visual language of Manjusha art, reinforcing ideas of harmony and transcendence.

Kalash: Auspiciousness, Abundance, and Cosmic Order

The *Kalash* (ritual pot) is a powerful symbol of **auspiciousness, fertility, abundance, and continuity of life**. In Manjusha art, it frequently appears in ceremonial or narrative contexts, marking sacred thresholds or divine interventions. The Kalash embodies the concept of *purna* (wholeness), signifying prosperity and spiritual completeness. Its inclusion reflects the ritualistic origins of Manjusha paintings, which were traditionally created as offerings during the Bishahari festival.

Bird: Freedom, Divine Messenger, and Natural Harmony

Bird motifs in Manjusha art symbolize **freedom, transcendence, and communication between the earthly and divine realms**. They often function as narrative connectors, indicating movement, transition, or spiritual ascent. Birds also represent harmony with nature and the cyclical rhythms of life. Their stylized depiction aligns with the folk aesthetic of Manjusha art, emphasizing symbolism over realism.

Elephant: Strength, Stability, and Royal Authority

The elephant motif represents **strength, wisdom, stability, and royal or divine authority**. In Indian visual culture, elephants are often associated with power and protection, as well as with Lord Ganesha, the remover of obstacles. In Manjusha art, the elephant may signify social order, protection of sacred narratives, and auspicious beginnings. Its inclusion underscores themes of endurance and controlled power within the visual storytelling tradition.

Sampling and Weaving

- Pilot samples were woven on handlooms with extra weft technique.
- Raw Bhagalpuri Tussar silk yarn was used.
- Multiple weft and warp combinations were tested for optimal motif visibility.



Snake



Lotus



Kalash



Bird



Elephant

Fig.2 Motifs of painting woven on loom

1. Yarns Used for base fabric

Physical and Structural Characteristics:

- **Type:** Non-mulberry (wild) silk
- **Texture:** Slightly coarse with a natural slub, contributing to a rich tactile quality
- **Lustre:** Moderate, with a natural matte-golden appearance

Yarn Count and Form:

- **Warp yarn:** Typically 20–22 denier or 2-ply reeled Tussar silk for strength and uniformity
- **Weft yarn:** 40–60 denier spun or reeled Tussar silk, allowing flexibility in texture and drape
- **Twist:** 8tpi (medium twist), maintaining softness while providing adequate cohesion

The inherent irregularity of the silk contributed to its handcrafted aesthetic and aligned well with the folk visual language of Manjusha art.

2. Yarns Used for Extra-Weft Motif Development

- **Type:** Dyed Tussar silk
- **Count:** 80 denier
- **Advantages:** Harmonized with the base fabric; preserves uniform silk character
- **Dye class :** Reactive
- **Colours:** Green, yellow, pink

Five motif-based sample was successfully developed, representing border, body, and pallav placements. The use of multicolored extra wefts echoed the chromatic vibrancy of traditional Manjusha paintings while maintaining the tactile qualities of Tussar silk.



Fig. 3. Motifs developed as a unit

Artisan Perspectives and Co-Creation Impact

Two artisans who were involved reported increased design awareness and creative confidence through participation in the project. Challenges included increased weaving time and initial difficulty in interpreting complex graphs. Nevertheless, the collaborative process fostered skill enhancement and design ownership.

Market Relevance and Cultural Value

Preliminary feedback from consumers indicated potential for niche and premium markets. The work was perceived as culturally authentic, artisanal, and differentiated qualities increasingly valued in ethical and heritage-based consumption.

Table 1. Feedback of the consumers

No	Attributes	Responses n=30		
		Agree	Neutral	Do not agree
1	The integration of Manjusha art into Bhagalpuri silk gives the product a distinctive and exclusive identity.	28	02	-
2	The combination of traditional folk art and handloom silk enhances the perceived value of the product.	26	03	01
3	The storytelling and symbolic elements embedded in the design increase the desirability of the product.	28	02	-
4	Consumers who prefer exclusive, artisanal, and heritage-based products would be attracted to these textiles.	30	-	-
When the Manjusha motifs used on sarees				
5	The sarees will appear suitable for niche markets that value cultural heritage and handcrafted textiles.	30	-	-
6	I associate these sarees with craftsmanship, authenticity, and cultural richness.	28	02	-
7	I would consider these sarees appropriate for special occasions or high-end cultural events.	28	02	-
8	The uniqueness of Manjusha motifs will differentiates these sarees from mass-produced silk sarees	30	-	-
9	The sarees have strong potential for positioning in boutique stores, exhibitions, or designer-led retail spaces.	28	-	-

CONCLUSION

The study establishes Manjusha art as a viable and culturally rich design resource for innovating Bhagalpuri silk fabric and subsequently in sarees. By integrating folk art at the structural weaving level and employing a co-creation framework, the research advances both design innovation and craft sustainability. The findings reinforce the importance of participatory, practice-based research in revitalizing traditional crafts while preserving their cultural essence.

RECOMMENDATIONS

- Integration of underrepresented folk-art traditions into handloom textiles through structural design approaches
- Capacity-building initiatives focused on graph reading and design interpretation for weavers
- Expansion of Manjusha-inspired designs into diversified textile and lifestyle products
- Policy-level support for co-creation-based craft development programs

REFERENCES

- Das, A. (2020). *Folk arts of Bihar: A visual journey*. National Folklore Institute.
- Jain, J. (2014). *Indian folk art: A continuing tradition*. Mapin Publishing.
- Kumar, R., & Das, P. (2021). Co-creation as a strategy for craft sustainability: Evidence from Indian handlooms. *Journal of Cultural Economy*, 14(4), 421–438. <https://doi.org/10.1080/17530350.2021.1894567>
- Mukherjee, R. (2017). Sustainable weaving in Bhagalpur: Tradition and challenges. *Textile Review*, 34(3), 45–52.
- Nimkulrat, N. (2012). Hands-on intellect: Integrating craft practice into design research. *International Journal of Design*, 6(3), 1–14.
- Sanders, E. B.-N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5–18. <https://doi.org/10.1080/15710880701875068>
- Sethi, R. (2008). *Crafting identities: The revival of traditional crafts in India*. Craft Revival Trust.
- Singh, A. (2018). *Manjusha art: A cultural heritage of Bihar*. Patna University Press.
- Sinha, M., & Verma, P. (2019). Integrating folk art in contemporary fashion. *Indian Journal of Textile Research*, 44(2), 123–129.
- UNESCO. (2017). *Strengthening creative industries for sustainable development*. UNESCO Publishing.
- Vyas, K., & Shah, D. (2020). Design intervention and innovation in Indian handloom textiles. *Fashion and Textiles*, 7(18), 1–16. <https://doi.org/10.1186/s40691-020-00205-4>

WOVEN TRADITIONS: A STUDY OF TEXTILE PRACTICES AND CRAFTSMANSHIP IN GANGI, TEHRI GARHWAL

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ABSTRACT

Traditional textile craftsmanship in Gangi, Tehri Garhwal, represents a legacy of self-sufficiency, environmental adaptation, and cultural continuity. This paper examines the indigenous techniques of wool processing, weaving, knitting, and *ringal* (bamboo) handicrafts practiced by the Gangi community, emphasizing their functional, social, and symbolic significance. The research adopted a qualitative ethnographic approach, incorporating field observations, interviews with artisans, and documentation of textile production methods. Findings revealed that textile practices in Gangi are deeply intertwined with the region's geography, climate, and socio-economic structure, ensuring both sustainability and resilience. However, modernization, shifts in climatic patterns, and increased access to external markets have led to a gradual decline in traditional weaving and craft-making. While older generations continue to engage in indigenous textile production for household use, younger generations are increasingly drawn towards commercial fabrics and modern clothing, posing challenges to the preservation of these heritage skills. Despite these changes, traditional textiles retain their cultural significance, particularly in ceremonial contexts and festivals. The study underscores the need for targeted interventions, including craft revitalization programs, market linkages, and policy support to sustain Gangi's rich textile traditions. By documenting these artisanal practices, this research highlights the delicate balance between tradition and adaptation, advocating for strategies that ensure their continued relevance in a changing socio-economic landscape.

Keywords: Artisan Livelihoods, Cultural Heritage, Sustainability, Textile Craftsmanship, Traditional Weaving

INTRODUCTION

Traditional Textiles as Cultural Heritage

Textile traditions have long been recognized as integral to cultural identity, reflecting historical continuity, environmental adaptation, and social structures. Across generations, indigenous textile practices have served not only as a means of clothing but also as a representation of craftsmanship, self-sufficiency, and community values. In many remote regions, textile

production remains deeply embedded in daily life, shaping the way people interact with their environment and sustain their livelihoods.

The Himalayan region, in particular, is known for its distinct textile traditions, where communities rely on locally sourced materials to craft garments suited to harsh climatic conditions. Among these, the village of Gangi in Tehri Garhwal, Uttarakhand, stands as a remarkable example of an independent, self-sufficient textile culture, where traditional weaving and handicrafts remain essential to daily life.

Gangi, Tehri Garhwal: A Centre for Indigenous Textile Production

Nestled in the high-altitude landscapes of Tehri Garhwal, Gangi is a remote Himalayan village where traditional textile craftsmanship has been preserved across generations. Due to its geographic isolation, the community has historically relied on locally available raw materials, such as sheep wool and bamboo, to produce garments, household textiles, and essential handicrafts. Unlike many other weaving traditions that cater to trade or commercial markets, Gangi's textile practices are rooted in necessity rather than economic activity.

The primary textile crafts of Gangi include:

- **Wool Processing and Weaving** – Utilizing *Taana* (backstrap loom) for fabric production
- **Handicrafts** – Creation of bamboo-based household items (*Ringal* crafts)
- **Natural Dyeing and Finishing** – Using locally sourced dyes and traditional techniques

These age-old practices are deeply sustainable, relying on natural fibres, minimal waste generation, and eco-friendly production methods. However, with increasing external influences, changing climatic conditions, and the availability of mass-produced clothing, these traditions are gradually fading.

Justification and Need for the Study

While textile heritage has been widely documented in other regions of Uttarakhand, there is limited research focusing on the textile practices of Gangi, which differ from commercially driven weaving hubs.

The significance of this study lies in:

- **Preserving Endangered Knowledge** – Many textile techniques in Gangi are oral traditions passed down through generations, with no formal documentation available.
- **Understanding Sustainable Practices** – The hand-woven textiles and handcrafted bamboo products in Gangi follow environmentally friendly production methods, offering insights into sustainable textile traditions.
- **Assessing Modernization's Impact** – As ready-made garments and synthetic materials become available, the younger generation is gradually moving away from traditional textile production. This study explores how modernization is reshaping textile identity in Gangi.

Given these factors, there is an urgent need to document, analyse, and preserve the textile heritage of Gangi before these practices are lost to modernization and changing lifestyles.

Scope and Significance of the Research

This research contributes to textile conservation, cultural studies, and sustainability discourse by providing:

- **Ethnographic Documentation** – Recording step-by-step textile production processes, including wool processing, weaving, dyeing, and production of handicrafts.
- **Insights into Self-Sufficiency** – Understanding how Gangi’s textile practices have historically ensured economic and environmental sustainability.
- **Perspectives on Modernization** – Evaluating how changing clothing preferences, climate shifts, and external influences are affecting traditional weaving and handicrafts.

OBJECTIVES

In view of the above research was undertaken with following objectives

1. To document the traditional textile production techniques in Gangi, Tehri Garhwal.
2. To study the role of weaving and handicrafts in sustaining self-sufficiency and environmental adaptability.
3. To examine the impact of modernization on traditional textile craftsmanship.

By examining Gangi’s unique textile practices, their historical relevance, and the challenges posed by modernization, this study seeks to bridge the gap in literature and provide a comprehensive record of a fading textile tradition. Practices are the traditional methods and processes of making textiles (spinning, dyeing, etc). Craftsmanship is the skill, knowledge, and artistic ability of artisans in creating textiles.

The study reflects *practices* through documenting production techniques, and *craftsmanship* through examining artisans’ skills, design sense, and adaptation to change.

HYPOTHESIS & RESEARCH QUESTIONS

Hypothesis

Traditional textile production in Gangi, Tehri Garhwal, has historically ensured self-sufficiency and sustainability, but modernization, changing climatic conditions and external influences are gradually leading to a shift in practices. While some elements of weaving and handicrafts continue, the transition toward mass-produced clothing and synthetic materials is affecting the continuity of these traditional crafts.

Null Hypotheses (H₀)

H₀₁: There is no significant relationship between respondents’ age group and their involvement in traditional textile and handicraft practices in Gangi.

H₀₂: Modernization factors (education level, market access, and availability of ready-made garments) have no significant influence on the decline of traditional textile craftsmanship.

Alternative Hypotheses (H₁)

H₁₁: There is a significant relationship between respondents’ age group and their involvement in traditional textile and handicraft practices.

H₁₂: Modernization factors (education level, market access, and availability of ready-made garments) significantly influence the decline of traditional textile craftsmanship.

Research Questions

The study seeks to answer the following key questions:

1. Documenting Traditional Textile Production

- What are the primary textile production techniques practiced in Gangi, including wool processing, weaving, and handicraft-making?
- How do natural resources, such as sheep wool and bamboo, contribute to traditional fabric and craft production?

2. Understanding the Role of Weaving and Handicrafts

- How have textile production and handicrafts supported self-sufficiency in Gangi over generations?
- What is the role of traditional textiles in cultural and functional identity within the community?

3. Examining the Impact of Modernization

- How has the introduction of ready-made clothing and synthetic materials influenced traditional textile practices?
- What factors (climatic change, migration, and economic shifts) are driving changes in weaving and handicraft traditions?
- How can traditional textile knowledge be preserved while adapting to modern needs?

METHODOLOGY

Research Design

This study employed a mixed-method ethnographic research design combining qualitative documentation with basic quantitative analysis to examine traditional textile production in Gangi, Tehri Garhwal. The research focused on wool processing, weaving techniques, and handicraft-making, analysing their cultural significance, sustainability, and changing practices.

- **Ethnographic fieldwork** was conducted to gain in-depth insights into textile craftsmanship, material sourcing, and production methods.
- **Oral histories and participant observations** were used to capture intergenerational knowledge transfer and craft adaptation.
- **Quantitative component** was introduced to examine the relationship between demographic factors (especially age group) and participation in weaving practices using a Chi-square test of association.

Locale of the Study

The study was conducted in Gangi village and its seasonal settlement, Reeh, in Tehri Garhwal, Uttarakhand.

- **Gangi**, a remote Himalayan village, is known for its traditional weaving and self-sufficient craft production.
- **Reeh**, located 10 km downhill, serves as a winter refuge for villagers due to extreme cold in Gangi. The migration pattern provided an opportunity to study seasonal variations in textile use and production.

Sampling and Data Collection

Sampling Technique

- Purposive sampling was employed to select artisans, weavers, and elderly villagers with extensive knowledge of traditional textiles.
- A cross-generational sample ensured insights from elders (custodians of tradition), middle-aged artisans (active weavers and craft makers), and younger villagers (adopting modern influences).

Sample Size

A total of 45 participants were selected, divided into three age groups:

- 15–30 years (young adults exposed to modern influences)
- 31–45 years (middle-aged individuals balancing tradition and change)
- 46+ years (elders preserving weaving and handicraft traditions)

Data Collection Methods

- Semi-structured interviews with artisans and villagers to understand textile-making processes and their cultural relevance.
- Focus group discussions with weavers, women's groups, and elderly custodians of textile traditions.
- Participant observation to document wool processing, spinning, weaving, dyeing, and handicraft-making techniques.
- Photographic and video documentation of textile production processes, tools, and finished products.
- Structured recording of respondent involvement in weaving (engaged vs. not engaged), used for statistical analysis

Data Analysis

The study adopted both **qualitative and quantitative analysis techniques**.

Qualitative Analysis

- **Thematic analysis** identified key themes related to traditional textile practices, sustainability, modernization, and cultural continuity
- **Comparative analysis** between historical narratives, oral testimonies, and present practices assessed the trajectory of change

Quantitative Analysis

- A Chi-square test of independence was applied to examine the association between age group and involvement in traditional weaving practices
- Respondents were grouped into age categories and classified as engaged or not engaged in weaving
- The statistical test supported interpretation of generational participation trends and helped verify research hypotheses regarding the impact of demographic and modernization factors on traditional craftsmanship

FINDINGS AND DISCUSSION

This section presents the findings based on primary data collected from artisans, weavers, and villagers in Gangi, Tehri Garhwal. It explores the traditional textile production techniques, the cultural and functional role of weaving and handicrafts, and the impact of modernization on these practices.

Traditional Textile Production in Gangi

The textile production process in Gangi is deeply rooted in self-sufficiency and sustainability. The entire production chain, from wool processing to fabric weaving and finishing, relies on locally available materials and traditional techniques that have been passed down through generations. Unlike commercial textile centres, Gangi's textile practices prioritize local consumption rather than large-scale trade. This ensures that the village remains largely self-reliant, with a minimal ecological footprint.

Sorting and Scouring

The production process begins with the careful **sorting** of wool based on its natural colours—black, white, and brown—each used for distinct textile products such as *Lawa*, *Pankhi*, and *Angda*. In contrast to mechanized textile industries where grading is a standardized process, grading in Gangi remains an informal practice, influenced by the specific needs of each household.

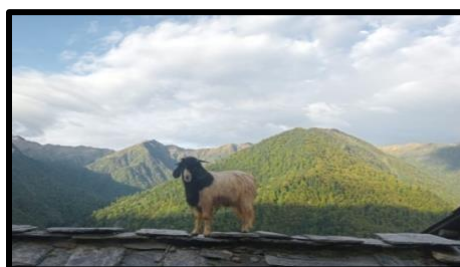


Fig.-1: Rambouillet Sheep

Source: *Researcher*

Once sheared, the wool undergoes an essential cleaning process known as **scouring**, which removes dirt, grease, and impurities. The raw wool is soaked for approximately one day in large

metal vessels known as *Bhagona* or *Pateli*, after which it is washed in wooden containers *Dhokar* (Fig.-2). The wool is then beaten with wooden bats (*Danda*) for 1-2 hours to loosen impurities.



Fig.-2: Dhokar (Wooden Container)

Source: *Researcher*



Fig.-3: Washing Of Wool In Dhokar

Source: *Researcher*

Following this, the wool is dried outdoors for 2-3 days. It is spread over *chadri* (cotton sheets), clean walls, wooden sticks, or bundles of dried grass to ensure thorough drying. This process relies entirely on natural methods, maintaining the wool's integrity without chemical treatments.

Carding and Spinning

Once dried, the wool undergoes carding to align the fibres and remove any remaining tangles. This is done using traditional wooden combs, known as *Kanghi*, which help prepare the wool for spinning. After carding, the fibers are loosely twisted and wrapped onto a wooden rod called *Dandi* to prevent entanglement. The final spinning process is carried out using a *Taakla* (Fig.-5), a wooden tool specially designed for hand-spinning wool. With skilled precision, the wool is gradually transformed into thin strands of yarn, which are then wound into skeins or balls, ready for weaving or knitting.



Fig.-4: Winding Of Wool On Taakla

Source: *Researcher*



Fig.-5: Taakla (A Special Wooden Tool)

Source: *Researcher*

Weaving Techniques and Fabric Production

Weaving in Gangi is performed using the *Taana*, a traditional back-strap loom that has been in use for centuries. This simple yet efficient tool consists of a set of wooden bars and a *Patel* (backstrap), which is wrapped around the weaver's back, with the other end attached to a fixed structure such as a tree or a house hook. This technique allows the weaver to control warp tension using body movements, enabling fine-tuned adjustments throughout the weaving process.

Weaving Process:

- a) **Setup and Warp Preparation:** The warp threads are stretched between a fixed object and the

weaver's back strap, while the weft threads are inserted manually.

- b) **Shed Formation:** Wooden heddles are used to lift and lower the warp threads, creating space for the weft thread to pass through.
- c) **Insertion of Weft and Beating:** A wooden shuttle, wrapped with wool yarn, is passed through the shed. The weft is then beaten down using the weaver's fingers, ensuring a tight weave.
- d) **Pattern Formation:** Fabrics are primarily solid-coloured (black, white, or red). However, chequered patterns in black and white are sometimes woven for special occasions such as festivals and weddings.

The body movement of the weaver plays a crucial role in the weaving process, as shifting forward or backward adjusts the warp's tension, while hip and leg movements help open and close the shed.



Fig.-6: One End Of Taana Attached To The Metallic Loops Of The House

Source: *Researcher*



Fig.-7: Other End Of Taana Attached With The Belt Around The Weaver

Source: *Researcher*



Fig.-8: Weaving Done On Taana

Source: *Researcher*

Finishing

This is the final stage in fabric production. Once the fabric is woven, it is washed in clean water under a communal tap to remove any residual dirt from the weaving process. No detergents or soaps are used, ensuring the preservation of the wool's natural properties. The fabric is then dried under the sunlight before being cut and stitched into garments of various sizes. Dyeing is a secondary process, mainly reserved for *Pathed*, which is traditionally dyed red using dyes, which are presently procured from nearby markets. The dyed fabric is immersed in boiling water for two to three hours to ensure thorough colour absorption before being left to dry. However, due to the low wash-fastness of the dyes used, the vibrancy of the colours tends to fade over time.

Textiles and their Traditional Garment Usage

Fabric production in Gangi follows a distinct pattern, with specific textiles designated for different garments. *Angda*, a black woollen full-sleeve shirt, is traditionally woven for women and girls, while *Lawa* and *Pankhi*, lower garments, are made in either black or white. *Pathed*, a rectangular woollen shawl, is worn by men, women, and children alike. The *Dhigula*, an off-white loose coat, is commonly worn over a tunic, while *Hizar* or *Selta*, are woollen trousers, that are crafted for men.

Role of Weaving and Handicrafts in Self-Sufficiency and Sustainability

Traditional weaving and handicrafts play a crucial role in fostering self-sufficiency and environmental sustainability in rural communities. These practices not only preserve cultural heritage but also provide economic independence, minimize ecological footprints, and promote sustainable livelihoods. In Gangi, a village known for its rich textile traditions, weaving and handicraft production have long served as pillars of local resilience. These practices contribute to sustainability through resource-efficient production methods, self-reliance, and adaptation to environmental conditions.

Handicrafts and Sustainable Craftsmanship

Beyond weaving, Gangi is renowned for its handcrafted products made from *Ringal* bamboo, an indigenous material that reflects the community's deep connection with nature. The production of these handicrafts involves minimal environmental degradation and utilizes locally available raw materials. Artisans harvest bamboo sustainably from nearby forests, ensuring regeneration by selecting mature stalks while leaving younger ones to grow. The crafting process involves stripping the bamboo, removing the leaves, and carefully splitting the sticks into thinner strips. These strips are then beaten to ensure uniformity before being woven into various functional household items.



Fig.-9: Swelta (Basket)



Fig.-10: Muraithu (Floor-Spread)

Source: *Researcher*

The craftsmanship in bamboo weaving is highly specialized, requiring skill and precision. The most commonly produced items include *Swelta* (Fig.-9), a loosely woven basket used for carrying cow dung and leaves; *Ghildi* (Fig.-11), a closely woven grain storage basket; and *Muraithu* (Fig.-10), a mat used as a floor spread or bed lining. Smaller baskets such as *Tokri* (Fig.-12), used for storing chapatis, and *Nela*, a feeding basket for lambs, are also crafted with great attention to detail.



Fig.-11: Ghildi (Closely Woven Basket)



Fig.-12: Tokri

Source: *Researcher*

However, the production of bamboo crafts has seen a decline in recent years. The widespread availability of plastic alternatives and reduced interest among younger generations have contributed to a gradual erosion of this craft. Without strategic interventions, this invaluable aspect of Gangi's material culture risks being lost.

Sustainability and the Future of Traditional Weaving in Gangi

Weaving in Gangi represents a highly **sustainable model of textile production**, characterized by:

- Minimal waste generation – Every part of the wool is used, with excess fibers repurposed for household applications.
- Low environmental impact – The reliance on hand-processing techniques and natural fibers ensures that the textile industry remains largely eco-friendly.
- Self-reliance – Weaving remains a household-based activity rather than a commercialized industry, fostering autonomy and reducing dependence on external markets.

Despite these sustainable attributes, traditional weaving faces several **challenges**:

- Declining Interest Among Younger Generations – The exposure to modern fashion trends and the labour-intensive nature of handweaving have led to reduced participation from younger community members.
- Market Limitations – Since textiles are primarily produced for self-use, the lack of broader market access limits economic opportunities for artisans.
- Limited Innovation – Traditional designs are preserved, but adaptation to contemporary consumer preferences remains slow.

Addressing these challenges requires a multi-faceted approach that balances cultural preservation with economic viability. **Potential strategies** include:

- Skill Development Programs – Engaging younger generations through training initiatives that make traditional weaving more accessible and appealing.
- Market Linkages – Establishing connections with sustainable fashion brands and heritage textile initiatives to create demand for handcrafted textiles.
- Policy Support – Encouraging government and non-governmental organizations (NGOs) to invest in infrastructure, financial incentives, and market accessibility programs that facilitate artisan sustainability.

The role of weaving and handicrafts in self-sufficiency and sustainability extends beyond mere economic activity; it represents a way of life that integrates ecological responsibility, cultural heritage, and community resilience. By implementing targeted interventions that foster skill development, expand market access, and ensure policy support, the traditional crafts of Gangi can be revitalized.

5.3 Age-wise Participation in Weaving

Survey data from 45 respondents reveals generational differences in weaving involvement.

Table: Age-wise Distribution of Respondents and Involvement in Weaving

Age Group	Total Respondents (n)	Percentage(%)	Engaged in Weaving	Not Engaged in Weaving
15–30 years	8	17.8%	3	5
31–45 years	25	55.6%	20	5
46+ years	12	26.6%	10	2
Total	45	100%	31	14

The table indicates that middle-aged respondents (31–45 years) show the highest engagement in weaving (20 individuals), followed by the elderly group (46+ years) with 10 active weavers. The youngest group (15–30 years) has the lowest participation (3 individuals), highlighting a generational decline in skill transmission.

A chi-square test of association was applied to examine the relationship between age group and involvement in weaving. The observed distribution shows clear variation across age groups, indicating that age is an important factor influencing participation in traditional textile practices.

Hypothesis Verification:

- **H₀₁:** No significant relationship between age and involvement → **Rejected**
- **H₁₁:** Significant relationship between age and involvement → **Accepted**

This confirms that younger individuals are less engaged, while middle-aged and older residents remain key bearers of weaving traditions.

5.4. The Impact of Modernization on Textile and Handicraft Traditions

Despite the resilience of traditional textile-making, modernization has introduced significant changes in clothing preferences and production methods. The younger generation in Gangi increasingly prefers modern attire such as tracksuits, jackets, and factory-made woollen garments, particularly for daily wear. Traditional clothing is now mostly reserved for festivals and special occasions like *Jatrada* and *Bhairon ka Kauthik*.

One of the primary reasons for this shift is the bulky and restrictive nature of traditional garments, which makes them impractical for daily agricultural work. Additionally, climatic changes have played a role in altering clothing choices, as Gangi has experienced an increase in warmer summers, reducing the need for thick woollens.

With the decline in demand for hand-woven textiles, fewer villagers are actively engaged in the craft. Many younger residents do not learn weaving skills, and traditional knitting practices have seen a reduction due to the availability of cheaper, mass-produced alternatives. Similarly, the use of bamboo handicrafts has decreased, as plastic and metal containers have replaced handcrafted baskets and mats.

Therefore, Hypothesis

- **H₀₂**: Modernization has no significant influence → **Rejected**
- **H₁₂**: Modernization significantly influences decline → **Accepted**

While these changes reflect broader socio-economic transformations, they also pose a risk to Gangi's rich textile heritage. However, there remains potential for revival through sustainable textile initiatives, heritage tourism, and government-supported craft preservation programs. Encouraging local artisans to collaborate with designers, promoting handcrafted products in ethical fashion markets, and implementing skill development programs could help sustain these time-honoured traditions while adapting them to contemporary needs.

CONCLUSION

This study documented the traditional textile practices of Gangi and showed that the production process is rooted in indigenous knowledge, local materials, and sustainable, household-based techniques. Weaving and handicrafts continue to support self-sufficiency and environmental adaptability through the use of renewable resources and low-impact methods. However, modernization, changing lifestyles, and reduced youth participation are weakening the continuity of these traditions. Sustained efforts in preservation and adaptation are therefore essential to ensure the survival of Gangi's textile heritage.

IMPLICATIONS

This study highlights the significance of preserving traditional textile production in Gangi while adapting it to contemporary needs. Revitalizing indigenous weaving requires community-led skill development programs, economic incentives, and collaborations with designers to expand market reach. Sustainable production can be promoted through ethical fashion, heritage-based tourism, and digital storytelling. Policy support, such as geographical indication (GI) status and fair wage initiatives, is essential for artisan empowerment.

Suggestions for Future Research

While this study provides insights into textile production in Gangi, further research is needed on:

- **Intergenerational Knowledge Transfer** – Examining how weaving skills are passed down and the challenges in maintaining continuity.
- **Sustainability in Textile Production** – Assessing the environmental impact of traditional vs. modern methods and exploring eco-friendly alternatives.
- **Comparative Regional Studies** – Investigating textile traditions in other Himalayan villages to understand regional variations.

Addressing these areas can deepen understanding of traditional craftsmanship, sustainability, and economic opportunities, contributing to broader discussions on heritage conservation and rural development.

REFERENCES

- Basu, A., Parmar, M. S., Pandey, A. K., & Chauhan, S. (2019). Value Added Products from Natural Fibres of Indian Himalayan Region.
- Bhat, D, Joshi, G.C., & Tiwari, L.M. (2009). Culture, Habitat and Ethno-Medicinal practices by Bhotia Tribe people of Dharchula Region of Pithoragarh District in Kumaun Himalaya, Uttarakhand.
- Chandra Bhatt, H., & Pant, J. (2018). A Conceptual Model for Sustainable Development of Woollen Handicraft in Almora District of Uttarakhand. 6, 147–154.
- Chattopadhyay, K. (1976). The Glory of Indian Handicrafts. Indian book.
- Chinnaswamy Balaji, N., & Mani, M. (2014). sustainability in traditional handlooms (Vol. 13, Issue 2).
- Harbola, R. (2016). study of traditional costumes of mohair and rung communities of bhotia tribe in Uttarakhand: a changing perspective (unpublished Master's Dissertation), Department of Fabric and Apparel Science, Lady Irwin College
- Joshi, S. C. (2015). Tribal Art and Craft of Uttarakhand.
- Negi, G. (2015). State at a glance: *Uttarakhand*. G.B. Pant Institute of Himalayan environment & Development, 1(5)(2455-8133)
- Sati, dr. vishwambhar P. (2023). Uttarakhand: Society, culture and pilgrimages. Today & Tomorrow's Printers and Publishers.
- Tewari, k. (2023). Aipan: intangible cultural heritage of Uttarakhand . blue rose publishers .

A STUDY ON AWARENESS OF GOVERNMENT SCHEMES AMONG WOMEN ENTREPRENEURS ENGAGED IN MICRO ENTERPRISES OF MEERUT CITY

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ABSTRACT

The entrepreneurial spirit of the nation drives its progress and makes a major contribution to its overall development. The Indian government has recognized the need to uplift and empower women entrepreneurs and launched several schemes and programs to encourage more women to start their businesses that will not only help them financially but also promote their contribution to becoming partners in the nation's progress. If the benefits provided by these schemes are availed adequately, it will result in good transformation and have a greater impact on the businesses owned and operated by these women. This paper aimed to assess the awareness of the various development schemes and programs and its association with socio-demographic data and entrepreneurial profiles among women entrepreneurs of Meerut city that have been implemented by the government to support them. For the current investigation, the research was mainly based on primary data wherein the information was obtained from primary sources, such as women entrepreneurs, and secondary sources that were gathered from previously published articles, papers, journals, etc. The 100 registered female entrepreneurs were chosen as a sample using the convenience sampling method of non-probability sampling techniques. The self-structured questionnaire was utilized as a data collection tool, and the descriptive survey method was the research design employed in this study. The study concluded that the majority of the women entrepreneurs are not aware of the schemes and programs that are easily accessible to them; as a result, they cannot get profit from these schemes. The findings of the study recommended raising more awareness among women and motivating them to start small enterprises.

Key Words: awareness extent, government schemes, micro-enterprises, women entrepreneurs

INTRODUCTION

When women's status and standard of living are on a level with men's, a nation is considered to have undergone revolution. Jawaharlal Nehru, the first Prime Minister of India, famously remarked, "When a woman moves forward, the family moves, the village moves, and the nation moves." Keeping this in mind, women are therefore seen as the focal point of nation-building. In the marketplace and in society, women are consistently undervalued. Even if they have the capacity to confront and resolve the situation, they are prevented from obtaining quality healthcare, education, training, and employment possibilities. Although the number of women operating their

businesses is rising, their potential for entrepreneurship and socioeconomic achievements is still mostly unrealized. They are mostly engaged in micro-sized, informal, low-return, poor-productivity enterprises. Providing gender-responsive laws, services, and business settings is essential to encouraging women's companies to start and grow. This will assist in achieving gender equality, reducing poverty, and ensuring healthier economies and societies. It is unclear if women in microenterprises and small companies, especially in developing nations, are aware of and taking advantage of the government assistance programs that are accessible to them. Women entrepreneurs are those who own, start, and manage businesses that empower women and improve their economic standing and standing in society. Due to a variety of economic constraints, women are now more likely than ever to pursue entrepreneurship and have come to the realization that working alongside males is the only way for them to survive and reach their full potential (Sangolagi & Alagawadi, 2016). In India, the business environment is evolving constantly due to the advancement of technology, modernization, industrialization, urbanization, the expansion of education, and government-initiated development programs. Under such circumstances, women's employment opportunities have risen significantly.

To support and encourage the growth of female entrepreneurs, the government has launched several policies, financing schemes, and entrepreneurship development programs. A few government initiatives for female entrepreneurs include the following:

- Pradhan Mantri MUDRA Yojana
- Uttar Pradesh Skill Development Mission
- Trade Related Entrepreneurship Assistance and Development Scheme (TREAD)
- Annapurna Scheme
- Mahila Udyam Nidhi (MUN) Yojana offered by SIDBI
- Stree Shakti Package, by State Bank of India
- Dena Shakti Scheme launched by Dena Bank
- Support to Training and Employment Program (STEP)
- Mahila-E-Haat” An online marketing platform
- ‘Nirbhaya Ek Pahal’ by Uttar Pradesh government
- ‘Synd Mahila Shakti Scheme’ by Canara Bank
- Women Entrepreneurship platform (WEP) 3.0 web platform
- District Industries Centre’(DIC) , by central government
- Credit Guarantee Fund Trust for Micro and Small Enterprises
- Nehru Rojgar Yojana
- Stand-up India’ Scheme

The Micro, Small, and Medium Enterprises Development (MSMED) Act of 2006 primarily divides companies into two sectors: manufacturing and services. Businesses that produce items are known as manufacturing companies. Service businesses are defined in terms of equipment investment and service providers. According to the 2025 revision, a microenterprise is a legally registered business with an investment in plant and machinery or equipment of no more than 2.5 crore and an annual turnover of no more than 10 crore. The government has effectively promoted entrepreneurship through various schemes, but women entrepreneurs often lack awareness and educational support regarding these initiatives. Awareness of the benefits is crucial for beneficiaries to take advantage of these programs. Unexpectedly, there is little discussion of this facet of Indian women entrepreneurs in the literature. This paper aims to determine the awareness

among Indian women entrepreneurs of government programs and schemes for their upliftment. It also offers suggestions for ways to increase awareness among women entrepreneurs.

REVIEW OF LITERATURE

Patni (2022) examined the awareness of government schemes among female entrepreneurs in selected wards (A-E) of South Mumbai. Utilizing an interview schedule method, data was collected from 300 respondents through the random sampling method. The study concluded that none of the female entrepreneurs were aware of government programs, indicating a significant issue. Arulmoorthy and Uma (2019) examined the awareness of the central government's entrepreneurship programs among women entrepreneurs using structured questionnaires filled out by 100 respondents. The survey employed simple percentage analysis to assess entrepreneurs' perceptions of the government plan. The results revealed that loans are generally viewed as a source of security for emerging enterprises. Sahoo et al. (2019) conducted a study titled "Women Entrepreneurs and Their Awareness Level towards Various Government Schemes." The data has been collected from 100 women business owners in the Khurda district of Odisha. Four distinct government programs for women were included in the study. A three-point Likert scale and chi-square test were used to interpret the data. The study's findings suggested that women should participate in more awareness campaigns and be encouraged to start small companies. Ashok et al. (2018) investigated women's awareness and access to government schemes for promoting entrepreneurship. The results revealed a mean score of 84.79, with an average of 3.26. Respondents scoring above 3.26 demonstrated full awareness and access to these schemes, whereas those below this score showed less awareness and access. Shiralashetti (2013) conducted a study on 1250 women entrepreneurs in North Karnataka. Statistical tools such as percentage analysis, scaling procedure, and chi-square were used to interpret and analyze the data. The study recommended that women entrepreneurs should be encouraged to obtain self-income and made more aware of the advantages of government programs.

OBJECTIVES OF THE STUDY

- To assess the socio-demographic data of the women entrepreneurs of Meerut city.
- To assess the entrepreneurial profile of the women entrepreneurs of Meerut city.
- To find out the association between the socio-demographic data, entrepreneurial profile and the awareness of government schemes of women entrepreneurs.

HYPOTHESIS

H₁: There is significant association between the socio-demographic data, entrepreneurial profile and the awareness of government schemes of women entrepreneurs.

H₀: There is no significant association between the socio-demographic data, entrepreneurial profile and the awareness of government schemes of women entrepreneurs.

RESEARCH METHODOLOGY

Locale: Meerut city of Uttar Pradesh, India.

Research Design: The research design used in this study was the descriptive survey method.

Sample size and sampling technique: The convenience sampling technique of the non-probability sampling was used to select a sample of 100 registered female entrepreneurs in Meerut city.

Data collection tool: Both primary and secondary sources of data were used in the present study. The self-structured questionnaire with closed-ended questions and statements has been utilized to collect primary data. Secondary data for the study have been gathered from different journals, magazines, official websites, and relevant research and review articles.

Data interpretation and analysis: Data have been analyzed using frequency and percentage analysis. A chi-square test was employed to find out the association between the socio-demographic data, entrepreneurial factors, and the awareness of government schemes.

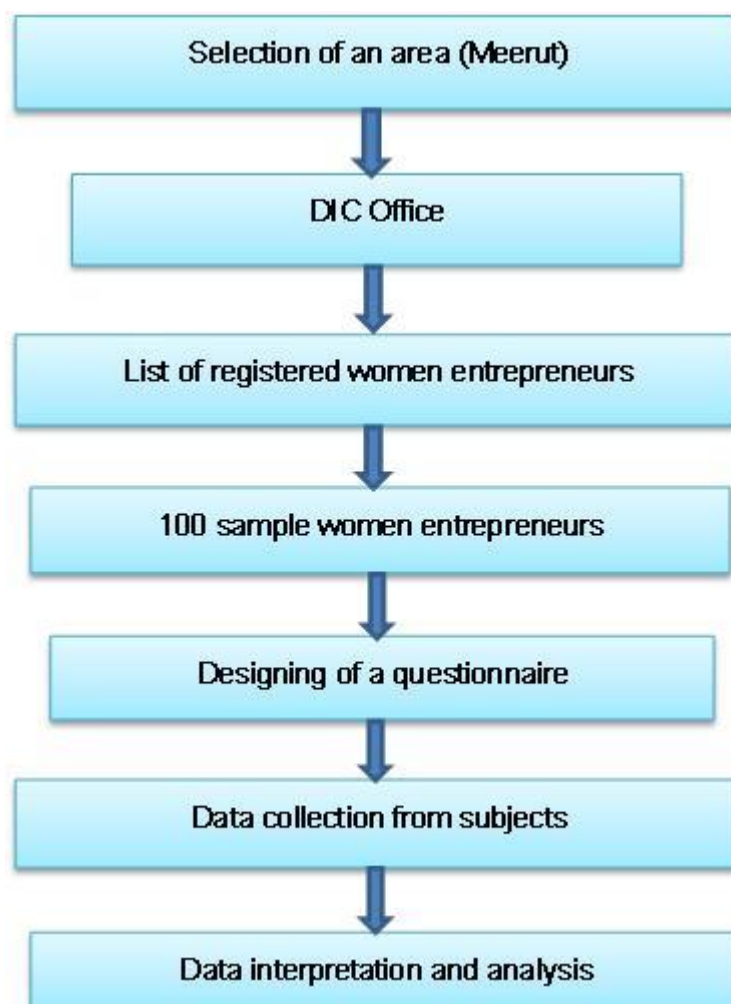


Fig.-1: Flow chart of the conducted study

RESULTS AND DISCUSSION

Table1: Distribution of sample women entrepreneurs on the basis of socio-demographic data and entrepreneurial profile.

Variables	Category	Frequency (n=100)
Age (years)	20-30	7
	31-40	67
	41-50	17
	51-60	9
Educational qualification	Illiterate	1
	Upper Primary	4
	High school	7
	Intermediate	17
	Graduation	39
	Post-graduation	32
Marital status	Married	89
	Unmarried	7
	Widow	4
Religion	Hindu	84
	Muslim	10
	Sikh	5
	Christian	1
Category	General	54
	OBC	38
	SC	8
Monthly Income (Rs.)	below 10000	11
	10001-20000	29
	20001-30000	19
	30001-40000	6
	40001-50000	9
	Above 50000	26
Type of family	Joint	71
	Nuclear	29
Type of ownership	Sole proprietorship	98
	Partnership	2
Nature of enterprises	Manufacturing Units	26
	Service Units	74
Source of investment in business	Investment of own savings	66
	Taken loan from banks	24
	Borrowed from friends and relatives	6
	Government loan schemes	4
Years of business experience	0-5	34

	6-10	38
	11-15	19
	16-20	6
	21-25	1
	26-30	2
Working Hours per day	less than 5 hours	4
	5-8 hours	38
	8-10 hours	58
Types of industries	Bakeries	3
	Beauty/spa/cosmetic center	41
	Educational coaching center	4
	General store	9
	Readymade garment shop	10
	Sports shops	3
	Tailoring/boutique	23
	Any other	7

Source: field survey computed data

Table 1 reveals that 67% of respondents were aged 31-40 years, and 7% of respondents were between 20 and 30 years old, indicating a higher proportion of early adulthood respondents compared to younger or elderly respondents. More than 30% of the respondents were of graduate and postgraduate level, and only one percent has been found to be illiterate. Although the respondents were found to be well educated, still they were not aware of the entrepreneurship-related government schemes. The majority of the respondents, 89%, were married, with 7% unmarried and 4% of the respondents being sadly widowed. The majority of respondents, 84%, were Hindu, and only 1% was Christian. The majority of the respondents (54%) were General Caste, followed by Other Backward Class (38%), and only 8% belonged to the SC category.

The survey revealed that the majority of the respondents (29%) had a monthly income in the range of Rs. 10000-20000, followed by 26% who had an income above Rs. 50000, and the rest had a monthly income below Rs. 10000 and in the range of Rs. 20000-50000. The majority of the respondents (71%) belong to joint families, and the rest of them (29%) live in nuclear families, indicating that those who live in joint families get support from family while balancing their personal and professional lives. The study revealed that 98% of the enterprises owned by the respondents belong to sole proprietorships; only 2% of the enterprises were being run under partnership. The results revealed that 74% of the enterprises were service units, and the rest of the 26% belonged to manufacturing units, indicating the ability to run service units with more ease, as stated by the respondents. It has been found that 66% of the respondents used their own savings to invest in business, 24% have taken loans from banks, 6% borrowed money from their friends and relatives, and only 4% have availed themselves of the benefit of government loan schemes for investment. The majority of the respondents (38%) had 6-10 years of experience, and only three had more than 20 years of experience. A higher number (58%) of the respondents committed 8-10 hours, 38% devoted 5-8 hours, and 4% of the respondents devoted less than 5 hours (operating coaching institutions) every day to their business activities. Beauty, spa, and cosmetics have drawn the highest percentage of female entrepreneurs (41%), followed by boutiques and tailoring (23%), general stores (9%), educational coaching centers (4%), bakeries and sports stores (3% each),

ready-made clothing stores (10%), and other various businesses that were found to be run by 7% of women.

Table 2- Age* Awareness of Scheme

Variable		Awareness of Scheme		Total	Pearson Chi-Square		
		Yes	No		Value	df	Asymp. Sig. (2-sided)
Age	20 to 30 years	2	5	7	1.235 ^a	3	.745
	31 to 40 Years	30	37	67			
	41 to 50 years	7	10	17			
	51 to 60 years	5	4	9			
Total		44	56	100			

Note-Relationship is NOT Significant, *df = degree of freedom

Table 2 reveals that there is no significant relationship between the age and awareness of respondents for government schemes ($p > 0.05$).

Table 3- Educational Qualification * Awareness of Scheme

Variable		Awareness of Scheme		Total	Pearson Chi-Square		
		Yes	No		Value	Df	Asymp. Sig. (2-sided)
Educational Qualification	Illiterate	0	1	1	3.484 ^a	5	.626
	Upper primary	2	2	4			
	High school	4	3	7			
	Intermediate	10	7	17			
	Graduation	15	24	39			
	Post-Graduation	13	19	32			
Total		44	56	100			

Note-Relationship is NOT Significant, *df = degree of freedom

Table 3 reveals that there is no significant relationship between the educational qualification and awareness of respondents for government schemes ($p > 0.05$).

Table 4- Marital Status * Awareness of Scheme

Variable		Awareness of Scheme		Total	Pearson Chi-Square		
		Yes	No		Value	df	Asymp. Sig. (2-sided)
Marital Status	Married	42	47	89	4.187 ^a	2	.123
	Unmarried	2	5	7			
	Widow	0	4	4			
Total		44	56	100			

Note-Relationship is NOT Significant, *df = degree of freedom

Table 4 reveals that there is no significant relationship between the marital status and awareness of respondents for government schemes ($p>0.05$).

Table 5- Religion * Awareness of Scheme

Variable		Awareness of Scheme			Total	Pearson Chi- Square		
						Value	df	Asymp. Sig. (2-sided) P ≤0.05
Religion	Hindu	32	52	84	9.864 ^a	3	.020 (Sig*)	
	Muslim	8	2	10				
	Sikh	4	1	5				
	Christian	0	1	1				
Total		44	56	100				

Note-Relationship is Significant at .05-level. , *df = degree of freedom

Table 5 reveals that there is significant relationship between religion and awareness of respondents for government schemes ($p<0.05$).

Table 6- Category * Awareness of Scheme

Variable		Awareness of Scheme			Total	Pearson chi- square		
		Yes	No	Total		Value	df	Asymp. Sig. (2-sided) p >0.05
Category	General	23	31	54	1.771 ^a	2	.413	
	OBC	19	19	38				
	SC	2	6	8				
Total		44	56	100				

Note-Relationship is NOT Significant, *df = degree of freedom

Table 6 reveals that there is no significant relationship between the category and awareness of respondents for government schemes ($p>0.05$).

Table 7- Monthly Income* Awareness of Scheme

Variable		Awareness of Scheme			Total	Pearson Chi-Square		
		Yes	No	Total		Value	df	Asymp. Sig. (2-sided)
Monthly Income	Below 10000	5	6	11	4.046 ^a	5	.543	
	10001-20000	15	14	29				
	20001-30000	8	11	19				
	30001-40000	4	2	6				
	40001-50000	2	7	9				

Above 50000	10	16	26			
Total	44	56	100			

Note-Relationship is NOT Significant, *df = degree of freedom

Table 7 reveals that there is no significant relationship between the monthly income and awareness of respondents for government schemes ($p>0.05$).

Table 8- Type of family * Awareness of Scheme

Variable		Awareness of Scheme		Total	Pearson Chi-Square		
		Yes	No		Value	df	Asymp. Sig. (2-sided)
Family Type	Joint	32	39	71	.114 ^a	1	.736
	Nuclear	12	17	29			
Total		44	56	100			

Note-Relationship is NOT Significant, *df = degree of freedom

Table 8 reveals that there is no significant relationship between the type of family and awareness of respondents for government schemes ($p>0.05$).

Table 9- Type of Ownership * Awareness of Scheme

Variable		Awareness of Scheme		Total	Pearson Chi-Square		
		Yes	No		Value	df	Asymp. Sig. (2-sided)
Ownership	Sole Proprietorship	42	56	98	2.597 ^a	1	.107
	Partnership	2	0	2			
Total		44	56	100			

Note-Relationship is NOT Significant, *df = degree of freedom

Table 9 reveals that there is no significant relationship between the type of ownership and awareness of respondents for government schemes ($p>0.05$).

Table 10- Nature of Enterprises * Awareness of Scheme

Variable		Awareness of Scheme		Total	Pearson Chi-Square		
		Yes	No		Value	df	Asymp. Sig. (2-sided)
Nature of Enterprises	Manufacturing	9	17	26	1.256 ^a	1	.262
	Service	35	39	74			
Total		44	56	100			

Note-Relationship is NOT Significant, *df = degree of freedom

Table 10 reveals that there is no significant relationship between the nature of enterprises and awareness of respondents for government schemes ($p>0.05$).

Table 11- Source of Investment * Awareness of Scheme

Variable		Awareness of Scheme		Total	Pearson Chi-Square		
		Yes	No		Value	Df	Asymp. Sig. (2-sided)
Source of Investment	Own savings	28	38	66	7.517 ^a	3	.057
	Taken loan from banks	8	16	24			
	Borrowed from friends and family	4	2	6			
	Government loan schemes	4	0	4			
Total		44	56	100			

Note-Relationship is NOT Significant, *df = degree of freedom

Table 11 reveals that there is no significant relationship between the source of investment and awareness of respondents for government schemes ($p>0.05$).

Table 12- Years of Experience * Awareness of Scheme

Variable		Awareness of Scheme		Total	Pearson Chi-Square		
		Yes	No		Value	df	Asymp. Sig. (2-sided)
Years of Experience	0-5	17	17	34	4.983 ^a	5	.418
	6-10	14	24	38			
	11-15	10	9	19			
	16-20	2	4	6			
	21-25	1	0	1			
	26-30	0	2	2			
Total		44	56	100			

Note-Relationship is NOT Significant, *df = degree of freedom

Table 12 reveals that there is no significant relationship between the years of experience and awareness of respondents for government schemes ($p>0.05$).

Table 13 Working hours per day * Awareness of Scheme

Variable		Awareness of Scheme		Total	Pearson Chi-Square		
		Yes	No		Value	df	Asymp. Sig. (2-sided)
Working hours per day	Less than 5 hours	4	0	4	6.722 ^a	2	.035
	5-8 hours	13	25	38			
	8-10 hours	27	31	58			
Total		44	56	100			

Note-Relationship is Significant at .05-level. , *df = degree of freedom

Table 13 reveals that there is significant relationship between the working hours per day and awareness of respondents for government schemes ($p < 0.05$).

Table 14- Types of industries * Awareness of Scheme

Variable	Awareness of Scheme			Pearson Chi-Square		
	Yes	No	Total	Value	Df	Asymp. Sig. (2-sided)
Type of industries						
Bakeries	1	2	3	6.808 ^a	7	.449
Beauty/Spa/Cosmetic center	23	18	41			
Educational coaching center	2	2	4			
General store	3	6	9			
Readymade garment shop	2	8	10			
Sports shop	1	2	3			
Tailoring/Boutique	8	15	23			
Any other	4	3	7			
Total	44	56	100			

Note-Relationship is NOT Significant, *df = degree of freedom

Table 14 reveals that there is no significant relationship between the types of industries and awareness of respondents for government schemes ($p > 0.05$).

Chi-square test results indicate that there is statistically no significant association between age, educational qualification, marital status, category, monthly income, type of family, type of ownership, nature of enterprises, source of investment in business, years of business experience, types of industries, and awareness of government schemes at the 5% significance level ($p > 0.05$). Contradictory results were found that age, education, caste, marital status, family size, and years of business operation are the demographic parameters that have an association with the awareness of women entrepreneurs at a 5% level of significance (Sahoo et al., 2019), and there is a significant relationship between educational qualification and awareness of government schemes among women entrepreneurs (Kiruthiga & Sankar, 2023). In contrast, the results of this study found that there is a statistically significant association between religion and working hours per day and awareness of government schemes at the 5% level of significance ($p < 0.05$); this suggests that entrepreneurs with longer working hours are more likely to attend workshops, seminars, and trade meetings that disseminate information, and their interaction with suppliers, customers, banks, self-help groups, etc., increases their knowledge about government schemes.

A significant association was found between religion and awareness of government schemes; this suggests community support and networks that actively share information, the role of religious institutions that act as information hubs, and religious practices may also influence and encourage women’s mobility, participation in economic activities, and government programs. So, the results provide partial support for the null hypothesis. Therefore, the null hypothesis failed to be rejected for variables such as age, educational qualification, marital status, category, monthly income, type of family, type of ownership, nature of enterprises, source of investment in business,

years of experience, and types of industries but was rejected for variables such as religion and working hours per day.

LIMITATIONS OF THE STUDY

The survey was confined to 100 registered female entrepreneurs who reside and run their businesses in the urban region of Meerut City, so the sample size doesn't represent the population outside of this region. Women entrepreneurs under 20 and over 60, as well as those from rural regions, were not included in the study.

CONCLUSION AND SUGGESTIONS

According to the study, conducted in Meerut city, very few women entrepreneurs were aware of some government schemes like the Mudra Yojana, Cent Kalyani Scheme, and Annapurna Scheme, while most of them were unaware. It is evident that very few women are taking advantage of these initiatives. Based on the study's findings, it can be concluded that informing female entrepreneurs about government initiatives requires targeted techniques. Campaigns, seminars, and workshops with a community focus can effectively disseminate knowledge, and women should also be encouraged to take part in more awareness campaigns. Awareness will be increased when the information is shared in regional languages on social media and digital channels. Furthermore, organizing mentorship programs and networking events will create a community of support that encourages resource sharing and increased utilization. Policies related to the upliftment of women entrepreneurs must be periodically reviewed to examine their effects on the success rate of women entrepreneurs. Government schemes can be made more accessible by streamlining application procedures, clarifying guidelines, and offering assistance. This study also serves as a foundation for future research that can examine different aspects of women entrepreneurship.

RECOMMENDATIONS FOR FUTURE RESEARCH

There is always room for further study by exploring a number of more in-depth topics related to women entrepreneurship. Research can also be conducted on the following recommendations:

- Comparison of the awareness and availability of government programs between rural and urban women entrepreneurs.
- Examining regional or state-specific differences to see how local governance contributes to implementation.
- Examination can be done on how socioeconomic status, age, and education affect schemes' awareness and usage.
- Determination of the discrepancies between scheme awareness and actual utilization, looking into the causes of underutilization.
- Research can also be conducted on how social media and digital literacy might raise awareness among female entrepreneurs.
- Examine the awareness levels of particular groups, such as underprivileged women and micro-entrepreneurs.

REFERENCES

- Ashok, D., Selvam, V., & Devi, I. (2018). Measuring women awareness and access to various schemes to promote women entrepreneurship. *International Journal of Mechanical Engineering and Technology*, 9(5), 506-513.
- Kiruthiga, P., & Sankar, P. (2023). Awareness of government schemes among women entrepreneurs with special reference to Chengalpet district. *Journal of Research Administration*, 5(2), 7390-7398.
- Patni, M. S. (2022). A study on the awareness of government schemes among the women entrepreneurs. *International Journal of Advance and Applied Research*, 9(6), 618-621.
- Sahoo, S., Soren, R., & Nayak, D. (2019). Women entrepreneurs and their awareness level towards various government schemes. *EPRA International Journal of Economic and Business Review*, 7(11), 21-24.
- Sangolagi, K., & Alagawadi, M. (2016). Women entrepreneurs. *International Journal of Advancement in Engineering Technology, Management and Applied Science*, 3(1), 216-222.
- Shiralashetti, A. S. (2013). Awareness level towards Government Schemes-A study of Women Entrepreneurs of North Karnataka Districts (Part of UGC Supported Major Research Project). *Summer Internship Society*, 4(1), 24-33.
- Uma, M., & Arulmoorthy, A. (2019). A Study on Entrepreneurs Awareness towards Central Government Schemes. *IJRAR-International Journal of Research and Analytical Reviews (IJRAR)*, 6(2), 109-115.

CYBERCRIME AWARENESS AND VICTIMISATION ACROSS AGE GROUPS IN KAMRUP RURAL DISTRICT OF ASSAM

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ABSTRACT

Cybercrime has emerged as a global concern in the 21st century due to the rapid digitalization across all age groups. This study investigates cybercrime awareness and victimization among school students, college students and adults in Kamrup rural district of Assam. 90 respondents were selected and data were collected through a purposive sampling method using an online survey. Descriptive analysis revealed that a substantial proportion of the school students reported experiences of cyberbullying, hacking and social media frauds while the college students displayed better preventive awareness, yet were susceptible to cyber threats. Adults were particularly prone to financial fraud with half of them reporting direct victimization. Data reveals a lack of proper cybersecurity knowledge and limited awareness among the respondents. The study confirms the urgent need for structured, age-specific digital literacy modules, awareness campaigns, and community-based training to reduce vulnerability in rural Assam.

KEYWORDS: Adults; Assam; Cybercrime; Cybersecurity; Students; Victimization;

INTRODUCTION

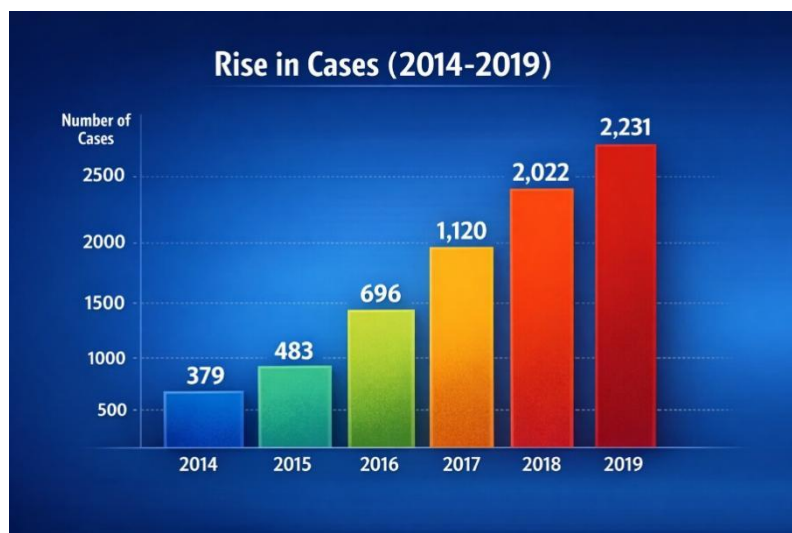
Cybercrime has emerged as a pressing concern in the 21st century due to rapid digitalisation. become much prominent over the last decade. It refers to any unlawful behaviour involving of computer and its network is considered cybercrime. It covers offenses in which computers are used as targets, instruments, or both. The use of electronic communication devices to conduct illegal activities, frequently involving manipulation of online information or theft, is cybercrime (Information and Communication Technology Act, 2000). All age categories, from youngsters and children to working adults and senior citizens, are at grave risk due to the exponential rise in cybercrime.



(Source: AI generated)

Cybercrime profile in Assam

Assam has witnessed a sharp increase in cybercrime cases over the last few years. The state ranks 5th nationally with a cybercrime rate of 4.9 per cent, with a lowest charge-sheeting rate of 14 per cent (NCRB, 2020). According to the data (NCRB, 2018-19, Govt. of Assam), there was a 99 per cent increase in cybercrime cases in Assam from 2017 to 2019.



(Source: AI generated)

The most common cases prevalent in Assam, as per the Cyber Crime Cell in Assam, are - Social Media Fraud, Financial Fraud, Hacking of Email ID/ Facebook ID/ Bank Accounts, Creation of a fraudulent account and publishing obscene materials on Facebook.

Rationale

Though national data provide a wider overview of cybercrime throughout all age groups, there is limited research examining the variation in experiences and victimization of cybercrime across different age groups. Teenagers and young adults (students) are more susceptible to cybercrimes like bullying, harassment, identity theft, phishing, hacking, and cyber pornography, and the reason is India's sharp increase in usage of internet, especially after COVID-19 and the shift to online learning (Rajasekharaiah et al., 2020). These offenses often have a hurt kids' motivation, academic achievement, and mental health; Also, it is worth noting that cyberbullying frequently results in low self-esteem, social isolation, and depression (Singh & Singh, 2020). National Crime Records Bureau (NCRB, 2020) shows a dramatic increase in cybercrimes against minors, with 79 cases in 2017 to 1,823 in 2022, with India having the greatest rate of cyberbullying among youngsters worldwide (Sharma & Gautam, 2023).

Adults who are 30 and above are particularly vulnerable to cybercrimes. According to recent reports from Andhra Pradesh and Karnataka, working professionals aged 30-45 are specifically targeted and exploited by cyber criminals via investment scams (July 29, 2025, Times of India; August 20, 2025, Bangalore Mirror). Older folks are more vulnerable to recurrent victimization and financial loss than younger adults because they are more likely to disclose minor cybercrime events (Havers et al., 2024).

Considering the existing scenario, this study investigates cybercrime awareness and victimization patterns in Kamrup Rural District, Assam, with a focus on comparing experiences among school students, college students, and adults.

REVIEW OF LITERATURE

Altarawneh et al. (2025) surveyed of middle school students in Jordan found that awareness was strongly influenced by password knowledge, social media use, legal understanding, and cybersecurity education. The regression model explained 67.5% of variance, underscoring the importance of structured awareness programs and training.

Sahu & Shukla (2024) found no significant gender difference in cybercrime awareness among 60 students in Chattisgarh, but students from urban locality showed greater awareness than those from rural areas. A t-test confirmed the rural–urban difference, highlighting the role of location in awareness levels.

Sayyad et al. (2023) conducted a study including 50 college students in Narhe revealing that most were aware of cybercrime, had antivirus protection, and felt safe online. They avoided unsafe sites, supported anti-cybercrime laws, and knew how to secure their devices, though few had personally been victims of cybercrime.

Toso et al. (2023) conducted a study of 253 senior high school students found a “very aware” level of cybercrime knowledge, particularly concerning cyberbullying, cyberpornography, and identity theft in the Philippines. The conclusions revealed a high sensitivity to common online threats among youth.

Jonathan et al. (2021) found that interventions on cybercrime increase students' knowledge of cyber threats and their consequences. Such awareness may prevent malicious acts and promote ethical online behavior, as well as inspire students to pursue positive cyber career paths.

Research gap

According to previous research conducted in India and outside indicates that students' understanding of cybercrime varies, the majority of Indian studies are constrained by their scope, sample size, and geographic location. A study examining the scenario of cybercrime awareness across three categories – school students, college students and adults ranging from 30 – 60 years of age is something that can give clear picture how cybercrime varies across age-groups.

OBJECTIVES

1. To study whether respondents have ever encountered any cybercrimes.
2. To explore different types of cybercrimes that are prevalent in the region.
3. To explore the factors responsible for the prevalence of cybercrime.

METHODOLOGY

Research design

The study adopted a descriptive survey design for examining cybercrime awareness and victimization across all three age-groups.

Population of the present study

The study was carried out in the Kamrup rural district of Assam, and the population consisted of Higher Secondary students (11th & 12th), undergraduate college students and adults (30-60 years) residing in the area.

Sample of the study

Two schools (Darwin Academy and Career Plus), two colleges (Dakshin Kamrup Girls' College and Dakshin Kamrup College) and adults within the age-groups of 30-60 years from Mirza and Bijaynagar from Kamrup rural district of Assam were selected. 90 samples were drawn purposively, 30 from each group.

Tool for data collection

3 questionnaires were prepared by the investigator for 3 target groups tailored to the needs of each target group. The questionnaire was divided into 4 sections. The first section consisted of a background profile of the respondents. The second section consisted of information related to awareness of cybercrime among respondents, and the third section consisted of information about cyber victimization of the respondents. The fourth section consisted of the factors responsible for the prevalence of cybercrime among the respondents.

Method of data collection

Through online google forms, data was collected and consent was taken electronically from the respondents.

Data analysis

The data analysis was done using descriptive statistics (frequency and percentage).

Ethical considerations

Informed consent was obtained electronically from every respondent, ensuring voluntary participation. Confidentiality was also maintained to protect the privacy of the respondents.

FINDINGS AND DISCUSSION

Category: School students

Section - A

Table 1: Demographic Profile (n=30)

Category	Frequency (<i>f</i>)	Percentage (%)
Age		
16	17	56.67
17	13	43.33
Class		
11 th	15	50
12 th	15	50
Sex		
Female	18	60
Male	12	40

Table 1 shows profile of the selected school students of Mirza and Bijaynagar, Assam. Slightly less than majority (56.67%) of the students were from the age-group of 16 years. Half of them were from 11th and half of them were from 12th class. Majority (60%) of them were females.

Section – B: Encounter with Cybercrime and its types

Table 2: Frequency and Percentage Distribution of Respondents According to Their Encounter with Cybercrime. (n=30)

Category	Frequency (<i>f</i>)	Percentage (%)
No	17	56.67
Yes	13	43.33
Total	30	100

About 43.33 per cent were found to have faced cybercrimes due to lack of awareness regarding cybersecurity tools and services, lack of digital literacy or overexposure to the internet.

Table 3: Frequency and Percentage Distribution of Respondents According to Their Relation with Cyber Victim. (n=30)

Category	Frequency (<i>f</i>)	Percentage (%)
Friends	19	63.33
Relatives	7	23.33
Family	4	13.33
Total	30	100

More than majority (63.33 %) of the respondents’ friends have faced cybercrimes followed by 23.33 per cent respondents’ relatives have faced cybercrimes and 13.33 per cent of the respondents’ family have faced cybercrimes. This might be due to the close association of students with their friends and, peer groups, and thus, they know about their friends’ problems.

(n=30)

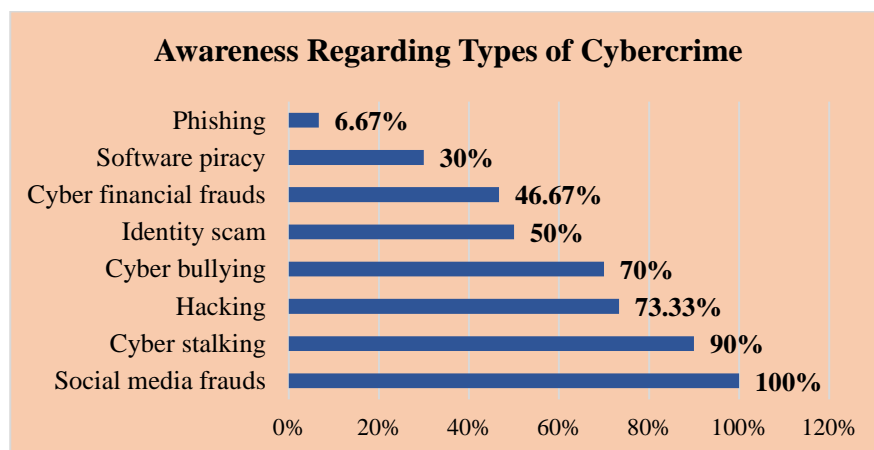


Figure 1: Percentage Distribution of Respondents According to Their Awareness Regarding Types of Cybercrime.

Figure 1 reveals that cent per cent (100%) were aware of social media frauds; This suggests the universal awareness of social media among the people, also any fraud in social media is highly visible through posts, tweets, videos and images, making it easier for the students to identify one. This mirrors the study done by Tokunaga (2010), where it was revealed that 20 - 40 per cent of all the youths faced cyberbullying at least once in their lifetime.

Section – C: Types of Cybercrime prevalence

(n=30)

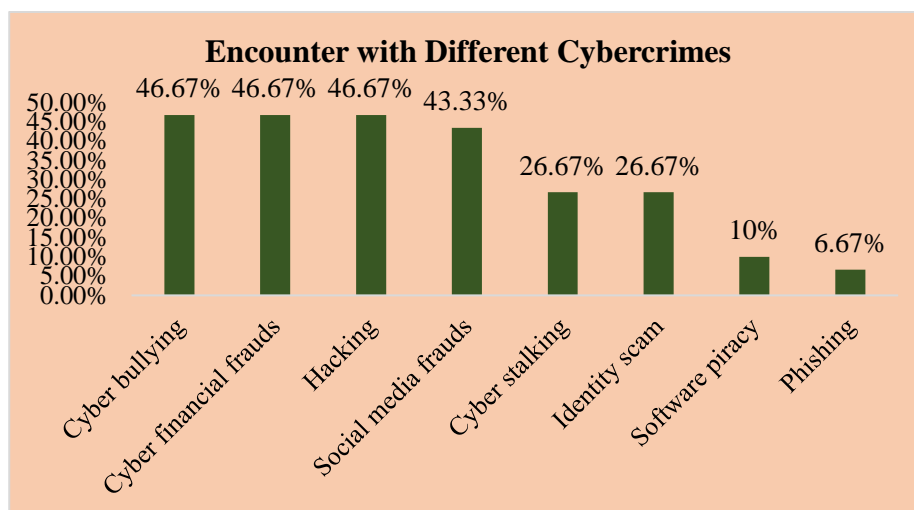


Figure 2: Percentage Distribution of Respondents According to Their Encounter with Different Cybercrimes in Their Region.

Figure 2 reveals that cyber bullying, cyber financial frauds and hacking are the top three crimes that are prevalent in the study area, a slightly over 40 per cent (43.33%) of the respondents have faced or heard of people facing social media frauds in the region. This indicates that the respondents are highly aware of and are exposed to these cybercrimes. The findings are consistent with NCRB data; revealing a substantial 63.48 per cent increase in 2019 in the number of cybercrimes with cyberbullying, harassment, cyberstalking as few of the major cyber concerns (Balamurugan et al., 2024).

Section D: Factors responsible for prevalence of cybercrime

Table 4: Frequency and Percentage Distribution of Respondents According to Their Agreed Factors Responsible for Prevalence of Cybercrime. (n=30)

Factors responsible for cybercrime prevalence	Frequency (f)	Percentage (%)
Poor security knowledge	18	60
Lack of cybersecurity awareness	14	46.67
Overindulgence in cyber world	13	43.33
Social media usage	13	43.33
Lack of proper rules and law	11	36.67
Poor skill in media handling	5	30
Lack of monitoring from parents	9	30
Technological advancement	8	26.67
Lack of strict punishment	8	26.67
Digitalization in all sector	8	26.67
No proper age restriction in digital world	8	26.67
More dependence on technology	6	20
Lack of monitoring by the school authority	5	16.67
Digital illiteracy	4	13.33

***Multiple responses were allowed*

The data in Table 4 reveals that a significant majority (60%) of the respondents have identified poor security knowledge as a primary contributor to the prevalence of cybercrime in the region. A little less than half of the respondents (46.67%) believed that lack of cybersecurity awareness is one of the main factors that is responsible for prevalence of cybercrime.

Category: College students

Section – A

Table 5: Demographic Profile (n=30)

Category	Frequency (f)	Percentage (%)
Age		
21 years	10	33.33
20 years	8	26.66
18 years	7	23.33
19 years	5	16.67
Sex		
Female	19	63.33
Male	11	36.66

Table 5 reveals that among the college students, 33.33 per cent were 21 years and little over the majority were females.

Section – B: Cybercrime and its types

Table 6: Frequency and percentage distribution of respondents according to their encounter with cybercrime. (n=30)

Category	Frequency (f)	Percentage (%)
No	23	77
Yes	7	23
Total	30	100

The data in Table 6 indicates that a substantial majority (77%) of the students in colleges have not faced any cybercrimes whereas 23 per cent was found to have faced cybercrimes. The college students might be aware about the different Cybersecurity measures and hence able to prevent cybercrimes.

Table 7: Frequency and percentage distribution of respondents according to their relation with cyber victim. (n=30)

Category	Frequency (f)	Percentage (%)
Friends	20	66.67
Relatives	7	23.33
Family	2	6.67
Total	30	100

6.67 per cent of the respondents' family has faced cybercrimes, 23.33 per cent respondents' relatives have faced cybercrimes and the friends of little over the majority (66.67%) of the respondents have faced cybercrimes. The findings corroborate the with data of the school students.

(n=30)

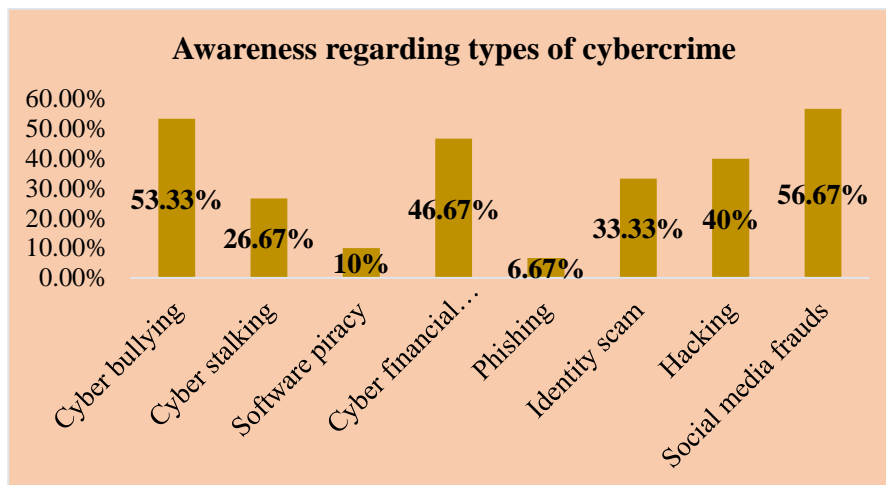


Figure 3: Percentage distribution of respondents according to their awareness regarding types of cybercrime.

Figure 3 reveals that 56.67 per cent were aware of frauds over social media followed by 53.33 per cent of cyber bullying; The high visibility in social media might be the reason that college students are aware about such frauds. It might also be due to over exposure of social media that the college students are aware about social media frauds.

Section – C: Types of Cybercrime prevalent

(n=30)

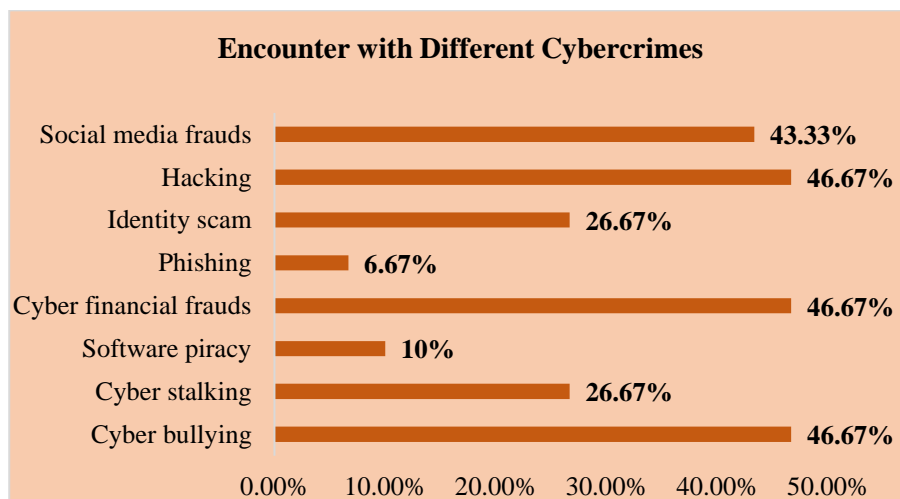


Figure 4: Percentage Distribution of Respondents According to Their Encounter of Different Cybercrimes in Their Region.

Figure 4 reveals that cyber bullying, cyber financial frauds and hacking are the top three crimes that are prevalent in the area of study, a little over 40 per cent of the respondents have either faced or heard of people facing social media frauds in the region. Phishing is the least prevalent cybercrime in the region.

Section D: Factors responsible for prevalence of cybercrime

Table 8: Respondents’ Frequency and Percentage Distribution According to Their Agreed Factors Responsible for Prevalence of Cybercrime. (n=30)

Category	F	Percentage
Poor security knowledge	18	60%
Lack of cybersecurity awareness	14	46.67%
Social media usage	13	43.33%
Overindulgence in cyber world	13	43.33%
Lack of proper rule and law	11	36.67%
Poor skill in media handling	5	30%
Lack of monitoring from parents	9	30%
Technological advancement	8	26.67%
Digitalization in all sector	8	26.67%
No proper age restriction in digital world	8	26.67%
Lack of strict punishment	8	26.67%
More dependence on technology	6	20%
Lack of monitoring from school authority	5	16.67%
Digital illiteracy	4	13.33%

***Multiple responses were allowed*

Majority (60%) of the respondents believed that poor security knowledge as a contributing factor towards prevalence of cybercrime in the study area (Table 8). The findings are similar to school students suggesting the need proper intervention designed to enhance the cybersecurity knowledge among the students of the area.

Category: Adults

Section - A:

Table 9: Demographic Profile (n=30)

Age (Years)	Frequency (f)	Percentage (%)
32	2	6.66
33	4	13.33
37	3	10
46	5	16.66
47	7	23.33
54	4	13.33
56	3	10
58	2	6.66
Total	30	100

According to the above table, it can be seen that 23.33 per cent of the adults belong to age-group of 47 years, followed by 16.66 per cent belong to 46 years of age and 13.33 per cent belong to 33 and 54 age-group among the respondents.

Section – B: Cybercrime and its common forms

Table 10: Respondents’ Frequency and Percentage Distribution According to Their Encounter with Cybercrime. (n=30)

Category	Frequency (f)	Percentage (%)
Yes	17	56.67
No	13	43.33
Total	30	100

Table 10 reveals a little less than majority (56.67%) have faced cybercrimes and a little over 40 per cent did not face any cybercrime. The findings corroborate with Insights Reports of Norton Cyber Safety (2021), where it was reported that over one third (36%) of respondents (Indian adults) reported experiencing unauthorized access to a device or account, according to the research.

Table 11: Respondents’ Frequency and Percentage Distribution According to Their Relation with Cyber Victim. (n=30)

Category	Frequency (f)	Percentage (%)
Friends	20	66.67
Family	5	16.67
Relatives	5	16.67
Total	30	100

Data from Table 11 reveals that 66.67 per cent of the respondents’ friends have faced cybercrime, 16.67 per cent of the respondents’ family and relatives have faced cybercrime; similar with school and college students. Encouraging open discussion on cyber related issues should be promoted in school, college, workplace and even in social gatherings so that the students get a comfortable environment to share their own stories.

(n=30)

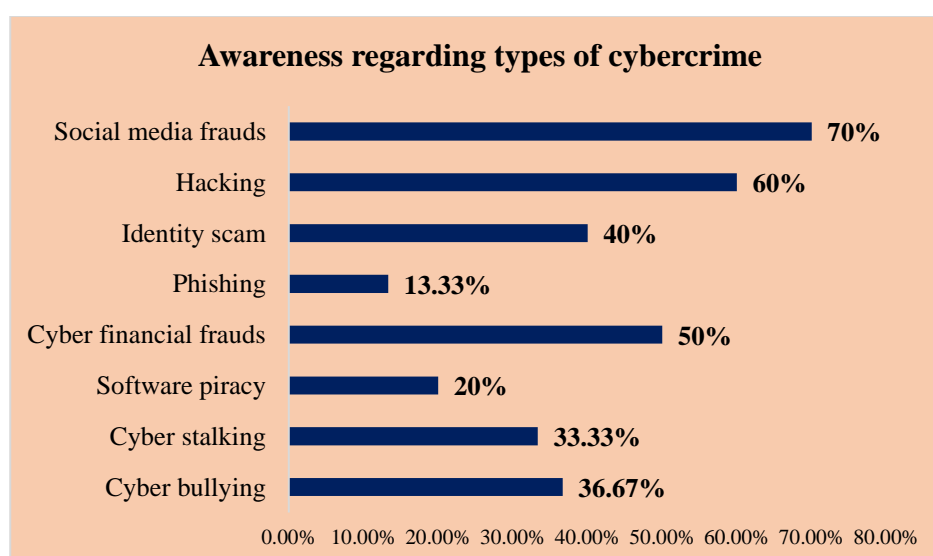


Figure 5: Respondents’ Percentage Distribution According to Their Awareness Regarding Types of Cybercrime.

Figure 5 indicates that social media fraud was known to 70 per cent (majority) of the respondents, followed by hacking that majority (60%) are aware of; The findings are similar with school and college students. 50 per cent are aware of cyber financial frauds; as the age-group lies between 30-60 years of age, they perform tasks that demands them to be using online financial services.

Section – C: Types of Cybercrime prevalence

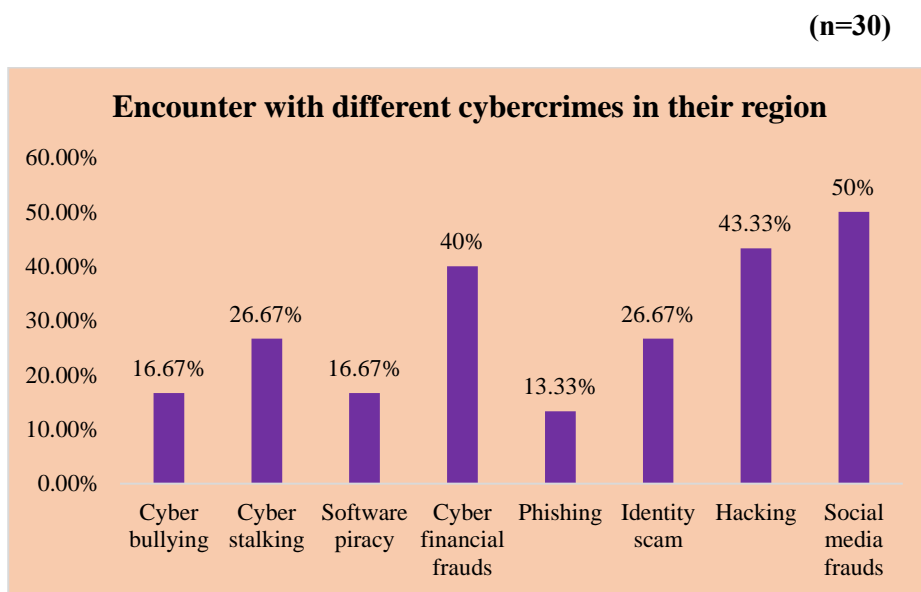


Figure 6: Respondents’ Percentage Distribution According to Their Encounter of Different Cybercrimes in Their Region

Above figure reveals that half (50%) of the respondents have encountered directly or someone known to them have encountered social media frauds, 43.3 per cent and 40 per cent of them have encountered directly or someone known to them have encountered hacking and cyber financial frauds; highlighting the prevalence of cybercrime among adult age-group also.

Section D: Factors responsible for prevalence of cybercrime

Table 12: Respondents’ Frequency and Percentage Distribution According to their Agreed Factors Responsible for Prevalence of Cybercrime. (n=30)

Category	F	Percentage
Lack of cybersecurity awareness	18	60%
Digital illiteracy	11	36.67%
Poor security knowledge	11	36.67%
Social media usage	10	33.33%
Lack of strict punishment	8	26.67%
Poor skill in media handling	8	26.67%
Digitalization in all sector	8	26.67%
No proper age restriction in digital world	8	26.67%

Lack of proper rules and law	7	23.33%
Lack of monitoring from parents	6	20%
Technological advancement	6	20%
Lack of monitoring from school authority	5	16.67%
Overindulgence in cyber world	5	16.67%
More dependence on technology	5	16.67%

***Multiple responses were allowed*

Table 12 reveals that majority (60%) believed lack of Cybersecurity awareness as the main factor responsible for prevalence of cybercrime. 36.67 per cent adults have agreed that digital illiteracy and poor security knowledge as another two factors contributing to prevalence of cybercrime. This indicates the busy lifestyle of the adults; that do not allow them to concentrate fully on inheriting knowledge regarding the same or lack of interventions might also be the reason for their lack of Cybersecurity awareness.

Comparative insights

Table 13: Intergenerational Analysis of Cyber Victimization

Group	Most Reported Victimization	Level of Awareness	Main Risk Factors Identified
School Students (11th–12th)	Cyberbullying, hacking, social media frauds	Better on social media risks, weaker on financial frauds	Excessive social media use, peer influence, lack of coping strategies
College Students (UG)	Harassment, online frauds, phishing	Higher than school students (knowledge of hacking/phishing)	Over-reliance on social media, gap between awareness and safe practice
Adults (30–60 years)	Financial frauds (investment scams, identity theft)	Lowest (poor cybersecurity knowledge, weak digital literacy)	Lack of financial vigilance, limited tech familiarity, poor enforcement

Clear age-specific patterns of vulnerability are revealed by the comparative data as presented in Table 13. Schoolchildren were disproportionately impacted by interpersonal cybercrimes like bullying and social media frauds. College students, on the other hand, showed greater understanding and some preventive measures, but their ongoing vulnerability to online fraud and harassment indicates that knowledge alone cannot guarantee safety. Adults were mostly targeted by financial frauds that have real financial repercussions. Crucially, adults view victimization in context of money and security, but students interpret it in context of social and emotional factors. This highlights the disparities in exposure and impact between generations.

Table 14: Association between age-groups and cybercrime victimization

Variables	Chi-square value	p-value
Age-group × Cyber Victimization	6.976	0.031*

(*Significant at the 0.05 level, 2-tailed*)

The Chi-Square analysis revealed a significant association between age-group and cybercrime victimization ($\chi^2 = 6.976$, $df = 2$, $p = 0.031$). This indicates that the likelihood of encountering cybercrime significantly differs across school students, college students, and adults.

CONCLUSION

The study reveals a clear image of cyber landscape across three demographic groups – school students, college students and adults (30-60 years). Though the accurate nature of the cyber concerns may vary on personal basis but the message is clear that cybercrime is a societal issue with which no age-group is fully immune. The results reinforce the previous literature enforcing cyber vulnerability among the youths (Rajasekharaiah et al., 2020; Singh & Singh, 2020), increase of cyber financial exploitation among the adults (Times of India, 2025; Bangalore Mirror, 2025). The college students do not face direct cyber victimization but are significantly exposed to the internet hence are susceptible to various cyber threats. Even though a sizeable percentage of adults experienced cybercrime, it is an alarming situation which highlights the lack of awareness across all demographic groups.

FUTURE IMPLICATIONS

The study underlines an urgent need for early cyber education in schools through including Cybersecurity in curriculum to build resilience against hacking, bullying and social media frauds. Awareness programmes and training in colleges targeting online financial frauds, bullying in a structured way and comprehensive format. And a cohesive, cross-generational approach backed by policies, institutions and community efforts is vital to combat the issue of cybercrime. Stronger policy initiatives, such as regional awareness campaigns, more stringent law enforcement, and better charge-sheeting of cybercrime cases in Assam, are required in addition to individual interventions.

REFERENCES

- Altarawneh, M. H. M., Althunibat, A., Almajali, M. H., Alzriqat, N., & Alazzam, S. H. (2025). Cybersecurity awareness among school students: Exploring influencing factors, legal implications, and knowledge gaps. *International Journal of Innovative Research and Scientific Studies*, 8(1), 1516–1529. <https://doi.org/10.53894/ijirss.v8i1.2131>
- Bangalore Mirror. (2025, February 5). *Age is the new bait: Cybercrooks target victims by generation*. Bangalore Mirror. <https://bangaloremirror.indiatimes.com/bangalore/crime/age-is-the-new-bait-cybercrooks-target-victims-by-generation/articleshow/120240994.cms>
- Bruce, M., Lusthaus, J., Kashyap, R., Phair, N., & Varese, F. (2024). Mapping the global geography of cybercrime with the World Cybercrime Index. *PLOS ONE*, 19(4), e0301452. <https://doi.org/10.1371/journal.pone.0301452>
- Garba, J., Kaur, J., & Ibrahim, E. (2023). Awareness of cybercrime among online banking users in Nigeria. *Nigerian Journal of Technology*, 42(3), 406–413. <https://doi.org/10.4314/njt.v42i3.7>

- Gautam, S., & Sharma, S. (2023). Cyberbullying: Repercussions and strategies for its prohibition. *Research Communications*, 1(2), 172–178. <https://doi.org/10.5281/zenodo.10024192>
- Havers, B., Reeve, R., Bland, A., Hann, M., & Dawkins, R. (2024). Cybercrime victimisation among older adults: A probability sample survey in England and Wales. *PLOS ONE*, 19(5), e0303286. <https://doi.org/10.1371/journal.pone.0303286>
- Lu, H., Bai, Z., Tu, R. R., & Zhang, S. (2023). A research on senior people online consumption in China: From perspective of providing technology support. *ResearchGate*. <https://doi.org/10.13140/RG.2.2.22317.17125>
- M, V., Balamurugan, G., Sevak, S., Gurung, K., G, B., X, S., P, T., & S, T. (2024). Silent screams: A narrative review of cyberbullying among Indian adolescents. *Cureus*, 16(8), e66292. <https://doi.org/10.7759/cureus.66292>
- National Crime Records Bureau. (2023). *Crime in India 2022*. Government of India. <https://ncrb.gov.in>
- NortonLifeLock. (2021). *Norton Cyber Safety Insights Report: India*. Computer Crime Research Center. <https://cybercrime-research.org/Norton-Cyber-Safety-Insights-Report-India>
- Rajasekharaiah, K. M., Dule, C. S., & Sudarshan, E. (2020). Cybersecurity challenges and its emerging trends on latest technologies. *IOP Conference Series: Materials Science and Engineering*, 981(2), 022062. <https://doi.org/10.1088/1757-899X/981/2/022062>
- Sahu, M., & Shukla, P. (2024). A study on cyber-crime awareness among students in Chhattisgarh. *Journal of Ravishankar University (Part A: Social Science)*, 30(1), 54–60. <https://doi.org/10.52228/JRU.2024.v30i1.8>
- Sayyad, A., Dusane, R., Hanamghar, A., Bhoite, S., & Mohite, B. J. (2023). A study on awareness about cyber-crime among college students. *International Journal of Novel Research and Development*, 8(10), 250–256. <https://www.ijnrd.org/papers/IJNRD2310240.pdf>
- Singh, M., & Singh, S. (2020). Influence of cyberbullying behaviour on the academic achievement of college-going students. *Journal of Critical Reviews*, 7(13), 3049–3054. <https://doi.org/10.31838/jcr.07.13.514>
- Times of India. (2025, July 19). *From teens to seniors: Fraudsters customize scams by age in AP*. The Times of India. <https://timesofindia.indiatimes.com/city/vijayawada/from-teens-to-seniors-fraudsters-customize-scams-by-age-in-ap/articleshow/122958459.cms>
- Tokunaga, R. S. (2010). Following you home from school: A critical review and synthesis of research on cyberbullying victimization. *Computers in Human Behavior*, 26(3), 277–287. <https://doi.org/10.1016/j.chb.2009.11.014>
- Toso, C. H. S., Jumalon, A. J. A., Magadan, J. A. R., Alvarico, A. B., & Cuevas, J. F. (2023). Cybercrime awareness among senior high school students. *Mediterranean Journal of Basic and Applied Sciences*, 7(2), 160–176. <https://doi.org/10.46382/mjbas.2023.7207>

A STUDY OF EMPOWERMENT STATUS OF RURAL COLLEGE GOING GIRLS IN SKILL-BASED EDUCATION

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ABSTRACT

Various schemes and skill training centres have been running and established by the government to empower the youth. Due to a lack of awareness, girls are not able to take advantage of these opportunities. If girls take skill training along with education, they will become self-reliant and play an important role in the development of the nation. The objective of this study was to know the status of empowerment of rural college-going girls in Skill-Based Education of Sathiaon Block of Azamgarh District, (U.P.). In this study, a total of 75 college-going girls were selected. A Self-Structured questionnaire was utilized to know the status of empowerment of college-going girls in Skill-Based Education. All responses were collected in the month of April, 2025 from two private degree colleges of Sathiaon Block in Azamgarh District. For statistical analysis, percentage was calculated and graphical representation was made with the help of Microsoft Excel 2021 Software. Study concluded that 57.33% of respondents were aware of empowerment regarding skill-based education 42.67% were unaware i.e., a mixed picture of awareness and access regarding skill-based education. Most of the respondents stated that their parents did not allow them to take any type of Skill-Based Education. This highlights the need for improved outreach and support for rural college-going girls, ensuring that they not only have access to skill-based education but also clear pathways for job opportunities that can empower them economically and socially.

Keywords- Empowerment, Job Opportunities, Skill-Based Education

INTRODUCTION

Education empowers women to overcome obstacles, question their established roles and transform their lives. It is often considered a significant milestone in women's empowerment. Education is among the most effective means of influencing women's status in society. In our country, a sizable portion of the female population is still exploited, ignorant, and backwards due to a lack of education. Education serves as a tool to elevate one's position within the family and lessens inequality. Women have a way to get knowledge and skills that will help them better their

lives via empowerment and capacity building. Any country's residents are seen to have a fundamental right to education and a basic demand. Because it helps individuals become independent, it is a potent weapon for decreasing inequality. Education is a turning point in women's empowerment since it enables them to face obstacles, question their traditional looks, and transform their way of life (Pathak and Gupta, 2013).

Education is the fundamental right of every person in our society, irrespective of their gender. However, in our Indian society, girls have been deprived of education for a long time. Even today, higher education is the dream of many girls in rural areas. Vocational Education or Technical Education or skill-based education in a specific field enables students to acquire training and practical skills in a specific discipline or trade, vocation, or occupation. Vocational courses focus more on application-based study. Diverse job functions from various sectors, such as banking and finance, food and beverage, tourism, computer networks, designing, healthcare, cosmetology, skilled trades, etc., are included in vocational education. It is an advantage, as VET programs offer practical skills and hands-on training that train students for specific jobs. Skill-based education helps rural college going girls to become independent at an early age and prepares them for very fulfilling employment. As a result, the Indian government runs several programmes to give the poor and economically disadvantaged people access to vocational training. A youthful, productive workforce produced by high-quality vocational education and also delivered by knowledgeable trainers will make a significant contribution to the advancement of the country. A life of liberty can be made possible by education, but ability enhancement makes liberty much more feasible by enabling one to achieve affluence. The current need is for training to be mainstreamed in universities and schools. Women who have received an education are better equipped to explore the world and fully engage in the process of progress.

Numerous studies have been conducted on the education of girls and their evaluation. Researchers have made an effort to connect women's empowerment with programs and schemes introduced especially for them. **Henry, et al., (2024)** conducted an analytical study on "opportunities and challenges of empowerment of rural girls through higher education" and revealed that the number of institutions in rural areas is less than in urban areas. Rural families have a mindset of educating their children on the basis of gender. The above study shows that, regardless of the barriers rural students face from parents and society to get higher education, they are not able to do so. It is necessary to reduce it and provide equal training to achieve economic development. Educated women are productive, creative and dynamic. They make their lives better as well as the lives of other family members too.

Tiwari, et al., (2020) conducted a study titled status and role of rural and urban girls in educational empowerment. To conduct the study, girls' empowerment via education is crucial for addressing their social, economic, and other status issues, particularly those related to their conventional impoverished background. Five specific educational institutions in Rewa, M.P., have been the site of the study. The study concluded that the Education of girls in Rewa can have a particularly significant impact on reducing poverty and promoting the financial stability of the family, district, state, and nation.

Prabhakar and Nimesh (2022) conducted a study on "Skill development programmes for women in India: current status and future perspectives. While conducting the study comprehending the obstacles faced by rural women and finding methods to enhance their skill was the objective. The study concluded That the courses in skill development help find work and advance one's

career. If the government and banks help young business owners get started, these people will create jobs for others and boost the economy. Policies such as increasing access to skill development by providing more seats for women, gender mainstreaming of training content and delivery, and usage of digital platforms for women's empowerment should be simplified.

Hasnaen, et al., (2023) conducted a study titled “Empowering Rural Women through Skill Development: A Pathway to Sustainable Livelihoods.” Study demonstrates how crucial these initiatives are in improving the standard of living of rural women. In addition to addressing health concerns, it provides them with training and opportunities to start their own businesses. The study stated that technology is crucial and important, especially having computer skills and an awareness of the internet. Study recommends the things like creating educational websites, facilitating internet access for individuals, and establishing neighbourhood gathering spots. The function of skill development programs is to transform women's socioeconomic position, self-image, and confidence, as well as the issues and difficulties associated with skill development training. Skill-based education is increasingly recognized as essential for empowering individuals, particularly in rural areas where economic opportunities are often limited. In India, the landscape of skill-based education is evolving, yet significant challenges remain, especially for rural college-going girls. The government has, from time to time, introduced several programmes and schemes for the betterment of youth, such as Pradhan Mantri Kaushal Vikas Yojana (Catering management, Tailoring, Beautician course, Thread-embroidery and Computer skills etc.) Uttar Pradesh Mukhaya Mantri Yuva Swarojgar Yojana, Uttar Pradesh Free Tablet Smartphone Scheme etc, but still due to a lack of awareness they are not benefited.

In recent years, the Indian government has made progress in promoting skill development through initiatives like the Skill India Mission, aiming to bridge the gap between education and employability. Technical and vocational education and training (TVET) programs have been introduced in various colleges and institutions, providing students with practical skills aligned with industry demands. However, despite these efforts, the uptake among rural college-going girls remains very low. Keeping this problem in mind the present study was conducted to know the actual situation of college going girls regarding their status of skill -based education. Women in rural areas are denied certain social and economic rights and raised under the general supervision of their male family members. This study is focused on the status of empowerment of rural college going girls in skill-based education. Therefore, the purpose of present study was to determine the empowerment status in skill-based education of college-going girls.

OBJECTIVES

- ❖ To know the demographic status of selected college-going girls of the Sathion block of Azamgarh district.
- ❖ To study the awareness of skill-based education of college-going girls of Sathion block of Azamgarh District.
- ❖ To know the various sources of information they received about skill-based education of college-going girls.
- ❖ To assess the actual percentage of students receiving skill-based education.

METHODOLOGY

Survey method was used for the study. Two private degree college which are situated in Sathiaon Block of Azamgarh District (UP) have been selected using purposive sampling technique. Total 75 College going girls were selected using simple Random Sampling Method. The necessary data related to skill -based education were collected in the month of April 2025. The study was confined to only graduate and post graduate girls. A self-developed questionnaire was used to measure the empowerment status in skilled based education of girls. The questionnaire consisted of two sections, the first being on socio-demographic details of the participant related to age, religion, current education status, type of family, father's education and mother's education. Second part contained questions on skill-based education and empowerment. For analysis of data percentage was calculated and graphical representation was made with the help of Microsoft Excel 2021 software.

FINDINGS, RESULTS & DISCUSSION OF THE STUDY

Table 1 Distribution of Socio-demographic Variables of Girls

Age in Years	No. of Participants (N-75)	Percentage (%)
18-21	33	44
22-25	27	36
26-28	15	20
Educational Qualification	No. of Participants (N-75)	Percentage (%)
Under Graduation	49	65.33
Post Graduation	26	34.67
Religion	No. of Participants (N-75)	Percentage (%)
Hindu	63	84
Muslim	12	16
Christian	0	0
Others	0	0

Table 1- shows the socio-demographic analysis of the 75 respondents and reveals several key characteristics. A significant majority are aged 18-21 years (44%), with 36% in the 22-25 age group 20% in the 26–28 years, indicating a predominantly youthful demographic status. Out of Total 75 girls 65.33% are undergraduates and 34.67 % are postgraduate reflecting a strong emphasis on higher education. The sample is primarily Hindu (84%), with a small representation of Muslim respondents (16%) and no participants identifying as Christian or from other religions.

Table-2 Demographic Variables Related to Families of Girls

Type Of Family	No. of Participants (N-75)	Percentage (%)
Nuclear	52	69.33
Joint	23	30.67
Education of Mother	No. of Participants(N-75)	Percentage (%)
Not Educated	22	29.33
Primary	16	21.33
High School	13	17.33
Intermediate	10	13.33
Graduation	08	10.68
Post Graduation & Above	06	08.00
Education of Father	No. of Participants (N-75)	Percentage (%)
Not Educated	11	14.66
Primary	14	18.67
High School	17	22.67
Intermediate	21	28.00
Graduation	09	12.00
Post Graduate	03	4

Table -2 shows the demographic variables related to families of the girls. It is clear from the table that 69.33% girls belong to nuclear family whereas 30.67% girls belong to joint family. Family structure data shows that (69.33%) came from nuclear families, suggesting a shift toward smaller family units that may allow greater autonomy and decision-making for young women. Regarding parental education, a noteworthy 29.33% of mothers are not educated formally. 21.33% mothers having primary education, 17.33% where high School and 10.68% having graduated, with only 8% holding postgraduate degrees or higher, pointing to ongoing potential challenges in women’s education. Fathers also exhibit low educational attainment, with 14.66% being not educated and 12% holding graduate qualifications, with only 4% holding postgraduate degrees. Overall, this profile highlights the educational aspirations and socio-economic backgrounds of the girls, providing a valuable context for further exploration of their experiences and perspectives.

Table 3 Awareness about Skill-Based Education & Training Centres

Awareness of Skill Based Education	Frequency (N-75)	Percentage (%)
Yes	43	57.33
No	32	42.67

Table 3 illustrates the distribution of awareness and it shows that half of the respondents (57.33%) were aware of skill-based education and training, while a significant proportion (42.67%) reported no awareness. This indicates that although awareness exists among many college-going girls, a substantial number still remain uninformed about the opportunities available, highlighting a significant concern within the educational framework. This data underscores the urgent need for initiatives aimed at enhancing skill acquisition and confidence, as a substantial majority feel either average or low in their empowerment. By addressing these gaps through targeted training,

mentorship, and supportive resources, educational programs can better equip individuals, fostering a more empowered and capable workforce with special reference to rural girls.

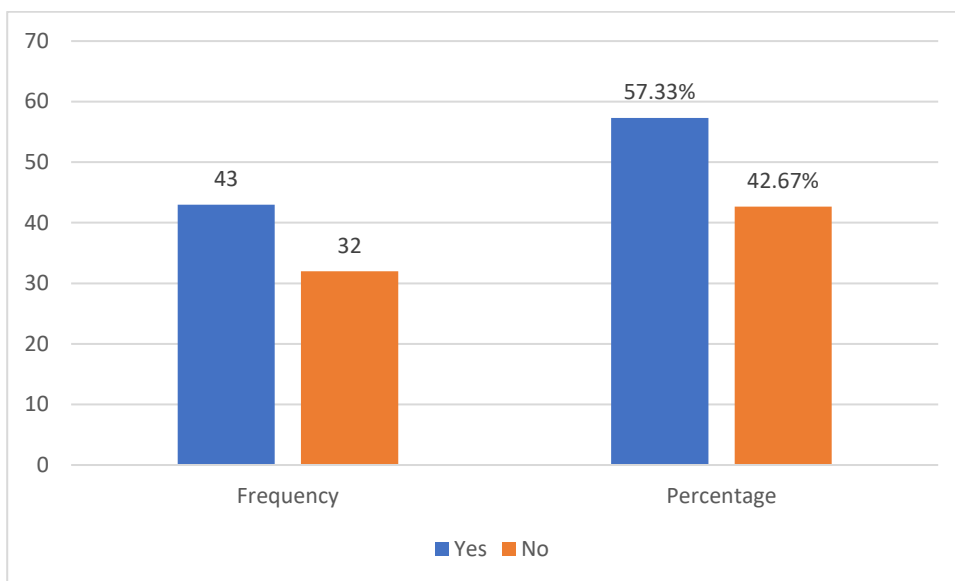


Fig-01 Awareness about Skill-Based Education & Training Centres

Table 4 Sources of Information About Skill-based Education & Training Centres

Sources of Information	Frequency (N-43)	Percentage (%)
Family & Friends	19	25.33
TV/Radio	8	10.66
Newspapers	5	06.66
Government Schemes	11	14.67

Table 4 shows that Family and friends were the most common source of information (25.33%), followed by government schemes (14.67%), TV/radio (10.66%), and very less percentage of girls received the information from newspapers (6.66%).

Table 5 Opportunity of Receiving Skill-Based Education & Training

Opportunity Received (SBE&T)	Frequency (N-75)	Percentage (%)
Yes	31	41.33
No	44	58.67

Table 5 shows that despite this awareness, only 41.33% had actually received skill-based education and training, leaving the majority (58.67 %) without access. This may be due to the reason that many rural families still adhere to traditional gender roles that prioritize early marriage and household responsibilities over education and career aspirations for girls. This cultural bias can discourage girls from pursuing skill training or higher education. In many rural areas, the infrastructure for skill training is inadequate. There may be a lack of nearby institutions offering quality vocational courses, making it difficult for girls to attend these programs without significant travel facility and associated costs.

Table 6 Opinion Regarding Job Security after getting Skill-Based Education & Training

Opinion about Job Security	Frequency (N-75)	Percentage (%)
Yes	36	48
No	39	52

Table 6 shows that opinion of job security after training was also mixed, with 48% believing it would provide employment benefits and 52% expressing uncertainty regarding potential employment after completing their training. Overall, the findings suggest that while some awareness exists, actual participation and confidence in career outcomes remain limited, pointing to the need for improved access and guidance.

Table 7 Obstacles Faced by Girls to Obtain Education and Training Related to Vocational Skills

S.no.	Obstacles	No. of Respondents	Percentage
01.	Low Income	10	13.33
02.	Lack of Proper Career Guidance	06	08.00
03.	Lack of Information	16	21.33
04.	Disagreement of Parents	43	57.34

Table 7 illustrates that 13.33% girls were facing the low-income obstacle. This may be due to the reason that financial challenges play a substantial role in the decision-making process. Their parents believed that it was a waste of time and money. Many families prioritize immediate financial needs over educational investments, leading to a focus on short-term employment rather than long-term skill development. This is particularly relevant for girls, who may be expected to contribute to household income early. 8% were facing with lack of proper guidance, 21.33 were facing lack of information and 57.34% were facing with disagreement of their parents. Disagreement with parents regarding the pursuit of vocational training is common, as families may have different views on the value of skill-based education versus traditional academic paths. This discord can create significant obstacles for girls aspiring to pursue vocational skills. There is often a significant gap in awareness about the availability of vocational training programs. Rural communities may less access to information about these opportunities, which can limit the girls' ability to make informed choices about their education and career paths. Concerns about safety while travelling to training centres can deter girls from seeking skill-based education. In many rural settings, the absence of reliable transportation and safe environments contributes to their reluctance.

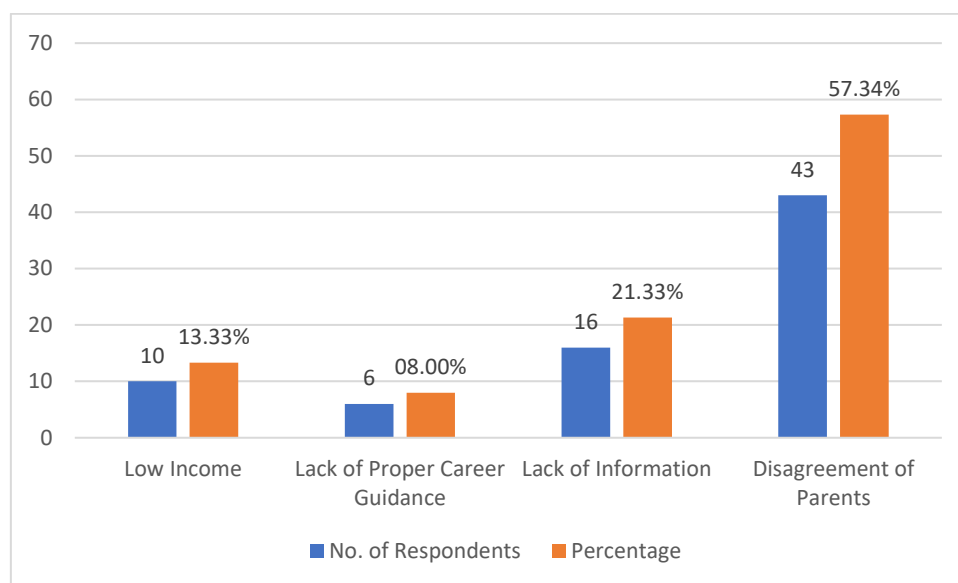


Fig-2 Obstacles Faced by Girls to Obtain Education and Training Related to Vocational Skills

CONCLUSION

- Only 57% of the college girls were aware of skill- based education and training.
- Family and friends were the most common source of (25.33%) information regarding skill-based education and Training.
- A very small percentage of college girls (41.33%) have the opportunity to receive Skill Based Education and Training while the majority were deprived.
- (48%) percentage of girls were of the opinion that skill- based education and training provide job opportunities.
- Disagreement of parents (57.34%) and lack of information (21.33%) regarding skill based education and training were the major obstacles faced by college girls.

The status of Empowerment of Rural College Going Girls in Skill-Based Education of Sathiaon Block at Azamgarh District (U.P.) was not satisfactory. The study gives the information that half of the girls were aware of skill-based education and training centres, but more than half of the girls did not have the opportunity to receive skill-based education and training. This highlights the need for improved outreach and support for rural college-going girls, ensuring they not only have access to skill-based education but also clear pathways to job opportunities that can empower them economically and socially.

SUGGESTIONS FOR FUTURE RESEARCH

- The study may be conducted selecting different blocks of different districts of Uttar Pradesh.
- In future, this study may be conducted selecting students of both genders.
- Study may be conducted comparing urban and rural college going girls.

REFERENCES

- Amgoth, D., Kameswari, S. L., & Reddy, R. G. (2022). Need-Based Vocational Skills for Rural Adolescent Girls. *Researchgate*, 73-82.
- Gautam, K., Gupta, R.P., & Tiwari, S. (2019). Study of Evaluating the Skill Development Programme: with special reference to Rewa. *International Research Journal of Commerce Arts and Science*, (10), 37-41.
- Hans, V. B., & Shetty, M. S. S. (2016). Education and Women Empowerment in India- Study in Dakshina Kannada District. *Annual Journal of Social Work "DEEKSHA"* 1(14), 5-21.
- Hariharan, N. (2021). Study on recent skill development and women empowerment forecasting 2012-2022 in India. *International Journal of Research Publication and Review*, (2). 608-613.
- Henry, A., Cutting, K., Hafeez, N. T., Lakhawat, P. S., & Sarkar, S. (2024). Analytical Study On Opportunities and Challenges for Empowerment of Rural Girls through Higher Education. *Educational Administration: Theory and Practice*, 30(5), 1-7.
- Luftu-ul-Hasnaen, S., Parvez, Z., & Syed, K. (2023). Empowering Rural Women through Skill Development: A Pathway to Sustainable Livelihoods. *Qlantic Journal of Social Sciences*, 4(4), 306-318.
- Pathak, S., and Gupta, A. (2013). Status of Women in India with Particular Reference to Gap in Male Female Literacy Rate in India, *International Journal of Environmental Engineering and Management*, 4(6): 549-552.
- Pillai. (1995). ietd.inflibnet.ac.in/bitstream/10603/435/8/08_chapter1.pdf
- Prabhakar, S., & Nimesh, A. (2022). Skill development programmes for women in India: current status and future perspectives. *World Journal of Advanced Engineering Technology and Sciences*, 7(1), 128-136.
- Tiwari, T., Tripathi, S. K., & Gautam, K. (2020). A Study of status and role of rural and urban girls in Educational Empowerment. *International Journal for Research in Education*, 9(4), 1-7.

VOLUNTEERS IN CORPORATE SETTINGS: A STUDY IN DELHI NCR

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ABSTRACT

The study "Volunteers in corporate setting: A study in Delhi NCR," explores the motivations and mobilization strategies of corporate volunteering across four (4) corporate organizations, two (2) national and two (2) international, using a mixed-method in Delhi NCR. The research gathered quantitative data from 60 young corporate volunteers, all with at least six (6) months of volunteering, and qualitative insights from four (4) program implementers. The demographic profile revealed that most volunteers were under 26, with a majority being male in both national (63.33%) and international organizations (56.67%). International organizations had a higher proportion of volunteers with postgraduate qualifications (40%) compared to national organizations (23.33%). The implementers were predominantly female, highlighting women's leadership in these programs. The key motivations for young volunteers included self-satisfaction, personal development, and improved work-life balance. Recognition and perks like volunteering leave, goodies, and refreshments were also found to boost engagement. Over 86% of volunteers reported developing valuable skills such as enhanced self-esteem, social awareness, and leadership. The study identified alignment with the Sustainable Development Goals (SDGs) as a way to promote impactful community development. Despite challenges such as time constraints and low awareness social media platforms like WhatsApp, Facebook, and LinkedIn were effective in raising awareness and sustaining participation. The findings emphasize the importance of adapting corporate volunteering strategies to the volunteers' interests and supporting them with policy frameworks that encourage youth empowerment. Effective collaborations with non-governmental organizations (NGO) were also deemed crucial for maximizing community impact. Overall, corporate volunteering not only contributes to societal well-being but also acts as a vital youth engagement strategy to empower young leaders and leverage their energy to drive social change.

Keywords: corporate volunteering, employee engagement, empowerment, non-governmental organization, volunteering

INTRODUCTION

Corporate volunteering is the process of engaging employees in community-focused activities that foster altruistic contributions to social causes while driving development (The Power of Volunteerism, 2016). Corporate organizations are discovering that integration of volunteer programs with their employees improves satisfaction, fosters employee engagement, and boosts retention (Kotler and Lee, 2011). Nowadays, volunteering is an end in and of itself as well as a tool

for development (UNV, 2018). It provides a special chance to execute one's altruistic nature and progress professionally (Wang, 2024). When properly implemented, this one-of-a-kind project has the potential to cause long-lasting social changes by creating ripple effects that spread throughout society. Well-designed volunteering activities offer a high sense of purpose, helping individuals and companies feel a deeper connection to something bigger than themselves (Harvard Business Review, 2019). Active volunteering has led to the development of various skills, such as time management, negotiation, collaborative abilities, planning, budgeting, and people management. (Caudron, 1994). This allows many corporations to reduce substantial expenditures on employee training and professional development initiatives, thereby enhancing business performance and fostering a more salubrious atmosphere for positive community relations in the areas where they operate.

Corporate volunteering encourages staff members to participate in socially conscious events organized by their workplaces in collaboration with non-governmental organizations (NGOs) (Samuel et al., 2013; Escher & Brzustewicz, 2020). Building on the framework by Siemieniako et al. (2021), corporate volunteering serves as a vital bridge, connecting businesses and NGOs to cultivate social awareness and drive positive change through their combined efforts. Corporate volunteering is efficient because it allows volunteers to use their existing skills, which reduces the need for extensive training and administrative overhead for NGOs (Salazar et al., 2012).

Inspired by global efforts like the Global Reporting Initiative and the Indian Companies Bill of 2013 led to the integration of human capital in CSR through corporate volunteering making it a key driver of CSR as stated by Grosser and Moon (2005). A company's social reputation significantly influences job choices, particularly among recent graduates. On top of that, specific employee groups show a growing interest in their company's engagement with local communities. This has led to an increasing coordination between CSR and human resources (HR) policies to meet employee demands for better work-life balance. According to research by Allen (2003) and Mittal et al. (2008), corporate volunteering provides two key benefits. First, it improves a company's external perception, which helps build community trust and attract new investors. Second, it enhances internal culture by increasing employee engagement and commitment to the company's values (Sgarciu, 2014). This strengthened sense of belonging can reduce employee turnover, boost productivity, and break down hierarchical barriers between management and staff.

Summary of companies' volunteer efforts							
Company	Rank in the list	Time allowances	Community involvement	Day of service event	Skills-based and pro-bono services	Non-profit board service	Focused philanthropy
Google	1	x		x	x		x
SAS	2	x		x	x	x	x
CHG Healthcare Services	3		x	x			
The Boston Consultancy Group	4				x		x
Wegmans Food Market	5						x
NetApp	6	x	x			x	

Hilcorp	7		x	x			
Edward Jones	8		x			x	
Ultimate Software	9	x	x				
Camden Property Trust	10		x				x
Accenture	91	x	x		x		
Hasbro	92	x	x				x
Goldman Sachs Group	93	x	x		x		x
Starbucks	94	x	x				
Mars	95	x	x		x		x
Mattel	96	x		x			x
Aeropostale	97	x		x			x
FedEx	98	x	x	x			x
Grainger	99		x				x
CH2M Hill	100	x	x	x	x		x

Fig 1: 100 Best Companies to Work For (Source: Fortune's report, 2013)

Companies all around the world emphasize multiple dimensions of employee well-being to ensure sustained engagement and motivation (Fortune, 2013). According to Barnett et al. (2020), volunteers' emotional commitment greatly enhances their work attitudes, resulting in increased job satisfaction and awareness of societal issues. Allowing volunteers to use their current talents further improves the effectiveness of corporate volunteering and reduces the administrative and training responsibilities (Salazar et al., 2011). Involving youth in corporate volunteering is an increasingly important and valuable endeavor for companies and development organizations. This initiative encompasses a range of benefits, including the potential to inspire, motivate, and empower individuals while making a significant contribution to social causes.

OBJECTIVES

General objective: To comprehensively examine the youth's motivations and mobilization strategies being used, including the prospects and challenges of the implementers in corporate volunteering.

Specific objectives

- To explore the youth's motivations and the influence of volunteering in their lives.
- To identify and document mobilization strategies used by different organizations in corporate volunteering.
- To map the perspectives of program implementers on the prospects and challenges of involving youth in corporate volunteering.
- To analyze the policies of corporate organizations about volunteering by their employee

HYPOTHESIS TESTING

Analysis of the age difference between national and international corporate organizations.

(Ho): There is no difference in the age of the participants

(Ha): There is a difference in the age of the participants

- $X^2 = 2.968326$
- p-value = 0.08491

Discussion: The statistical analysis conducted compared the ages of participants between National and International Organizations, to determine if there was a significant difference. The obtained chi-square value (X^2) was 2.968326, and the corresponding p-value was calculated to be 0.08491. With a predetermined significance level (α) of 0.05. We concluded that there is no difference in the age of the participants between national and international organizations

METHODOLOGY

Research design

This research used a mixed-methods exploratory approach to explore the dynamics of corporate volunteering among youth in the Delhi-NCR region. The study's design combined mixed methods, including quantitative surveys to measure youth motivations, with qualitative in-depth interviews to capture the perspectives of program implementers. This methodology provided a comprehensive view of what drives youth engagement and continued participation.

Locale of the study

The Delhi-NCR area was chosen as the study's location due to its dense corporate presence, which was ideal for a study on corporate volunteering. The region's vibrant urban environment, diverse socioeconomic profile, and strong culture of corporate social responsibility (CSR) and employee volunteering through Human Resources (HR) policies made it a fitting backdrop for the investigation.

Tools for data collection

The study combined quantitative surveys to assess youth motivations with qualitative in-depth interviews to capture program implementers' perspectives.

Analysis

The quantitative data are presented in percentages and totals with supporting graphs for clarity, while the qualitative interviews were analyzed using a thematic analysis approach. This provides insights into implementers' strategies, challenges, and perspectives. All tools were pre-tested to ensure reliability, and potential challenges such as scheduling with corporate employees were addressed through transparent communication and flexible arrangements.

Sampling method

For the study, a snowball sample was used to recruit 60 young volunteers from four different companies (two national and two international), all of whom had at least six months of volunteering experience, and one (1) program implementer from each of the four organizations, each with at least a year of experience.

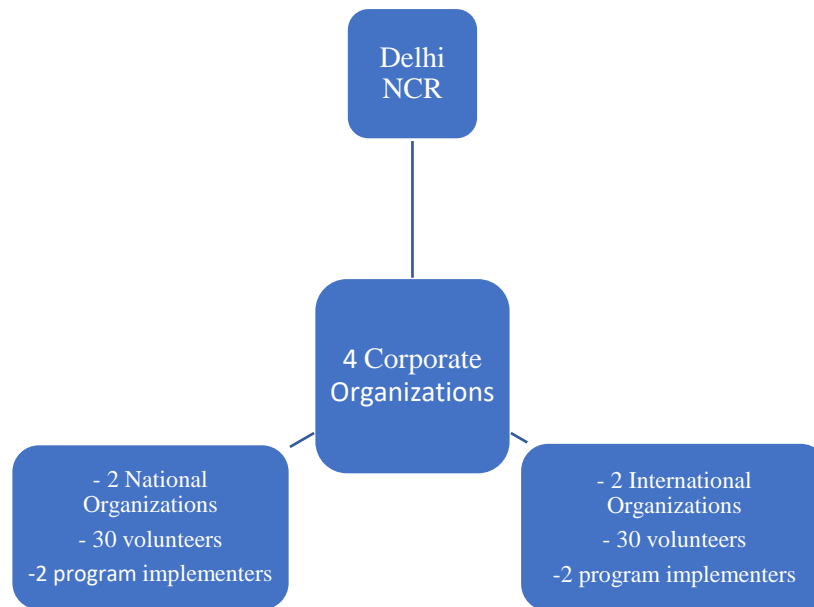


Fig 2: Sampling method

RESULTS & DISCUSSION

Demographic details of the respondents

National organizations have a higher number of young volunteers, a greater gender imbalance, and a higher proportion of graduates, whereas international organizations showed more diversity in age, a narrower gender gap, and a balanced mix of educational backgrounds. Despite these differences, both sectors are equally committed.

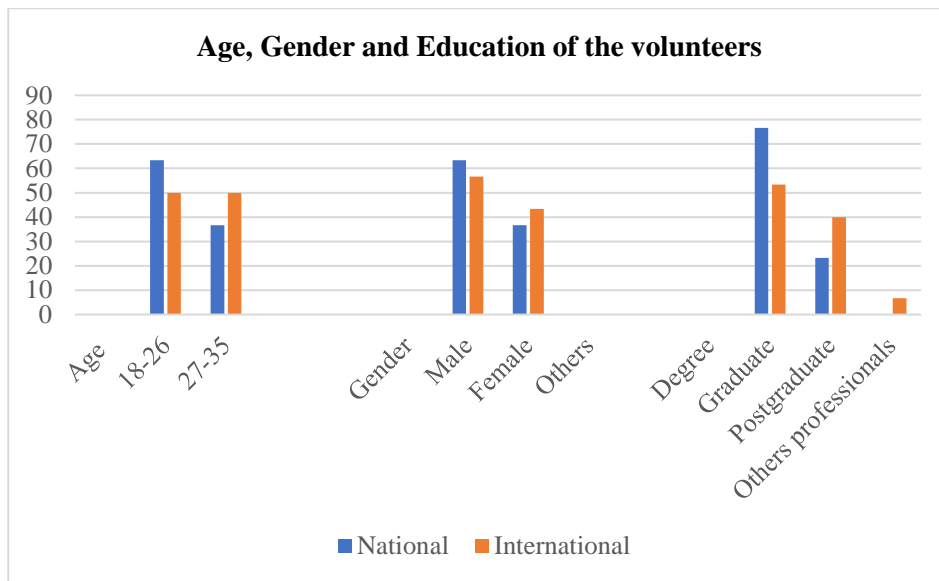


Fig 3: Demographic details of the respondents

Types of activities

Corporate volunteering programs in both organizations exhibit similar patterns as well as significant distinctions regarding time commitments. The majority of volunteers choose shorter time commitments (less than five hours). International organizations employ a more flexible hybrid model that incorporates online possibilities and favors a larger range of activities, whereas national organizations offer physical volunteering and concentrate on local environmental issues. This emphasizes how different organizations must increase their long-term volunteer retention and provide a variety of engagement options to accommodate a range of schedules and interests.

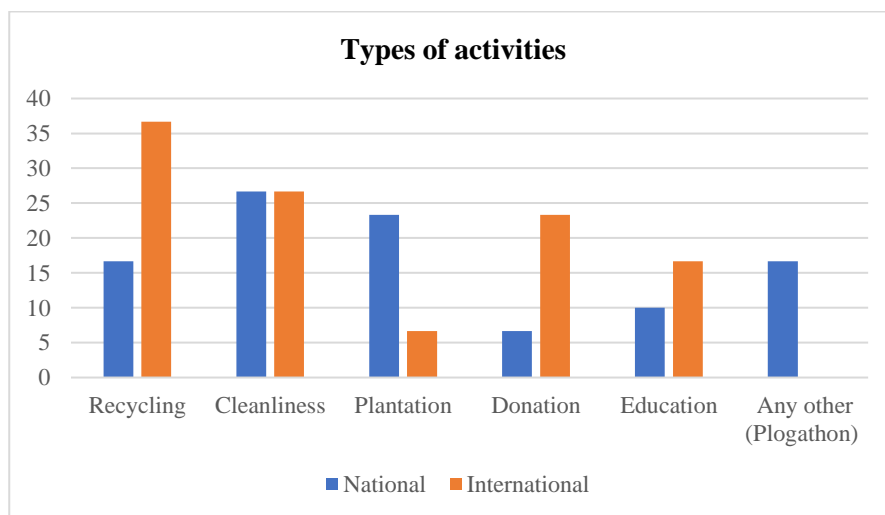


Fig 4: Types of activities

Benefits of corporate volunteering

Environmental causes are given top priority by corporate volunteers from both groups, with the majority of each group opting to support them. While international organizations are more likely

to offer non-monetary incentives like goods, national organizations are more likely to offer practical benefits like transportation. All of the respondents reported gains in self-esteem, heightened social awareness, and the growth of their leadership abilities. This demonstrates that volunteering is a potent instrument for societal influence and personal growth, motivated by a combination of intangible advantages and internal rewards.

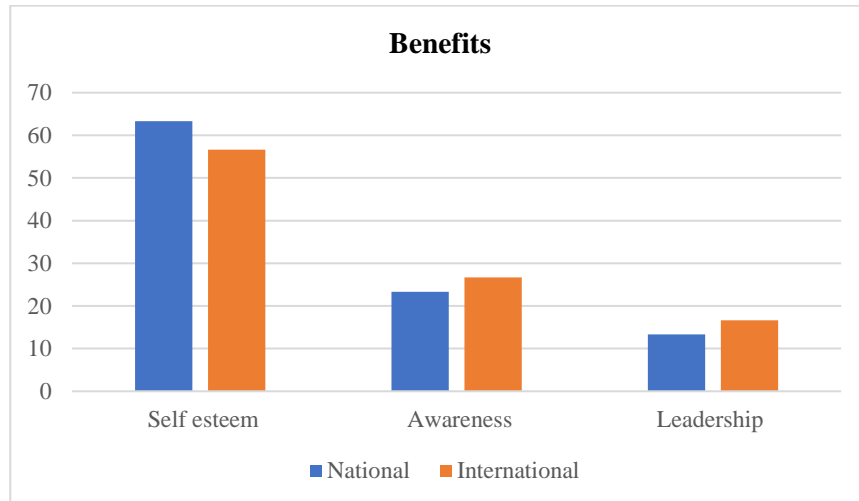


Fig 5: Benefits of corporate volunteering

Types of influence

Motivated primarily by a desire for change, empathy, and a sense of community belonging, volunteers see corporate initiatives as a way to create positive societal change. The success of these programs is measured by tangible improvements and growth, but also by the strength of collaborations and partnerships. For volunteers, satisfaction hinges on work-life balance, support from family and friends, and opportunities for personal and professional growth.

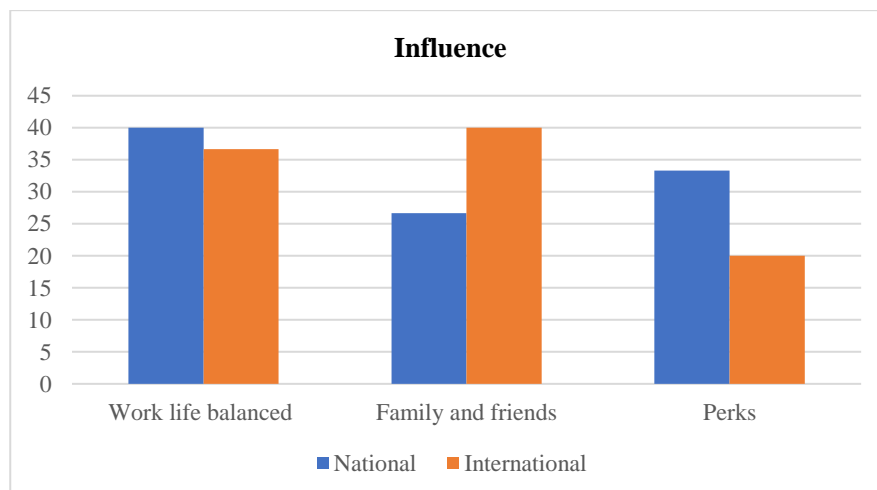


Fig 6: Types of Influence

Motivations of the volunteers

Volunteers are primarily driven by a profound desire for change and a deep sense of empathy. These individuals are motivated not only by a wish to see positive outcomes but also by an innate sense of belonging within a specific community, whether it's a group of patients or a wider social circle. Their commitment stems from a personal belief in the cause and a strong connection to the people they help by finding purpose and satisfaction in making a tangible impact on others.

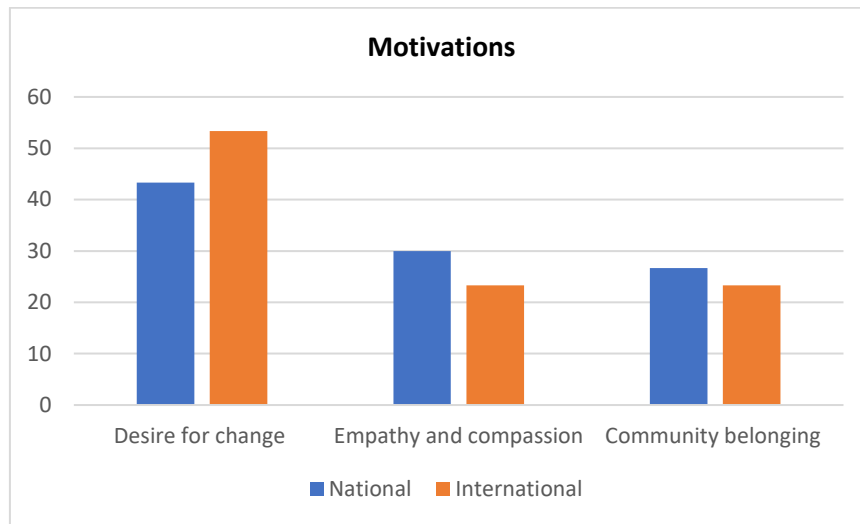


Fig 7: Motivations of the volunteers

Intention for future involvement in corporate volunteering

Both national and international volunteers have a positive opinion of their corporate volunteering experiences, and positive sentiment is tied to feelings of personal fulfillment, skill development, and social impact. As a result, all volunteers expressed a strong desire to continue their involvement in future corporate volunteering initiatives. This willingness highlights the importance of creating a supportive and engaging environment to ensure sustained commitment.

Communication and social media

Volunteers from both national and international contexts agree that communication in corporate volunteering programs is highly efficient, largely due to the effective use of social media. An impressive 95% of volunteers support sharing photos and videos of their activities online, and 100% affirm that social media is an effective tool for engaging volunteers and promoting philanthropic efforts.

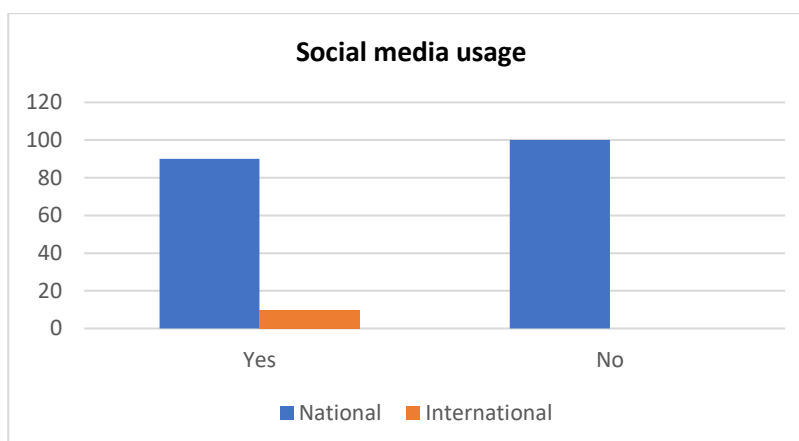


Fig 8: Communication and social media usage

Details of the implementers of corporate volunteering

The implementers, two from national and two from international organizations, provided insights into corporate volunteer programs. The majority (75%) were women between 27 and 35 years old, all with postgraduate degrees and full-time employment. The group had diverse professional backgrounds. Their experience as implementers ranged from 2.5 to 5 years. All the organizations had a long history of corporate volunteering, which was a core part of their Corporate Social Responsibility (CSR) and human resources policies. International organizations mobilized a large number of volunteers (e.g., 16,000), while national organizations had a smaller scale (e.g., 150 volunteers). The primary responsibilities of these implementers included identifying CSR projects, organizing quarterly activities, coordinating with volunteers and partners, and assigning tasks. Their priority areas are education, women's empowerment, environmental protection, disaster relief, gender empowerment, responsible travel, WASH, and livelihood initiatives. Corporate volunteering events are always aligned with the SDGs.

Benefits and challenges

Corporate volunteering helps individuals develop key professional and personal skills. It fosters teamwork, leadership, and problem-solving abilities. Volunteers gain practical experience that can influence their career decisions and overall personal development. By involving young people, companies infuse corporate volunteering with fresh perspectives and energy. To effectively engage them, organizations align volunteer opportunities with youth interests, provide leadership platforms, and ensure an inclusive environment, which not only builds a more sustainable future but also boosts the volunteers' personal well-being. The study identified key challenges in sustaining youth participation, including limited commitment to long-term engagement, misalignment between volunteers' personal interests and program activities, and difficulties in balancing volunteering with professional or academic responsibilities. These factors often hinder consistent involvement and reduce the overall effectiveness of corporate volunteering initiatives.

Supporting community activities and driving change

A company's deep involvement in corporate volunteering focuses on supporting vulnerable populations. They provide essential supplies like food, medicine, and clothing, and work to improve hygiene, education, and digital access by distributing menstrual kits and computers. Their dedication

to the environment is clear through recycling programs and cleanliness drives. The company also invests in empowering communities by providing solar energy solutions and offering skill-building workshops. Involving youth in volunteer programs brings fresh ideas and energy. To effectively engage them, companies align volunteer opportunities with young people's interests and values and offer platforms for leadership. This inclusive approach ensures that a wide range of young people can participate, which in turn helps create a more sustainable and equitable future.

Motivation and mobilization strategies for engagement

Organizations use several strategies to keep young volunteers engaged and committed for the long term. These include conducting regular sessions on the importance of their work, offering a variety of meaningful projects, providing ongoing training and skill-building, and fostering a sense of community. Recognition through public acknowledgment and awards also plays a crucial role. Organizations also maintain engagement through regular communication and flexible scheduling, and they use social media to showcase the impact of their volunteer efforts. A supportive organizational culture with clear communication and flexible scheduling is also vital. On the other hand, organizations have standardized volunteering policies that offer perks like paid time off (VTO), gifts, and transportation to motivate employees. Other initiatives include Matching Gift Programs, Skills-Based Volunteering, and Volunteer Recognition programs.

How organizations execute corporate volunteering

Organizations strategically use their Corporate Social Responsibility (CSR) and human resources funding to maximize impact. They tailor initiatives to the specific needs of local communities and ensure transparency through rigorous financial oversight and external audits. Collaboration with other organizations and stakeholders helps guide the allocation of funds, ensuring resources are used effectively. They also rely on data and pilot studies to make evidence-based decisions and prioritize local initiatives to ensure long-term sustainability. The increasing awareness of CSR among employees, especially recent graduates, also drives these efforts. Partnering with educational institutions provides access to a motivated pool of young volunteers and leverages existing resources for a greater impact.

Role of social media

Social media is a powerful tool for promoting corporate volunteering. Platforms like Instagram, Facebook, and LinkedIn are used to raise awareness, share success stories, and showcase volunteer experiences, which encourages peer-to-peer influence and participation. By using these platforms, organizations can maintain continuous communication with volunteers, helping to sustain engagement and build a sense of community.

CONCLUSIONS

Corporate volunteering is a powerful catalyst for positive change, driven by motivations like personal satisfaction and a desire for societal impact. Effective communication, especially through social media, boosts volunteer engagement and the overall success of these initiatives. Youth involvement is particularly beneficial, as it fosters skill development and aligns with a company's commitment to social and environmental responsibility. This study confirms that corporate volunteering is a significant tool for personal and community development with over 86% of volunteers reporting improved skills like self-esteem and leadership. These programs also align with

Sustainable Development Goals (SDGs), contributing to national progress. Despite challenges like time constraints and lack of commitment, social support from friends and family, combined with strategic use of platforms like WhatsApp and LinkedIn, helps to sustain participation. To enhance their impact, organizations should adopt flexible scheduling and create initiatives that meet specific community needs. This encourages more businesses and even government organizations to invest in volunteering to improve societal well-being.

The limitations of the study include the selection of only two (2) organizations, each from national and international organizations. This limited selection may not adequately represent the diversity of corporate volunteering programs across different regions and organizational structures.

SCOPE FOR FUTURE RESEARCH

Future research can further examine the strategies adopted by different companies, assess the role of corporate volunteering in strengthening social and community support systems, and explore how such initiatives can be effectively leveraged to address diversity, equity, and inclusion (DEI) in the workplace.

REFERENCES

- Allen K. (2003). The social case for corporate volunteering. *Australian Journal on Volunteering*, 8(1), pp. 57-62. F. (n.d.). <https://www.scribd.com/document/261055598/SocialCase-for-Corporate-Volunteering>
- Barnett, M. L., Henriques, I., & Husted, B. W. (2020). *Beyond Good Intentions: Designing CSR Initiatives for Greater Social Impact*. Journal of Management. <https://doi.org/10.1177/0149206319900539>
- Brzustewicz, P., Escher, I., Hatami, A., Hermes, J., Keränen, A., & Ulkuniemi, P. (2022). *Emergence of social impact in company–NGO relationships in corporate volunteering*. Journal of Business Research. <https://doi.org/10.1016/j.jbusres.2021.11.089>
- Caudron, S. (1994). *Volunteer efforts offer low-cost training options*.
- Escher, I., & Brzustewicz, P. (2020). *Inter-Organizational Collaboration on Projects Supporting Sustainable Development Goals: The Company Perspective*. Sustainability. <https://doi.org/10.3390/su12124969>
- *Fortune 100 Best Companies to Work For*. (2023). Fortune. <https://www.fortune.com/ranking/best-companies/>
- Grosser, K., & Moon, J. (2005). The role of corporate social responsibility in gender mainstreaming. *International Feminist Journal of Politics*, 7(4), 532–554. <https://doi.org/10.1080/14616740500284524>
- *Harvard Business Publishing Education Review*. (2019) <https://www.hbsp.harvard.edu/product/R2101H-PDF-ENG>
- Kotler, P., & Lee, N. (2011). *Corporate Social Responsibility*. John Wiley & Sons. http://books.google.ie/books?id=f6k9ycrf6b8C&pg=PA1982&dq=0-471-47611-0&hl=&cd=1&source=gbs_api
- Mittal R.K., Sinha N., Singh, A. (2008). An analysis of linkage between economic value added and corporate social responsibility. *Management Decision*, 46(9), pp. 1437-1443

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- Salazar, J., Husted, B. W., & Biehl, M. (2011). *Thoughts on the Evaluation of Corporate Social Performance Through Projects*. *Journal of Business Ethics*. <https://doi.org/10.1007/s10551-011-0957-z>
- Samuel, O., Wolf, P., & Schilling, A. (2013). Corporate Volunteering: Benefits and Challenges for Nonprofits. *Nonprofit Management & Leadership*, 24(2), 163–179. <https://doi.org/10.1002/nml.21089>
- Sgarciu L. (2014). De ce ar trebui se sustine companiile voluntariatul. Retrieved September 2016 from <http://www.csr-romania.ro/articole-si-analize/concepte-de-baza/978-de-ce-ar-trebuie-sa-sustina-companiile-voluntariatul.html>
- Siemieniako, D., Kubacki, K., & Mitreaga, M. (2021). Inter-organisational relationships for social impact: A systematic literature review. *Journal of Business Research*, 132, 453–469. <https://doi.org/10.1016/j.jbusres.2021.04.026>
- *The power of volunteerism*. (2016). UNV. <https://www.unv.org/power-volunteerism>
- *United Nations Volunteers Programme Annual Report (2018)*. <https://www.bing.com/search?q=UNV+2018+report&form=ANNTTH1&refig=68ce90249d294a808d0533802596ba67&pc=ASTS>
- Wang, J. (2024). *Employee Volunteering: 7 Benefits to Boost Engagement & Productivity - Communitier*. Communitier. <https://communitier.org/blog/employee-volunteeringengagement#:~:text=Regardless%20of%20the%20details%2C%20the%20foundation%20of%20an,on%20the%20employee%E2%80%99s%20interests%20Target%20real%20community%20needs>

A CASE STUDY ON RESIN FURNITURE IN CHENNAI CITY

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ABSTRACT

The Case study on Resin furniture in Chennai city was conducted to analyze the prevalence, durability and longevity of resin furniture and compare the cost-effectiveness, availability of design and style options of resin furniture with traditional outdoor furniture materials, such as wood, metal, and plastic. The methodology of the study comprises phase I, gathering information from the manufacturing dealers of resin furniture in the Chennai city followed by phase II, Creating awareness among the college students about the scope of resin furniture in future. The study has been carried out in three resin furniture manufacturing units. The managers of each unit were the respondents. The Tool used was Interview method which comprised of 25 questions with information pertaining to Types of resins used for furniture making, steps involved in furniture construction, cost, durability, care and maintenance, designs and styles of furniture, skills required, Bio-degradation of resin furniture, advantages and disadvantages, people's opinion and choice of resin furniture. It is concluded from the study that resin furniture is still under developing stage. It has following advantages of low care requirements, weather resistance, lightweight design, and durability, it is a great material for outdoor furniture including tables, chairs, and loungers. Resin furniture is well-known for being affordable, available in a variety of forms, and highly customizable in terms of color to fit a variety of decor styles and tastes. It is also found that Epoxy resin is the main substance used to make resin furniture.

Key Words – Biodegradable resin, Resin furniture, Upcycling of old furniture with resin.

INTRODUCTION

Wooden furniture can be found frequently in offices, government buildings, and residential and commercial spaces, such as hotels, hospitals, and schools. They make the area more appealing and beautiful. Furniture composed of specific plastics that may be molded into specific shapes is known as resin furniture. They protect outdoor furniture that is often composed of wood from the elements. Resin furniture was popular for its attractiveness, ease of cleaning and maintenance, resilience, and resistance to decay from rain and snow, they are becoming a good substitute for hardwood furniture.

Due to its excellent stiffness, dimensional stability, bending strength, water resistant, chemical and corrosion resistance, epoxy resin is widely used for laminations, adhesives, coatings, and advanced composite surfaces (Wondemagegnehu and Legesse, 2023). Resin furniture is a growing trend that has taken over the interior design world. It's a combination of wood and metal with epoxy resin that brings about the visionary and inspiring fabrication of semi-transparent, colorful masterpieces.

OBJECTIVES OF THE STUDY

- 1) To analyze the prevalence, durability and longevity of resin furniture, including its resistance to wear and tear, scratches, and fading.
- 2) To compare the cost-effectiveness of resin furniture with traditional outdoor furniture materials, such as wood, metal, and plastic.
- 3) To investigate the design and style options available for resin furniture, including its versatility in different settings, such as residential, commercial, and hospitality.

REVIEW OF LITERATURE

Resin

Resin is a strong, premium plastic that is used for tabletops, free-standing furniture, and components like seats, backs, and armrests. Its great waterproofness (it doesn't rust or degrade) makes it the perfect material for outdoor furniture. Polyester, polyamides, polyurethanes, epoxies, silicones, polyethylene, acrylics, or polystyrene are the few varieties of resins used for furniture construction (Simona Ganea, 2017).

Characteristic Features:

According to (Leni Yu 2023), Resin is a kind of plastic material which is well-known for being low maintenance, weather resistant, and durable. Furniture made of resin has a few characteristics, such as:

Highest Quality and Ultra Clear Epoxy Resin:

Ordinary epoxy resin materials are of mediocre grade and cannot ensure decades of endurance. UV-proof formula is one of the most important characteristics of the best epoxy resin. For decades, UV-proof epoxy resin promises not to fade, change color, or lose its transparency. Strong constituents in premium resins prevent scratches on the table's surface. Because of this, epoxy resin tables are more robust than conventional furniture materials.

UV-resistant:

Resin is inherently resistant to UV light and the color of the furniture won't deteriorate with time. This makes it perfectly fit for outdoor use.

Style options:

Many different styles ranging from conventional and classic to modern and contemporary can be made using resin that best suits to fit into our style and taste.



Fig-2: Resin Teapoy Table

Customizable:

Resin furniture can be customized with our preferred color or pattern.

Method of Creating Resin Furniture:

STEP 1: Select Wood, Sanding and Positioning the Wood: When the wood that we intend to treat in epoxy is uneven or rough, sand it with sandpaper grits ranging from 120 to 220. Make the surface smooth and even using a sandpaper, so that the epoxy will adhere to it easily.



Fig-4: Raw Wood before Treatment

STEP 2: Clean the wood: With a fresh microfiber cloth, mini vacuum or brush remove any debris or dust left behind from sanding the wood. When applying epoxy to wood that has been dampened with a towel to remove dust, allow the wood to cure completely.

STEP 3: Using Painter's tape: Turn the wood over, place it on a level surface. Apply painter's tape over the edge of the wood's back, making sure to press it down tightly to prevent epoxy leaks. When pouring resin into the wood, this prevents drips from creating on the underside of the wood.

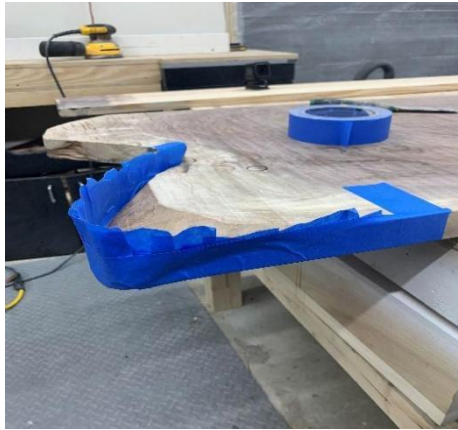


Fig-5: Using Painter's Tape to prevent Epoxy Leak

STEP 4: Cover the surfaces using cardboard or plastic: Pick a level surface, such as a work table or kitchen table, to construct furniture on. To prevent the epoxy from ruining your table, cover the surface with a piece of plastic or thick, even cardboard.



Fig-6: Work Table Surface

STEP 5: Prevent touching the surface: These might be any two or three flat and tall enough objects to lift the wood off the table, such as upside-down cups or wooden blocks. Keep the wood so that it is hovering over the surface of the objects, with the side that will receive the epoxy coating facing up.

STEP 6: Mix the epoxy: Since many varieties of epoxy have strong smells, it's crucial to mix and pour in an area with lots of fresh air. Additionally, it's critical to work in a dust-free environment to prevent particles from combining with the epoxy and producing a murky, unclean covering.

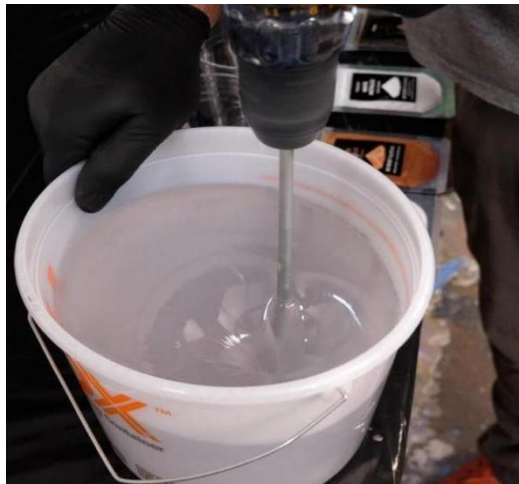


Fig-7: Mixing Epoxy

STEP 7: Measure the resin and hardener: The ratio of resin to hardener varies depending on the type of epoxy you use, so be sure to carefully read the instructions to ensure you are pouring the right amount of each. Transfer the hardener into a separate disposable cup and the resin into the first one. The majority of businesses will offer both the hardener and the resin.

Plastic cups are ideal because it's easy to measure the resin and hardener due to their indentations. The package will have the ratios labeled, and they are often 1:1, 2:1, or 4:1.

STEP 8: Combine the resin and hardener: Pour the resin and hardener into the same disposable cup after they have been accurately measured to start combining them.

STEP 9: Pour the epoxy: Once the epoxy is thoroughly combined, carefully pour it onto the wood as soon as possible to avoid hardening. Pour enough in the middle to create a thin layer that covers the entire piece of wood.



Fig-8: Pouring Epoxy

STEP 10: Use a foam brush to spread epoxy: Using back-and-forth strokes, dip the foam brush into the epoxy puddle and start pulling the epoxy over the edges. Make sure the entire piece of wood is covered by applying a uniform layer of epoxy. With the foam brush, remove any extra epoxy from the sides.

STEP 11: Get rid of air bubbles: When pouring epoxy, air bubbles are unavoidable, but they can be eliminated with a heat gun, torch, or hair dryer. To burst the bubbles, turn on the heat source and hold it about 6–10 inches (15–25 cm) away from the epoxy's surface.



Fig-9: Removing Air Bubbles using Heat Source

STEP 12: Allow to set for 4 hours: Let the first coat of epoxy start to solidify by setting a timer for four hours. As it cures, it should feel tacky, indicating that you should apply another coat even though it won't be totally dry and firm.

If, within the first half hour, you see more air bubbles, try using your preferred heat source to burst them.

STEP 13: Apply an additional coat: As with the previous batch, mix a second batch of epoxy with the proper ratio of hardener to resin. After pouring this coat into the center of the wood piece, level the surface using a spatula or spreader.

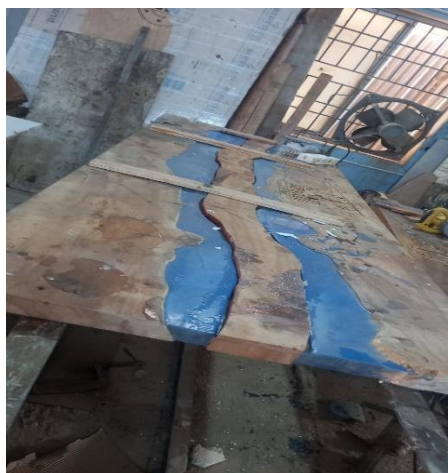


Fig-10: Hardening of Epoxy

STEP 14: Wait until epoxy hardens: It takes 24-36 hours for epoxy to fully solidify. When the wood is firm to the touch, carefully turn it over and remove the painter's tape to view the epoxy-coated wood. To ensure that the wood is not damaged while the epoxy is setting, refrain from touching or moving it (Barry Zakar, 2021).

Benefits of Resin Furnitures:

According to (Ashby 2014, Karbhari 2015, Strong 2016, Wibowo 2020), Resin furniture offers several functional, aesthetic, and environmental advantages that make it increasingly popular in both indoor and outdoor settings. One of its key benefits is high durability, as resin materials—particularly epoxy and polymer-based resins—exhibit excellent resistance to moisture, corrosion, chemicals, and weathering, making them ideal for outdoor and high-humidity environments. Resin furniture also requires low maintenance, as it does not rot, warp, or require frequent polishing like traditional wood,

and it can be easily cleaned with minimal effort. Another major advantage is design flexibility, since resins can be molded into complex shapes and combined with wood or metal to create innovative, semi-transparent, and visually striking furniture pieces that enhance contemporary interior aesthetics. Additionally, resin furniture supports material efficiency and sustainability, as it can extend the life of wood through protective coatings, reduce dependence on hardwood, and incorporate composite or recycled materials, contributing to more sustainable furniture manufacturing practices.

METHODOLOGY OF THE STUDY

Research Design

A case study can be defined as an intensive study about a person, a group of people or a unit, which is aimed to generalize over several units (Heale and Twycross, 2018). In this current study on resin furniture three commercial units manufacturing and distributing resin furniture were analyzed in detail regarding the varieties of furniture manufactured, materials used, manufacturing process, types of resins, advantages, drawbacks, care and maintenance and preference from customer point of view.

Tools Used for the Study

The main tool used for the present study was the interview schedule method. In order to fulfill the main objective of the study, a semi-structured questionnaire has been formulated. The necessary data was collected and the information was recorded carefully.

Semi-Structured Questionnaire comprises on following details like:

- Demographic profile
- Details of resin
- Details of resin furniture
- Cost of the resin furniture over the traditional furniture
- Advantages and Drawbacks of resin furniture
- Maintenance and characteristic of resin furniture
- Method of preparing resin furniture

Main Study

Utilizing the planned interview schedule, the primary study was carried out at Plate 1: Suzerain Epoxy Décor, Porur Gardens, Vanagaram, Chennai, Plate 2: Shaigrahaa, Ramamoorthy Garden, Thiruverkadu, Chennai, Plate 3: Walkwood Epoxy Decor, Green Park, Thiruverkadu, Chennai. The Owner and the in-charge were personally contacted and informed about the goal of the study. The two people got along well, and information was obtained on the procedure and the right approach about the Resin Furniture. On the spot, the questions were answered and the technical terms were explained.

Resin Furniture Manufacturing Units

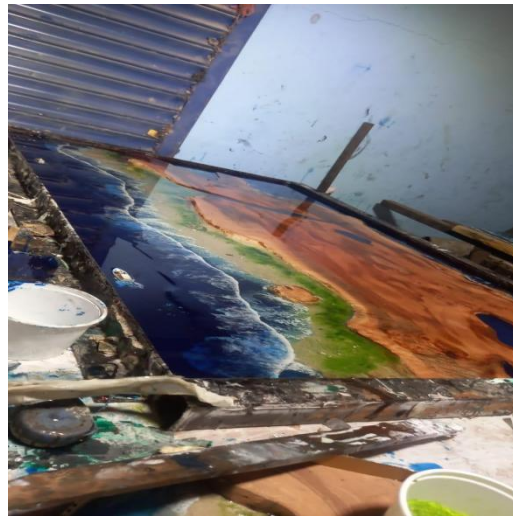


Plate 1: Suzerain Epoxy Décor, Porur Gardens, Vanagaram, Chennai.

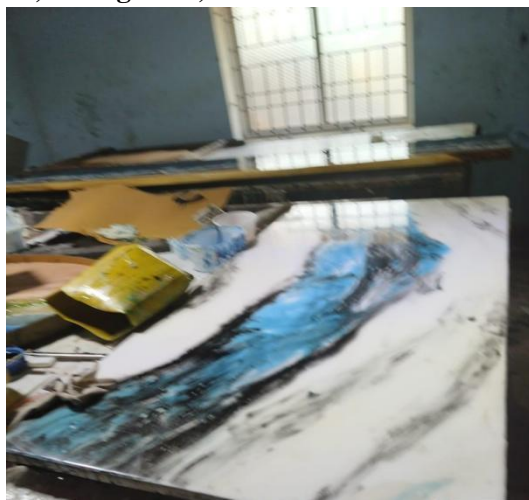


Plate 2: Shaigrahaa, Ramamoorthy Garden, Thiruverkadu, Chennai.



Plate 3: Walkwood, Green Park, Thiruverkadu, Chennai.

PHASE - II: Creating Awareness on Resin Furniture among College Students:The study fostered to create awareness on future generation and proper utilization of Resin furniture. The target groups focused to induce the knowledge about the resin furniture were college students. Since the students of adolescent age were going to be the future endeavors for the development of the society in proper consumption and utilization of resin furniture in both the interior space and outdoor space.

RESULTS AND DISCUSSION

“A Case Study on Resin Furniture in Chennai City” aimed to explore the growth and development of resin furniture in India, various sizes and cost of Resin furniture, types of Resin furniture and its use in interiors, method of construction, various themes and design, finishes applied in Resin furniture, advantages and drawbacks of resin furniture to college students.

1)How many types of resins are available in the market?

The respondents reported that more than five types of resin are available in the market, they list the five resin names Epoxy Resin, Polyester Resin, Polyurethane Resin, Silicone Resin, UV resin. These all are some types of resin but for the furniture making the specific resin were used.

2) Which type of resin are commonly used in furniture making?

The respondents reported that epoxy with the ratio of 3:1 was used for furniture making. The resin mixed with the hardener in the ratio 3:1 will give more durable furniture.

3)What is a key advantage of using resin in furniture making?

The respondents reported that the resin furniture is protected against spill, scratch and stain, it is more durable and long-lasting furniture, does not need more care and maintenance, easily customizable and also easy to make any colour combination.

4)For what weather condition resin furniture will be more suitable?

The respondents reported that the resin furniture is suitable for all kinds of weather conditions, so that's why the resin furniture is mostly preferred as outdoor furniture.

5)Is resin furniture more Durable and sturdier?

The respondents reported that while compared to other types of furniture like plastic, metal, glass furniture, resin furniture are more durable and sturdier. However, if the resin is not mixed in the correct ratio or if it has not been given the correct curing time, the durability gets affected and also leads to easy damage.

6)Is resin furniture suitable for Outdoor?

The respondents reported that the resin furniture is more suitable to use in the outdoor areas, as it is weather resistant and also heat resistant.

7)What are the steps involved in preparing resin furniture?

The respondents reported that the following are the steps involved in preparation of resin furniture

- Prepare work space
- Preparation of wood pattern (selection of wood and sanding the wood to make smooth surface)

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- Leakage arresting with tape (cover the area with painter's tape arrest the leakage)
- chemical treatment for wood
- Measure and mix resin and hardener (mix the resin and hardener with the correct given ratio of 3:1)
- Add colour (add extra elements to the resin like colours, glitters etc to enhance the beauty of the furniture)
- Pouring and casting (pour the resin in the wood from the center so it evenly spread to the all-area, and also did not cover the full area by pouring at one time have to pour the resin layer by layer)
- Curing (leave it for dry at minimum 24hrs)
- Demolding (after drying remove the painter's tape from it)
- Finishing Touches (mostly polish is done as the finishing touch to achieve a smooth and glossy finish to furniture)

8)Is resin furniture good for heat resistance?

The respondent reported that resin furniture can withstand heat up to 300°F and hence considered as good in heat resistance.

9)What is the quality testing done for resin furniture before marketing?

The respondent reported some quality tests are done like Durability test, heat resistance test, transparency test these all are some tests made before it sells.

10)What are the factors that affect the serviceability of resin furniture?

The respondent reported Curing time is the main factor affect the resin furniture, it takes more time to curing, changes in temperature and changes in climate during the curing process, extreme heat and extreme cold leads to crack, incomplete curing and bubbles formation in the resin, and also the mixing ratio of resin is not proper it leads to less durability and weaken the strength of the furniture and reduce the lifetime of the furniture.

11)Is resin furniture biodegradable or non-biodegradable?

The respondent reported that resin furniture is non-biodegradable, because while burning it releases some toxic gas that's why it is not biodegradable.

12)Any idea about how resin furniture is recycled?

The respondent reported that applying new epoxy resin layer over the old surface while applying it adds some colour pigment on it, so it adds beauty to the old furniture and also makes it new.

13)If yes, what methods are commonly adopted for re-cycling?

The respondent reported that if the old furniture is faded or broken resin is used to fix it, in the faded furniture the resin added with some colours make it as a new one, applying new epoxy resin coating with some elements like colours, seashell, glitters etc, and finally giving some finishes like sanding and polishing,

14)Do you undertake any recycling method in your firm?

The respondent reported that yes, like adding the resin coating with colours in the old furniture, adding the resin coating without any colour gives the glass like finish to the furniture, and also a re-polishing concept is applied.

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15)What kind of resin provides glass-like transparent properties?

The respondent reported that ultra-clear epoxy resin makes the glass transparent, the epoxy resin is the most common type resin used for furniture making.

16)What are the common elements added to resin furniture for improving its aesthetic appeal?

The respondent reported that the following element are used for the aesthetic

- Wood
- Colour Pigments
- Glitter,
- Seashell
- Sand
- Pebbles
- dry leaves, dry flowers, spices

17)What are the care and maintenance to be followed for resin furniture?

The responder reported that they mostly avoid sharp edge things like knives to prevent scratches, avoid direct sunlight to prevent the colour fading and keep it clean by wiping it regularly with soft cloth and have to use mild soap, detergent and water to clean.

18)What is the primary advantage of resin furniture over traditional wood furniture?

The responder reported that the following point as the advantage of resin furniture over the traditional wood furniture;

- Can add any colour,
- Can easily do any customized design
- Any theme-based project & Glossy look is given easily,
- Heavy duty,
- High bacterial resistance,
- High fungal resistant
- High corrosion resistance

19)What is a characteristic feature of resin furniture that makes it particularly eco-friendly?

The responder reported that using recycled material and using wood makes the resin furniture eco-friendly.

20)How does the weight of resin furniture generally compare to traditional furniture materials like metal or hardwood?

The responder reported that if the resin furniture is compared to the wood, it's almost the same weight, while we compared to the metal furniture the resin furniture is lighter than the metal furniture.

21)What are the common problems that are encountered in using resin furniture?

The responder reported that scratches are the one of the main problems affecting the glossy look of the furniture, if there is no proper curing time for resin furniture it leads to more issues like furniture bending, colour fading, and durability issues.

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22) How does the cost of resin furniture typically compare to furniture made of traditional materials like teak or mahogany?

The responder reported that basically the resin furniture is costly than the other furniture because of its material cost and duration of manufacturing cost, the rate of resin furniture is minimum 2800 per square feet, the prices may vary as per its design and them.

23) What innovative feature has been recently incorporated into some resin furniture?

The responder reported that the following design are recently incorporated in resin furniture;

- Spices table
- Coral rock design
- Deep sea concept
- Beach design
- Ocean design
- Simple transparent design with incorporation of wood
- Galaxy design

24) Can resin furniture be customized in terms of design and colour?

The responder reported that it is very easy to do a customized design, because it gives the more option to do a customized work, while compared to other furniture resin furniture is best to do a customized design.

25) What are the common Furniture pieces produced using resin?

The responder reported that the following are the some of the furniture pieces made by the resin;

- Chair,
- Tea Table, Side table
- Dining table and chairs,
- Door
- Wash basin.
- Bench

SUMMARY AND CONCLUSION

The study on resin furniture outlines the many advantages and characteristics of resin furniture. Because of its low care requirements, weather resistance, lightweight design, and durability, it is a great material for outdoor furniture including tables, chairs, and loungers. Resin furniture is well-known for being affordable, available in a variety of forms, and highly customizable in terms of color to fit a variety of decor styles and tastes.

The study includes a thorough analysis of the benefits, uses, and production method of resin furniture for interior spaces. It is a well-liked option for outdoor environments because of its resilience to weather and longevity. It has little maintenance needs. Epoxy resin is the main substance used to make resin furniture, and it is molded into different furniture components using an injection molding technique.

The study underscores the potential of resin furniture to play a significant role in interior design projects by offering a blend of functionality, durability, style, and ease of maintenance. As a versatile

and cost-effective furniture option, resin furniture can transform indoor spaces into inviting and practical environments that cater to the needs and preferences of occupants. Whether used in residential living rooms, office lobbies, restaurant seating areas, or hotel guest rooms, resin furniture has the capacity to enhance the overall ambiance and usability of interior settings, making it a valuable asset in the realm of interior design.

REFERENCE

- Ashby, M. F., & Johnson, K. (2014). *Materials and design: The art and science of material selection in product design* (3rd ed.). Butterworth-Heinemann.
- Barry Zaka,(2021)” How to Apply Epoxy on Wood” <https://www.wikihow.com/Apply-Epoxy-on-Wood>
- Heale and Twycross, (2017), “What is a case study”, (PDF) What is a case study? (researchgate.net)
- Karbhari, V. M. (2015). *Fiber-reinforced polymer composites for civil infrastructure*. Woodhead Publishing.
- Khalil, H. P. S. A., Bhat, A. H., & Yusra, A. F. I. (2012). Green composites from sustainable cellulose nanofibrils: A review. *Carbohydrate Polymers*, 87(2), 963–979. <https://doi.org/10.1016/j.carbpol.2011.08.078>
- Leni Yu, (2023), “Eco-Friendly Plastic Chairs: Sustainable, Recyclable, and Environmentally Conscious” 25th March 2023, LinkedIn Eco-Friendly Plastic Chairs: Sustainable, Recyclable, and Environmentally Conscious (linkedin.com)
- Simona Ganea, (2017) “Resin Furniture Forever Encapsulates Beauty In Extraordinary Designs” <https://www.homedit.com/resin-furniture/>
- Strong, A. B. (2016). *Fundamentals of composites manufacturing: Materials, methods, and applications* (2nd ed.). Society of Manufacturing Engineers.
- Wibowo, A., & Azis, Y. (2020). Durability and maintenance of resin-based outdoor furniture. *Materials Today: Proceedings*, 22(4), 1200–1206. <https://doi.org/10.1016/j.matpr.2020.03.145>
- Wondmagegnehu and Legesse, (2023) “Experimental Investigation of Mechanical and Physical Properties on Epoxy Resin with Wood Timber for Furniture Application” <https://www.tandfonline.com/doi/epdf/10.1080/15440478.2023.2286327?needAccess=true>

A STUDY ON PERCEPTION AND ATTITUDE OF TAMIL NADU-BASED COLLEGE STUDENTS TOWARDS INTERIOR DESIGN OF COMMERCIAL SPACES

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ABSTRACT

Given that spatial design has a substantial impact on user behavior, engagement, and emotional well-being, this study examines the attitudes, perceptions, and behavioral reactions of college students in Tamil Nadu toward the interior design of commercial venues. Understanding student viewpoints helps designers, educators, and legislators create user-centered environments since commercial designs have psychological and aesthetic functions in addition to functional ones. In order to investigate four main dimensions awareness of design principles, emotional reactions to spatial aesthetics, functional aspects of interiors, and behavioral influences on engagement and decision-making within commercial spaces data were gathered using a descriptive survey methodology and a structured questionnaire. Students from a variety of academic backgrounds made up the participant pool, enabling a comprehensive study of demographic variations in behavior and perception. ANOVA was used to find significant differences between groups, chi-square analysis was used to examine associations between categorical variables, reliability testing was used to guarantee measurement consistency, descriptive statistics were used to summarize trends, and correlation analysis was used to ascertain the direction and strength of relationships between variables. A thorough grasp of the relationship between design features and behavioral and psychological reactions is provided by this holistic analytical method. The study's conclusions emphasize how important aesthetics, usability, and environmental psychology are in determining how customers interact with commercial settings. The study provides practical insights for interior designers looking to improve engagement and satisfaction, academic institutions looking to incorporate design psychology into their curricula, and policymakers interested in creating spaces that balance mental health and functionality by clarifying the relationship between design, psychology, and user behavior. Overall, this research contributes to the growing body of knowledge on human-centered design and underscores the importance of creating commercial interiors that are both visually appealing and psychologically supportive.

Keywords- Commercial Interior Design, Student Perceptions, Behavioral Responses, Tamil Nadu College Students.

INTRODUCTION

Consumer attitudes, feelings, and behaviors are greatly influenced by commercial interior design. In contrast to residential designs, which prioritize individual comfort, commercial rooms are purposefully created to draw in, hold on to, and engage clients. In addition to improving aesthetics, components including lighting, color schemes, layout, and décor significantly affect psychological reactions and decision-making (Bitner, 1992; Kotler, 1973). Global research highlights how the physical setting in which services are provided, or the "servicescape," influences client loyalty and happiness. According to environmental psychology, physical locations can stimulate feelings of enjoyment, excitement, or calm, which can influence actions like engagement, time spent, and return visits (Mehrabian & Russell, 1974; Turley & Milliman, 2000).

Commercial interiors in India have become social and cultural hubs due to the fast growth of malls, cafés, restaurants, and co-working spaces, especially in urban areas (Chaudhuri & Majumdar, 2006). As new consumers with increasing purchasing power, college students are drawn to both practical features like accessibility, comfort, and cleanliness as well as aesthetic features that improve their mood and sense of social identity (Rani, 2014; Sharma & Ghosh, 2019).

This study integrates design and psychology principles to examine how college students in Tamil Nadu perceive and react to commercial interior design. In addition to advancing scholarly knowledge of the relationship between design, emotions, and consumer behavior, the findings are intended to assist designers, educators, and companies in developing commercial settings targeted towards young people.

OBJECTIVES

1. To determine how well-informed college students in Tamil Nadu are about the function of interior design components in business settings.
2. To investigate how students feel about aspects of commercial interior design like ambiance, color, and lighting.
3. To assess how students view commercial premises with relation to comfort and functionality (seating, layout, cleanliness, and illumination).
4. To examine how student's behavioral preferences such as visiting, buying, and recommending commercial spaces are influenced by interior design.
5. To investigate college student's general attitudes and perceptions on the role that interior design plays in influencing business encounters.

HYPOTHESES

H1: Students awareness of commercial interior design is significantly correlated with their demographics (gender, academic stream, and year of study).

H2: Students' emotional reactions (mood, comfort, and pleasure) are positively impacted by their awareness of commercial interior design elements.

H3: Students' perceptions and enjoyment of commercial venues are greatly influenced by functional design elements such as seating, cleanliness, layout, and lighting.

H4: There is a considerable correlation between positive emotional reactions to commercial interiors and behavioral outcomes, including time spent, propensity to visit, purchase, and recommendations.

H5: College students believe that interior design plays a significant role in determining the general success and appeal of commercial venues.

METHODOLOGY

Research Design: To investigate college students' attitudes and views of commercial space interior design in Tamil Nadu, a descriptive survey approach was used. Through the use of a standardized questionnaire that made systematic data collecting possible, this design allowed for quantitative examination of awareness, emotional responses, functionality, and behavioral preferences.

Population and Sample: Undergraduate students from particular colleges in Tamil Nadu were included in the population. 113 students in all finished the survey. Because students were easily accessible through peer and instructor networks, convenience sampling was employed, which was appropriate for exploratory studies on attitudes and perceptions.

Tool for Data Collection: Based on studies in interior design, environmental psychology, and consumer behavior, a systematic questionnaire was created. Among them were:

Section A: Demographics (Age, Gender, Study Year, Stream)

Section B: Perception and Awareness of Commercial Interior Design (8 items)

Section C: Emotional Reaction and Mood (8 entries)

Section D: Usability and Comfort (7 items)

Section E: Behavioral Influence and Preference (7 items)

A 5-point Likert scale was used to score the items in Sections B–E (1 being strongly disagree and 5 being strongly agree).

Data collection method: Students from a variety of universities, including those with home science and interior design degrees, were given access to the survey online through Google Forms. The goal of the study was explained to the participants, they were guaranteed anonymity, and they were asked to answer honestly.

Statistical Analysis: Descriptive statistics, correlation analysis, chi-square, one-way ANOVA, and reliability testing were used to examine the data.

FINDING AND DISCUSSION

Descriptive Analysis: Demographics

Introduction: In order to comprehend the respondents' backgrounds and diversity, this part examines their basic profiles. Age, gender, year of study, and stream are covered, all of which aid in spotting trends in attitudes and perceptions of commercial interior design.

Objective: To evaluate the demographic distribution of 113 students to provide context for subsequent perception and attitude analysis.

Table-1 Demographic Profile of the Study Participants

Variable	Category	Frequency (n=113)	Percentage (%)
Age	18–20 years	52	46.0%
	21–23 years	44	38.9%
	Above 23	17	15.1%
Gender	Female	74	65.5%
	Male	39	34.5%
Year of Study	1st Year	31	27.4%
	2nd Year	33	29.2%
	3rd Year	36	31.9%
	4th Year	13	11.5%
Degree Level	Undergraduate	105	92.9%
	Postgraduate	8	7.1%
Stream	Arts	45	39.8%
	Science	34	30.1%

	Commerce	23	20.4%
	Others	11	9.7%

Findings:

- The responses are dominated by younger participants, with the majority of students (46.0%) being between the ages of 18 and 20.
- Given that they make up 65.5% of the student body, more female students participated in the poll.
- The majority of responders (31.9%) are third-year students, with second-year students (29.2%) coming in second.
- When compared to other streams, students in the arts stream are the most represented (39.8%).

Conclusion: Diversity in viewpoints and experiences is ensured by the sample's balanced demographic profile, which includes a little female predominance and a larger proportion of Arts stream students.

Descriptive Analysis: Awareness & Perception

Introduction: Students' knowledge and impression of interior design in commercial settings are assessed in this section. Students' awareness levels demonstrate how well they understand how lighting, color schemes, textures, layout, and décor shape business spaces.

Objectives: The goal is to gauge students' knowledge and comprehension of commercial interior design and how it affects their perceptions.

Table-2 Awareness & Perception of Interior Design Elements in Commercial Spaces among Students

Question	High Awareness (n)	Moderate Awareness (n)	Low Awareness (n)	Mean	SD
Awareness of interior design in commercial spaces	70 (61.9%)	30 (26.5%)	13 (11.6%)	3.9	0.68
Awareness of lighting effects on mood	72 (63.7%)	28 (24.8%)	13 (11.5%)	4.0	0.65

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Noticing color schemes in commercial spaces	68 (60.2%)	32 (28.3%)	13 (11.5%)	3.8	0.71
Awareness of artistic elements like décor pieces	65 (57.5%)	35 (31.0%)	13 (11.5%)	3.7	0.69
Influence of innovative design on interest	75 (66.4%)	25 (22.1%)	13 (11.5%)	4.1	0.63
Attention to textures, patterns, materials	64 (56.6%)	36 (31.9%)	13 (11.5%)	3.8	0.72
Awareness of layout and space arrangement	70 (61.9%)	30 (26.5%)	13 (11.6%)	3.9	0.70
Perception of overall décor's effect	76 (67.3%)	24 (21.2%)	13 (11.5%)	4.0	0.66

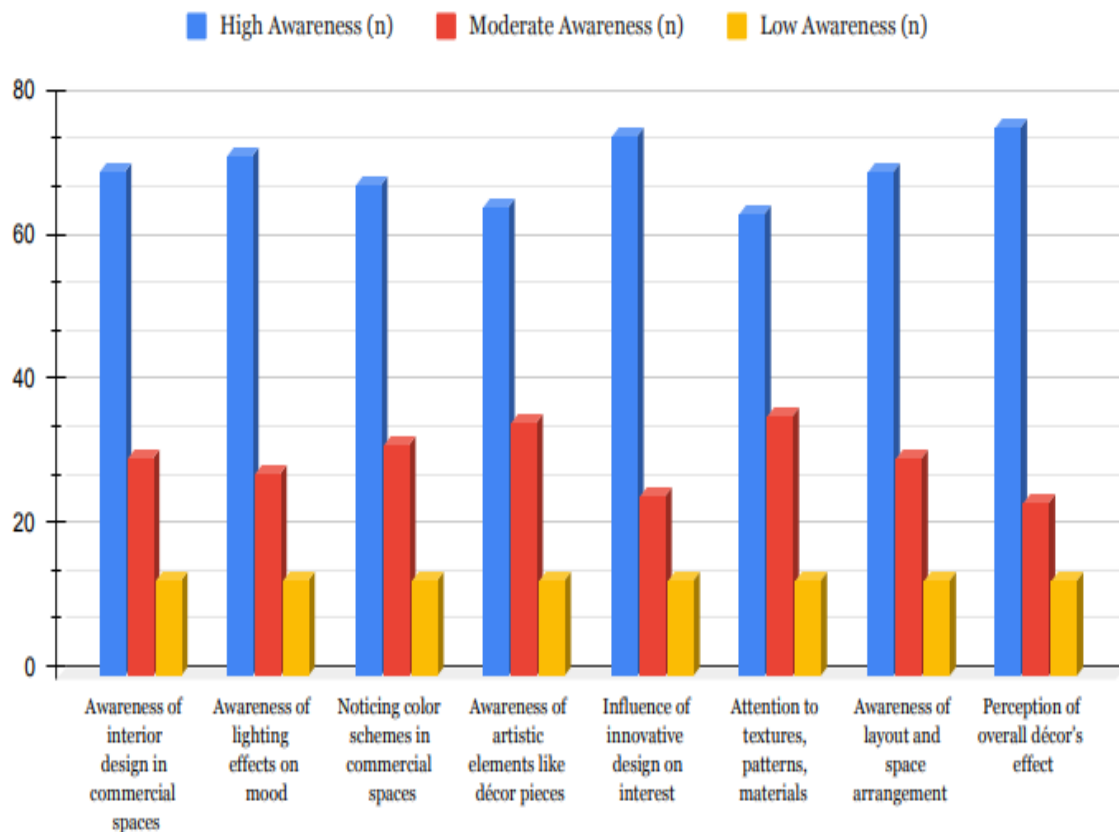


Fig-1 Awareness & Perception of interior design Elements in commercial

Findings:

- More than 60% of students showed a good level of awareness of design elements.
- Innovative interior design impacting interest had the highest awareness (4.1 mean score).
- Observing textures and patterns revealed somewhat lower awareness levels.

Conclusion:

The findings show that students are generally highly aware of the function and significance of business interior design, indicating that respondents value both aesthetic and practical elements.

Descriptive Analysis: Emotional Response & Mood

Introduction: In this section, the mood and emotional responses of students to well-designed commercial settings are examined. It examines how their emotional experiences are influenced by interior design components like color, décor, natural features, and general ambiance.

Objective: The purpose of this study is to assess the effects of commercial interior design on Tamil Nadu students' emotional comfort, optimism, relaxation, and contentment.

Table-3 Emotional Responses of Students towards Well-Designed Commercial Spaces

Question	High Emotional Response (n)	Moderate Emotional Response (n)	Low Emotional Response (n)	Mean	SD
Feeling relaxed in well-designed spaces	78 (69.0%)	25 (22.1%)	10 (8.9%)	4.1	0.62
Happiness or satisfaction in aesthetic spaces	80 (70.8%)	23 (20.4%)	10 (8.8%)	4.2	0.60
Influence of color schemes on mood	76 (67.3%)	25 (22.1%)	12 (10.6%)	4.0	0.65
Engagement with artistic décor elements	74 (65.5%)	28 (24.8%)	11 (9.7%)	3.9	0.68
Positivity due to natural elements	82 (72.6%)	20 (17.7%)	11 (9.7%)	4.2	0.58
Feeling inspired by creative design	79 (69.9%)	23 (20.4%)	11 (9.7%)	4.1	0.61
Ambience affecting emotional comfort	84 (74.3%)	19 (16.8%)	10 (8.9%)	4.3	0.57
Pleasant experience from design during shopping/leisure	81 (71.7%)	22 (19.5%)	10 (8.8%)	4.2	0.59

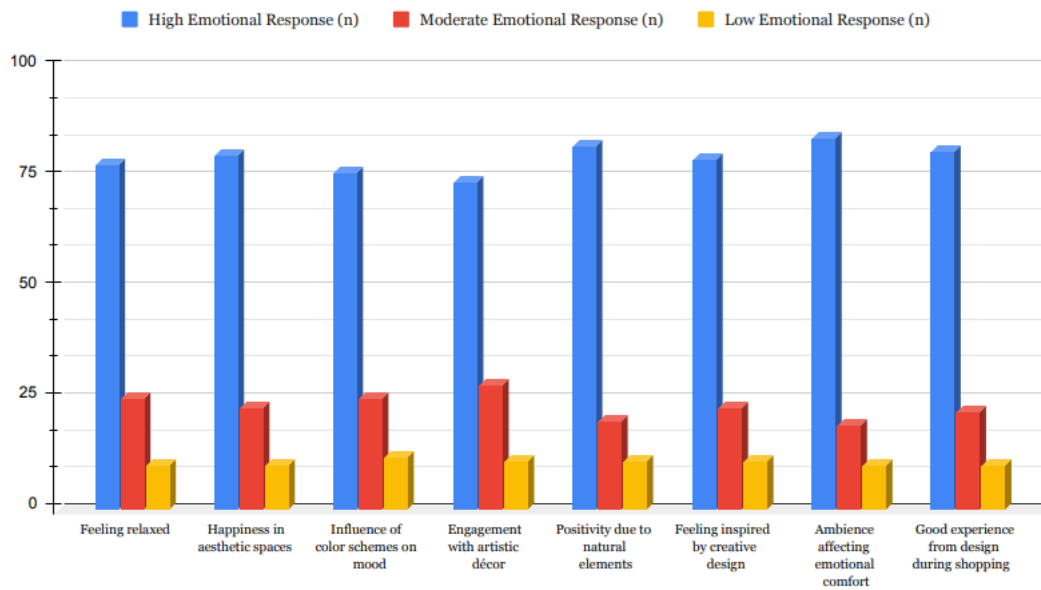


Fig-2 Emotional Responses of Students to Well-designed Commercial

Findings:

- A significant portion of pupils (70 percent and higher) regularly expressed favorable emotional responses to elements of commercial interior design.
- Ambience received the highest score (Mean = 4.3), emphasizing its important contribution to total experience and emotional comfort.
- Additionally, artistic designs and natural components were found to be significant beneficial triggers for emotional well-being.

Conclusion:

Students link well-designed spaces to improved emotional experiences, such as contentment, positivity, and relaxation. This suggests that emotional reactions can impact behavioral decisions, including returning to or promoting these settings, and they can strongly reinforce favourable opinions of commercial interior design.

Descriptive Analysis: Functionality & Comfort

Introduction: This part examines how students view elements such as seating, layout, lighting, and ergonomic design in relation to the practical usability and comfort of business interiors. In commercial settings, these factors have a big impact on user pleasure and experience.

Objective: To assess how comfort and usefulness affect students' tastes and contentment when they visit businesses.

Table-4 Functionality and Comfort of Commercial Interior Spaces

Question	High Response (n)	Moderate Response (n)	Low Response (n)	Mean	SD
Seating comfort affecting willingness to stay	78 (69.0%)	25 (22.1%)	10 (8.9%)	4.1	0.62
Layout and arrangement influencing satisfaction	80 (70.8%)	24 (21.2%)	9 (8.0%)	4.2	0.59
Cleanliness and organization shaping perception	85 (75.2%)	20 (17.7%)	8 (7.1%)	4.3	0.55
Ergonomic furniture improving experience	77 (68.1%)	26 (23.0%)	10 (8.9%)	4.1	0.64
Combination of aesthetics and functionality	82 (72.6%)	21 (18.6%)	10 (8.8%)	4.2	0.58
Proper lighting contributing to comfort	84 (74.3%)	20 (17.7%)	9 (8.0%)	4.3	0.56
Ease of navigation due to good layout	81 (71.7%)	23 (20.4%)	9 (7.9%)	4.2	0.57

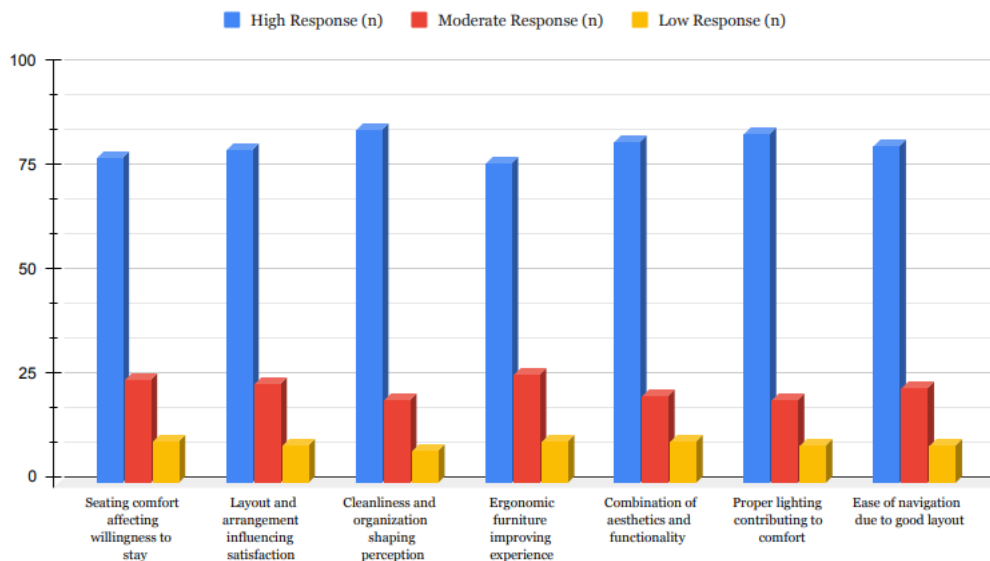


Fig-3 Usability and Comfort of Business interiors

Findings:

- The two factors that had the biggest impact on user comfort were cleanliness and organization (Mean = 4.3) and enough illumination (Mean = 4.3).
- Students valued both practical usability and aesthetic appeal, as evidenced by the excellent ratings given to seating comfort, arrangement, and ergonomic design.

Conclusion:

Students' enjoyment in commercial settings is closely correlated with functional design and comfort, demonstrating how practical usability influences their preferences in addition to aesthetic appeal.

Descriptive Analysis: Behavioral Influence & Preference

Introduction: This section examines how students' preferences, frequency of visits, propensity to make purchases, and recommendations are influenced by interior design elements in commercial settings.

Objectives: To assess how much students' visitation patterns, purchasing decisions, and peer recommendations are influenced by the visual and practical attractiveness of interior design.

Table-5 Behavioral Influence and Preference towards Commercial Interior Design among Students

Question	High Response (n)	Moderate Response (n)	Low Response (n)	Mean	SD
Influence of interior design on visiting decisions	80 (70.8%)	23 (20.4%)	10 (8.8%)	4.2	0.61
Appeal of interiors affecting purchase likelihood	78 (69.0%)	25 (22.1%)	10 (8.9%)	4.1	0.63
Noticing design before other factors (like price)	75 (66.4%)	28 (24.8%)	10 (8.8%)	4.0	0.65
Aesthetic appeal influencing time spent	82 (72.6%)	20 (17.7%)	11 (9.7%)	4.2	0.58
Likelihood to recommend based on interior design	84 (74.3%)	19 (16.8%)	10 (8.9%)	4.3	0.57
Attraction to modern design trends	79 (69.9%)	23 (20.4%)	11 (9.7%)	4.1	0.62
Belief that designs is key to success of space	85 (75.2%)	20 (17.7%)	8 (7.1%)	4.3	0.55

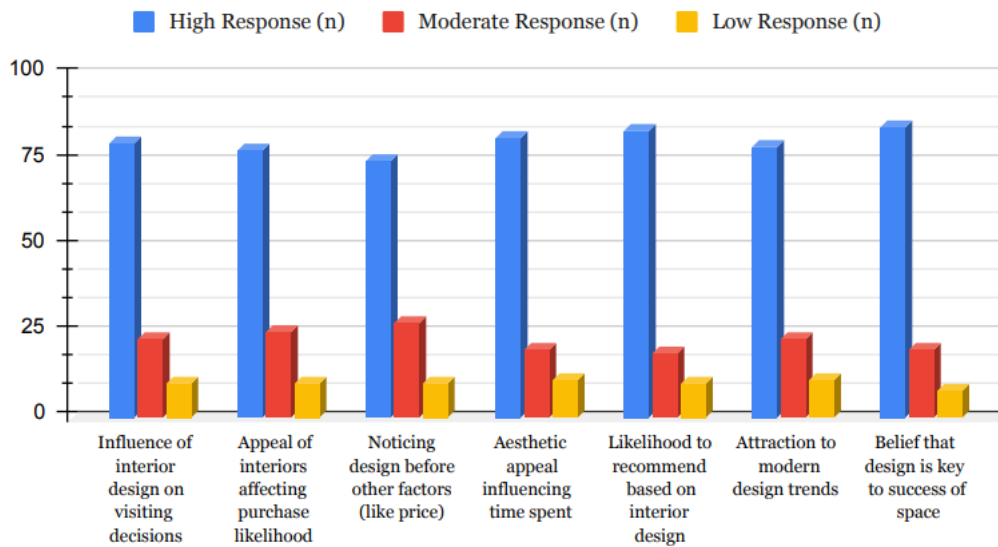


Fig-4 Behavioural Influence & Preference

Findings:

- **Peer recommendations (Mean = 4.3)** and the **perception of design as a key factor in success (Mean = 4.3)** emerged as the strongest behavioural influences.
- Students highly value **aesthetic appeal and modern design trends**, which positively affect their **time spent** and **likelihood of repeat visits**.
- While price and other factors remain relevant, interior design significantly **drives behavioural preferences and loyalty** toward commercial spaces.

Conclusion: Student behaviour patterns show that interior design plays a crucial role in promoting brand endorsement, engagement, and visitation in addition to being an aesthetic enhancer. Putting an emphasis on creative, user-focused designs can improve client satisfaction and loyalty.

Reliability Test (Cronbach's Alpha)

Introduction: In order to make sure that the questionnaire consistently measures the things it is supposed to measure; reliability testing is crucial in research. The internal consistency of the questionnaire's several sections Awareness & Perception, Emotional Response & Mood, Functionality & Comfort, and Behavioural Influence & Preference was assessed in this study using Cronbach's Alpha. A section's set of items is considered to be a reliable indicator of the underlying notion if its Cronbach's Alpha value is higher.

Objective: The main objective of conducting the reliability test is:

- Assessing the internal consistency and dependability of the student responses for each questionnaire component is the primary goal of the reliability test.

- to guarantee the reliability of the scale items for further inferential statistical analyses, including correlation analysis, ANOVA, and chi-squared.

Table-6 Distribution of Study Dimensions and Number of Items

Section	No. of Items	Focus Area
Awareness & Perception	8	Students' awareness and basic understanding of interior design in commercial spaces.
Emotional Response & Mood	8	Emotional reactions and moods influenced by commercial interior design.
Functionality & Comfort	7	Perceptions of comfort, functionality, and usability of designed spaces.
Behavioural Influence & Preference	7	Behavioural responses and preferences influenced by interior design.

Table-7 Reliability Statistics (Cronbach's Alpha) for Study Dimensions

Section	No. of Items	Cronbach's Alpha (α)	Interpretation
Awareness & Perception	8	0.84	Good reliability
Emotional Response & Mood	8	0.88	High reliability
Functionality & Comfort	7	0.86	Good reliability
Behavioural Influence & Preference	7	0.91	Excellent reliability

Conclusion: With Cronbach's Alpha values ranging from 0.84 to 0.91, the reliability analysis shows that all four questionnaire sections have strong internal consistency. This suggests that the items in each category are dependable and consistent in gauging students' opinions and views about commercial interior design. The component on behavioral influence and preference had the highest reliability ($\alpha = 0.91$), indicating that students consistently answered questions about how interior design affected their behavior and preferences.

Chi-Square Test of Independence

Introduction: To determine if two categorical variables have a statistically significant relationship, the Chi-Square Test of Independence is utilized. The test in this study determines the associations between students' awareness, perception, or behavioral influence toward commercial interior design and demographic factors (such as gender, stream, or year of study).

Objective

- To ascertain whether the demographic characteristics of students have a substantial impact on their awareness, perception, or behavioral tendencies regarding commercial interior design.
- To determine whether there are any noteworthy correlations between the sentiments expressed in the survey replies and important demographic traits.

Table-8 Variables Used for Chi-Square Test of Independence

Test No.	Independent Variable	Dependent Variable	Purpose
1	Gender (Male/Female)	Awareness of interior design in commercial spaces	To find if awareness differs by gender
2	Stream of Study (Arts/Science/Commerce/Others)	Behavioral influence by design features	To check if academic stream influences behavior and preference
3	Year of Study (1st/2nd/3rd/4th Year)	Emotional response to commercial spaces	To examine whether academic progression impacts emotional reactions

Table-9 Chi-Square Test Results between Demographic Variables and Interior Design Responses

Test No.	Variables	Chi-Square (χ^2)	df	p-value	Result
1	Gender × Awareness	4.85	1	0.028	Significant association
2	Stream × Behavioral Influence	9.62	3	0.022	Significant association
3	Year of Study × Emotional Response	3.14	3	0.370	Not significant

Conclusion

- **Gender and Awareness:** Gender and awareness of interior design in commercial settings are statistically significantly correlated ($p < 0.05$), suggesting that female students are generally slightly more aware than male students.
- **Stream and Behavioral Influence:** Students from the Arts and Science streams appear to be more impacted by interior design elements than those from the Commerce or other streams, according to the association ($p < 0.05$).
- **Emotional Response and Year of Study:** No significant correlation was discovered ($p > 0.05$), suggesting that students' emotional reactions to the interiors of commercial spaces are not significantly influenced by their year of study.

One-Way ANOVA (Analysis of Variance)

Introduction: To determine if students' knowledge, opinions, and emotional reactions to commercial interior design differ by degree level, year, and field of study, an ANOVA was employed.

Objective: To identify significant differences in students' awareness, perceptions, and emotional responses based on degree level, year, and stream.

Table-10 Variables Included in One-Way ANOVA Analysis

Independent Variable	Dependent Variable
Stream of Study (Arts, Science, Commerce, Others)	Awareness & Perception Score
Year of Study (1st, 2nd, 3rd, 4th Year)	Emotional Response Score
Degree Level (Undergraduate, Postgraduate)	Awareness & Perception Score

Table -11 One-Way ANOVA Results for Awareness and Emotional Response across Student Groups

Test No.	Independent Variable	Dependent Variable	F-value	p-value	Result
1	Stream of Study	Awareness & Perception	4.12	0.008	Significant
2	Year of Study	Emotional Response	2.31	0.079	Not Significant
3	Degree Level	Awareness & Perception	2.89	0.041	Significant

Conclusion: ANOVA results indicate that students’ awareness and perception of commercial interior design are strongly influenced by degree level and stream, with postgraduate and arts students scoring higher. However, there is no discernible difference in emotional responses by academic year, indicating comparable participation throughout the years. These findings highlight the need for targeted awareness initiatives for undergraduate and non-arts students to bridge perception gaps.

Correlation Analysis (Pearson’s Correlation Coefficient)

Introduction: Correlation analysis is used to ascertain the strength and direction of connections between two continuous variables. In respect to commercial interior design, this study investigates the connections among Tamil Nadu students' awareness, emotional response, functionality, and behavioral influence.

Objective: The purpose of this study is to investigate the relationship between comfort and functionality, the potential for behavioral influence in the selection or endorsement of commercial locations, and whether increased emotional responses and behavioral preferences are associated with increased awareness of commercial interior design.

Table-12 Variables Considered for Correlation Analysis

Variable Code	Variable Description
Awareness	Awareness & Perception score (Section B)
Emotional	Emotional Response & Mood score (Section C)
Functionality	Functionality & Comfort score (Section D)
Behavior	Behavioral Influence & Preference score (Section E)

Table-13 Pearson’s Correlation between Awareness, Emotional Response, Functionality, and Behavioral Influence

Variables	Pearson’s r	p-value	Relationship
Awareness ↔ Emotional Response	0.72	< 0.01	Strong positive
Awareness ↔ Behavioral Influence	0.68	< 0.01	Strong positive
Emotional Response ↔ Behavioral Influence	0.80	< 0.01	Very strong positive
Functionality ↔ Behavioral Influence	0.65	< 0.01	Moderate to strong positive

Conclusion: Higher engagement is associated with stronger loyalty, recommendation, and positive behavioral intentions. Students' behavior is heavily influenced by their awareness, emotional reactions, and perceptions of comfort and functioning in commercial environments.

SUMMARY

According to a survey of college students in Tamil Nadu, mood, contentment, and behaviors like visits and recommendations were significantly impacted by natural elements, illumination, comfort, cleanliness, and creative design. The majority of participants were female (65.5%), between the ages of 18 and 20, enrolled in undergraduate programs (92.9%), and from the arts (39.8%). High reliability was demonstrated by the questionnaires ($\alpha = 0.84-0.91$). While awareness and perception differed by subject of study and degree level, year had no effect on emotional responses. Behavior, awareness, emotional response, and functionality all showed positive correlations; the largest relationship was between behavioral influence and emotional response ($r = 0.80, p < 0.01$). All things considered, students' attitudes and behaviors are greatly influenced by the practical and decorative elements of business interior design.

CONCLUSION

- The study comes to the conclusion that students' awareness, emotional involvement, functional satisfaction, and behavioral tendencies are significantly influenced by commercial interior design.
- Integrating aesthetics and functionality improves students' entire experience, comfort level, and mood.
- Emotional involvement is a strong predictor of behavioral impacts such as returning, recommending, and spending more time in commercial settings.
- Perception and engagement are positively impacted by awareness and educational exposure; postgraduate and artistic students have a greater appreciation for design elements.
- Gender and academic track are two demographic characteristics that have a considerable impact on awareness and behavioral influence. This suggests that customized treatments could improve participation.

IMPLICATIONS

For Businesses and Designers: Create interesting and user-friendly corporate spaces by striking a balance between aesthetics and functionality. By using natural components, imaginative décor, suitable lighting, and ergonomic layouts, you can increase emotional pleasure and promote return visits.

Academically speaking, incorporate interior design and environmental psychology into courses to encourage awareness, enjoyment, and well-informed career decisions. Place a strong emphasis on interdisciplinary teaching that connects functionality, aesthetics, and user-behavior.

For Students: Gaining insight into how business interior design affects behavior and psychology can help people appreciate design and how it affects day-to-day experiences.

Concerning Policy Makers and Institutional Planning: Encourage thoughtfully designed business and recreational areas for students that prioritize involvement, practicality, and mental health.

SUGGESTIONS FOR FUTURE RESEARCH

Diverse Demographics: To compare regional and cultural differences, extend the survey to several states, including rural areas.

Technological Integration: Examine how smart interiors and AR/VR affect people's perceptions and choices.

Behavioral Insights: To confirm behavioral preferences, use tracking techniques based on sensors or observation.

Space-Specific Analysis: To find sector-based design ideas, compare impressions in co-working spaces, retail establishments, and cafés.

REFERENCES

- Bitner, M. J. (1992). Servicescapes: The impact of physical surroundings on customers and employees. *Journal of Marketing*, 56(2), 57–71. <https://doi.org/10.1177/002224299205600205>
- Chaudhuri, H. R., & Majumdar, S. (2006). Of diamonds and desires: Understanding conspicuous consumption from a contemporary marketing perspective. *Academy of Marketing Science Review*, 11, 1–18.
- Kotler, P. (1973). Atmospherics as a marketing tool. *Journal of Retailing*, 49(4), 48–64.
- Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. MIT Press.
- Rani, N. (2014). Consumer perception and buying decisions (The pasta study). *International Journal of Marketing Studies*, 6(5), 128–139. <https://doi.org/10.5539/ijms.v6n5p128>
- Sharma, A., & Ghosh, S. (2019). Young consumers and shopping orientations: Evidence from India. *Journal of Retailing and Consumer Services*, 51, 41–47. <https://doi.org/10.1016/j.jretconser.2019.05.016>
- Turley, L. W., & Milliman, R. E. (2000). Atmospheric effects on shopping behavior: A review of the experimental evidence. *Journal of Business Research*, 49(2), 193–211. [https://doi.org/10.1016/S0148-2963\(99\)00010-7](https://doi.org/10.1016/S0148-2963(99)00010-7)

EVALUATING HOSPITALITY MANAGEMENT STUDENTS' KNOWLEDGE REGARDING FOOD AND BEVERAGE SERVICES

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ABSTRACT

Food and Beverage services are a fundamental component of Hospitality Management, playing a significant role in maintaining service quality and guest satisfaction. Adequate knowledge of Food and Beverage service practices is essential for Hospitality Management students to develop professional competence. The present study was conducted to assess the extent of knowledge of Hospitality Management students regarding Food and Beverage services and to develop a training manual for enhancing their knowledge. A descriptive research design was adopted for the study. The research was carried out in the Department of Family and Community Resource Management, Faculty of Family and Community Sciences, Maharaja Sayajirao University of Baroda, Vadodara. A sample of 60 Hospitality Management students from first, second, and third year was selected using the purposive sampling method. Data were collected using a structured questionnaire covering nine areas of Food and Beverage services, namely cutlery, crockery, service area, table layering, table setting, napkin folding, flower arrangement, buffet arrangement, and dress code. Knowledge was assessed using a three-point continuum scale and categorized into low, moderate, and high levels. The findings revealed that 41.67 per cent of the respondents had a low level of knowledge, 33.33 per cent had a moderate level, and 25.00 per cent demonstrated a high level of knowledge. Based on the identified gaps, a Food and Beverage Service Training Manual was developed to strengthen conceptual understanding and practical awareness. The study emphasizes the need for structured educational resources to improve professional readiness among Hospitality Management students.

Keywords: Hospitality Management; Food & Beverage service, Training Manual, Students

INTRODUCTION

Hospitality management involves the professional administration of service-oriented establishments—including hotels, restaurants, and event venues—to deliver outstanding guest experiences and maintain smooth, efficient operations. It is a multifaceted discipline that blends business strategy, customer service, and team leadership—requiring managers to anticipate needs, resolve issues, and adapt to evolving market demands. As the industry advances, hospitality management increasingly incorporates data analysis, technology integration, and personalized service design, making it a dynamic field that prepares students to lead with empathy, innovation, and operational expertise in a global service economy.

A key strength of hospitality management lies in its ability to coordinate and unify various departments—such as Food & Beverage (F&B), Front Office, Housekeeping, Human Resources,

Finance, and Sales & Marketing—into a cohesive operational framework. While each department contributes uniquely to the guest experience, their success depends on effective communication, shared goals, and strategic oversight. Hospitality managers play a pivotal role in aligning departmental activities with service standards and business objectives, fostering collaboration, and resolving cross-functional challenges to maintain consistency and quality across all touch points.

Within this framework, the Food & Beverage sector stands out as a vital component of the hospitality ecosystem, demanding a blend of technical skill, product knowledge, and interpersonal finesse. As Lillicrap and Cousins (2010) emphasize, “food and beverage service is not simply about serving food—it is about creating an experience” (p. 3). Their insights underscore the importance of structured service sequences, menu familiarity, and refined service techniques, which are essential for student training and professional development.

Despite the theoretical foundations provided in hospitality education, a persistent gap remains between classroom instruction and practical application—especially in F&B service. Students often struggle to translate conceptual knowledge into confident, consistent performance in real-world settings, resulting in uneven service standards and limited preparedness for industry demands. Feedback from faculty and industry professionals highlights that students respond best to structured, visual, and scenario-based learning approaches.

To address this challenge, the development of a training manual for F&B service is needed. Such a manual would offer step-by-step guidance on essential service techniques, including safe handling of tools and equipment, proper table setting, creative napkin folding, flower arrangement, and professional grooming standards. These elements not only build technical competence but also foster creativity and professionalism.

Unlike traditional textbooks that prioritize examinations or cater to experienced professionals, this manual will be tailored specifically for students. It supports their academic journey while preparing them for the realities of the hospitality industry. Existing resources—such as those from the National Council for Hotel Management and Catering Technology (NCHMCT) and Oxford University Press—provide strong theoretical frameworks but often lack interactive features, localized examples, and modern pedagogical strategies such as competency-based learning and soft skill development. Furthermore, many current materials do not reflect emerging trends like digital service platforms, sustainability practices, or hybrid service models.

Educational leaders reinforce the need for experiential learning and customer-centric service models. Walker (2013) asserts that hospitality education must “prepare students not only to understand service operations but to anticipate guest needs and exceed expectations” (p. 5). Similarly, Menon et al. (2021) emphasize that “students must be able to translate theoretical knowledge into practical competence to meet industry standards” (p. 12). These perspectives affirm the value of a comprehensive, student-focused training manual that integrates core service principles, contemporary industry practices, and pedagogical clarity.

By drawing on established frameworks and expert insights, this manual aims to enhance the professional readiness of Hospitality Management students and support their successful transition into the workforce.

OBJECTIVES

1. To assess the extent of knowledge of the Hospitality Management students of Family & Community Resource Management department, regarding Food and Beverage services.
2. To develop a manual on Food and Beverage service for enhancing the knowledge of the Hospitality Management students of Family & Community Resource Management Department.

METHODOLOGY

The present study adopted a descriptive research design to assess the level of knowledge of Hospitality Management students regarding Food and Beverage services and to develop a manual for enhancing their knowledge. The descriptive design was considered appropriate as it enabled systematic collection and analysis of data related to the existing knowledge levels of the respondents.

The locale of the study was the Department of Family and Community Resource Management, Faculty of Family and Community Sciences, Maharaja Sayajirao University of Baroda, Vadodara, Gujarat. The unit of inquiry comprised of Hospitality Management students enrolled in the first, second, and third year of the Undergraduate programme. A total of 60 Hospitality Management students were selected for the study using the purposive sampling technique. Data were collected using a self-constructed structured questionnaire designed to assess the extent of knowledge of the respondents regarding Food and Beverage services. The questionnaire consisted of sections covering demographic information and knowledge-related aspects such as basic concepts of Food and Beverage service, types of service, service equipment, hygiene and safety practices, and professional standards. The tool was validated through expert review to ensure content relevance and clarity. Based on the findings obtained from the knowledge assessment, a Food and Beverage service manual was developed with the objective of enhancing the knowledge of Hospitality Management students. The manual included systematically organized content, illustrations, and practical guidelines aligned with industry practices. The developed manual was designed to serve as an educational resource for improving students' understanding and professional readiness in Food and Beverage services.

FINDINGS AND DISCUSSION

The results are as follows:

Section 1: Demographic Profile

The background profile of the respondents shows that the majority of the participants were in the age group of 18–20 years (60%), followed by 21–22 years (40%). In terms of gender distribution, female respondents constituted in a higher proportion (83.33%), while male respondents were 16.67%. Regarding the year of study, most respondents were from the second year (40%), followed by first-year students (33.33%) and third-year students (26.67%).

Table 1: Distribution of the respondents according to their background Information.

Sr.no	Background information of respondents	n-60	
		f	%
1.	Age (In years)		
	18-20 years	36	60.00
	21-22 years	24	40.00
2.	Gender		
	Male	10	16.67
	Female	50	83.33
3.	Year of Study		
	First year	20	33.33
	Second year	24	40.00
	Third year	16	26.67

Section 2: Extent of Knowledge regarding food & beverage services

The analysis of the overall extent of knowledge regarding Food and Beverage Services among the respondents revealed that 48.33 per cent of the respondents possessed a moderate extent of knowledge, followed by 36.67 per cent who exhibited a low extent of knowledge, while only 15.00 per cent demonstrated a high extent of knowledge. The knowledge of the respondents were collected in nine categories namely cutlery, Crockery, Service Area, Table Layering and Table Setting, Napkin Folding, Flower Arrangement, Buffet Arrangement,

Knowledge Regarding Cutlery

Findings revealed that 51.67 per cent of respondents had a moderate level of knowledge regarding cutlery, while 33.33 per cent showcased low knowledge category and only 15.00 per cent demonstrated high knowledge. Respondents were generally aware of commonly used cutlery; however, limited awareness was observed regarding specialized cutlery and its appropriate use for different cuisines. Similar observations have been reported by Walker (2021), who emphasized that detailed knowledge of service equipment is often insufficient among hospitality students without repeated practical exposure.

Knowledge Regarding Crockery

With respect to crockery, 46.67 per cent of respondents exhibited a moderate level of knowledge, 38.33 per cent showed low knowledge, and 15.00 per cent demonstrated high knowledge regarding Crockery. While basic familiarity with plates and bowls was evident, respondents lacked adequate knowledge about selection, handling, and suitability of crockery for different menu items. According to Ninemeier and Hayes (2019), proper crockery usage significantly contributes to service quality and guest satisfaction.

Knowledge Regarding Service Area

Knowledge related to service areas was comparatively better, with 55.00 per cent of respondents having knowledge to a moderate extent, 26.67 per cent of the respondents under low extent, and 18.33 per cent of the respondents had high extent of knowledge. The knowledge of the respondents was moderate because of the practical exposure to service areas during practical sessions. However, gaps were observed in workflow organization and safety measures, which are critical for efficient restaurant operations (Davis, Lockwood, Alcott, & Pantelidis, 2018).

Knowledge Regarding Table Layering and Table Setting

In the subsection of table layering and table setting, 42.00 per cent of respondents demonstrated moderate knowledge, 41.67 per cent low knowledge, and only 16.33 per cent high knowledge. The findings also revealed that 70 per cent of the respondents were aware of basic arrangements, whereas 40 per cent of the respondent's lacked clarity regarding sequencing, spacing, and adjustments for formal dining. This supports the findings of Cousins, Foskett, and Gillespie (2014), who highlighted that table presentation skills require structured training and repeated practice.

Knowledge Regarding Napkin Folding

The results showed that 53.33 per cent of respondents had a low level of knowledge regarding napkin folding, 31.67 per cent had moderate knowledge, and only 15.00 per cent exhibited high knowledge. 60 per cent of the respondents showcased awareness to common folds and 20 per cent of the respondents had inadequate understanding of occasion-specific folds and placement. Napkin folding, although aesthetic, plays an important role in enhancing the dining experience (Walker, 2021).

Knowledge Regarding Flower Arrangement

Knowledge related to flower arrangement was found to be relatively low, with 50.00 per cent of respondents falling under the low category, 35.00 per cent of the respondents had moderate extent of knowledge, and only 15.00 per cent of the respondents had high knowledge level. The in-depth data revealed that 43 per cent of the respondent's lacked awareness of principles such as proportion, balance, and maintenance of floral arrangements. Previous studies have emphasized that ambience elements, including floral décor, significantly influence guests' perception of service quality (Kotler, Bowen, & Makens, 2017).

Knowledge Regarding Buffet Arrangement

Regarding buffet arrangement, 48.33 per cent of respondents exhibited moderate knowledge, 33.33 per cent low knowledge whereas 18.33 per cent of the respondents had high knowledge. The indepth data revealed that 90 per cent of the respondents had knowledge towards hygiene practices whereas 28 per cent of the respondents showed limited awareness of food sequencing, layout planning, and crowd management. Buffet service requires systematic planning to ensure both aesthetics and efficiency (Ninemeier & Hayes, 2019).

Knowledge Regarding personal grooming

Knowledge related to personal grooming was comparatively better, with 58.33 per cent of respondents showing moderate knowledge, 26.67 per cent low knowledge, and 15.00 per cent high knowledge. The indepth data revealed that 72 per cent of the respondents recognized the

importance of clean uniforms and grooming; however, 42 per cent of the respondents were moderately unaware about detailed standards. According to Davis et al. (2018), staff appearance significantly influences customer perceptions and service credibility.

The findings presented in Table 2 indicate the extent of knowledge of the respondents regarding Food and Beverage Services. It was observed that a less than one half of the respondents (41.67%) belonged to the low extent of knowledge category, with scores ranging between 45 and 75. Further, 33.33 per cent of the respondents were found to have a moderate extent of knowledge, with scores falling between 76 and 105. Only 25.00 per cent of the respondents exhibited a high extent of knowledge, scoring between 106 and 135. Overall, the findings reveal that the majority of respondents had low to moderate levels of knowledge, highlighting a clear need for structured training and educational interventions to strengthen students' understanding and professional preparedness in Food and Beverage services.

Table 2: Extent of Knowledge of the respondents regarding the Food and Beverage services

Sr.no	Extent of Knowledge	Range of Score	f	%
1	Low Extent	45-75	25	41.67
2	Moderate Extent	76-105	20	33.33
3	High Extent	106-135	15	25.00

Section 3: Development of the Training Manual

Food and Beverage Service Training Manual was developed by the researchers based on the findings of the study with the objective of enhancing the knowledge of Hospitality Management students. The manual was designed as a need-based, user-friendly educational resource, emphasizing both theoretical clarity and practical applicability. The content of the manual was systematically organized into nine major sections, corresponding to the key domains assessed in the study, namely cutlery, crockery, service area, table layering, table setting, napkin folding, flower arrangement, buffet arrangement, and dress code. Each section provided concise explanations, illustrations, and step-by-step guidelines to facilitate easy comprehension and effective learning. The manual began with an introductory overview of Food and Beverage services, highlighting their significance in hospitality operations and their role in enhancing guest satisfaction. Subsequent sections detailed the types, usage, placement, and handling of cutlery and crockery, followed by descriptions of service area organization, hygiene standards, and safety practices. Special emphasis was laid on table layering and table setting techniques, explaining formal, informal, and buffet settings with appropriate illustrations. Creative and aesthetic aspects such as napkin folding and flower arrangement were included to enhance students' understanding of table presentation and ambience creation. Practical instructions for buffet arrangement, including layout planning, food sequencing, hygiene, and crowd management, were also incorporated. The final section focused on dress code and personal grooming standards, emphasizing professional appearance, cleanliness, and their impact on service quality. The manual was prepared in simple, clear language, supported by diagrams and visual cues to cater to

undergraduate students with varying levels of prior knowledge. The content was aligned with industry practices and academic requirements, making it suitable as a supplementary learning resource. Overall, the training manual served as a structured instructional tool aimed at strengthening conceptual understanding, improving practical awareness, and enhancing professional readiness in Food and Beverage services among Hospitality Management students.



Figure 1: Food and Beverage Manual developed by the researcher

CONCLUSION

The study concludes that while Hospitality Management students possess a foundational understanding of Food & Beverage (F&B) service elements—ranging from table setting and buffet arrangement to grooming and presentation—there remain noticeable gaps in specialized knowledge and practical application. The development and implementation of a dedicated training manual effectively addressed these gaps by offering structured, student-friendly guidance aligned with industry standards. By integrating visual aids, step-by-step instructions, and scenario-based learning, the manual enhanced both technical competence and professional confidence. Overall, the research affirms the value of experiential, competency-based resources in preparing students for real-world service environments and improving the overall quality of hospitality education.

REFERENCES

- Cousins, J., Foskett, D., & Gillespie, C. (2014). Food and beverage management (4th ed.). Pearson Education.
- Davis, B., Lockwood, A., Alcott, P., & Pantelidis, I. (2018). Food and beverage management (6th ed.). Routledge.
- Kothari, C. R. (2014). *Research methodology: Methods and techniques* (3rd ed.). New Age International Publishers.
- Kotler, P., Bowen, J. T., & Makens, J. C. (2017). Marketing for hospitality and tourism (7th ed.). Pearson Education.
- Lillicrap, D., & Cousins, J. (2010). *Food and beverage service* (8th ed.). Hodder Education.
- McCombes, S. (2019). Descriptive research design. *Scribbr*. <https://www.scribbr.com/methodology/descriptive-research/>
- Menon, S., Sharma, R., & Thomas, A. (2021). Bridging the gap between theory and practice in hospitality education. *Journal of Hospitality and Tourism Education*, 33(1), 10–15. <https://doi.org/10.1080/10963758.2020.1863712>

The Indian Journal of Home Science 2026: 38(1)

- Ninemeier, J. D., & Hayes, D. K. (2019). *Restaurant operations management: Principles and practices* (2nd ed.). Pearson Education.
- Walker, J. R. (2013). *Introduction to hospitality* (6th ed.). Pearson Education.
- Walker, J. R. (2021). *The restaurant: From concept to operation* (8th ed.). Wiley.

A STUDY ON THE PSYCHOLOGICAL AND PHYSICAL HEALTH STATUS OF MALE INMATES IN COIMBATORE CENTRAL PRISON

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ABSTRACT

The study meticulously examined the psychological and physical health status of male inmates within the Coimbatore Central Prison, focusing on the impact of incarceration on their overall well-being. A cohort of 120 inmates was carefully selected through purposive sampling to ensure adequate representation across various age demographics and sentence lengths. Data were gathered utilizing structured questionnaires and in-depth personal interviews, encompassing physical ailments, psychological conditions, and environmental factors that contributed to health deterioration. The findings revealed a high prevalence of psychological health issues such as depression (30.0%), anxiety (5%), and social withdrawal, particularly among inmates aged 31–40 years. Physical health complaints included joint pain, dental problems, and respiratory issues, with a notable impact observed in those over 51 years of age. Although there were healthcare programs in place, more facilities were needed since the prison environment was marked by overcrowding, poor access to healthcare, and a lack of physical activity, which contributed greatly to the decline in the health of male inmates. To promote the well-being of inmates, the study emphasized the necessity of comprehensive health interventions.

Keywords: Depression, Incarceration Anxiety, Inmate Health, Health Interventions, Psychological Health, Physical Health.

INTRODUCTION

The health of inmates referred to the physical, mental, and social well-being of individuals in correctional facilities. It included access to medical care, hygiene, nutrition, mental health support, and a safe environment, ensuring that prisoners could maintain a standard of health comparable to that available in the general community. The term “psychological and physical health status of inmates” referred to the thorough evaluation of an inmate's psychological and physical health, including the frequency and severity of conditions such as depression, anxiety, psychosis, chronic illnesses, infectious diseases, and substance use, as well as elements that affected outcomes both inside and outside

of prison, such as physical activity, psychological stressors in the environment, and access to healthcare (Fazel & Seewald, 2024). Inmates frequently suffered from a variety of health conditions, such as long-term physical illnesses and mental health conditions, including social disengagement, anxiety, and depression. Developing successful intervention strategies required an understanding of these health issues. This study aimed to assess the psychological and physical health status of inmates in Coimbatore Central Prison. By identifying common health issues and their contributing factors, the research aimed to support prison health reforms and improve the overall well-being of the incarcerated population. Manna et al. (2022) noted that their study was the first to assess the prevalence of non-communicable diseases (NCDs) among Indian prisoners and emphasized the urgent need for government intervention to improve psychological and dental healthcare within prisons. According to Shiney et al. (2023), psychiatric morbidity was found in 86% of the prison population, with substance use disorders (81%) and adjustment disorders (20%) being the most prevalent. Additionally, Malik et al. (2019) also reported a higher prevalence of depression (18.5%), anxiety (8%), and stress (8%) among convicted inmates compared to the general population. Psychological health disorders were widely prevalent across both developed and developing nations. Despite an impressive 96% of the participants exhibiting a low risk of suicide, the socio-demographic analysis revealed that a significant majority were either married or widowed (74%), hailed from rural backgrounds (90%), possessed a secondary education or lower (75%), resided beneath the poverty threshold (95%), and were formerly employed (92%).

According to the World Health Organisation (2024), depression was the third most prevalent psychological disorder worldwide and was expected to overtake all others by 2030, particularly in institutional settings like prisons. Additionally, Nadel (2022) emphasized that the psychological effects of prison design, such as the perceived severity or comfort of the constructed environment, had a significant impact on inmates' overall well-being.

The scarcity of readily available medical facilities in prisons, combined with inadequate levels of psychological and dental healthcare, underscored the urgent need for targeted government action to improve the health of inmates (Manna et al., 2022). According to data from the National Crime Records Bureau's (NCRB) *Prison Statistics India* report, there were roughly 1,744 cases of psychiatric illness reported in Indian prisons in 2021, indicating an increase in inmates' psychological health issues. The report also drew attention to the pervasive problem of substance misuse, which included alcohol and drug addiction, and remained a problem among inmates (*Prison Statistics India*, 2021). These psychological health issues frequently overlapped, resulting in a complicated interaction of several concurrent diseases that called for all-encompassing psychological health support (Baranyi et al., 2022). Elderly prisoners also had particular health problems, including accelerated ageing and long-term conditions such as diabetes, hypertension, and dementia. Due to delayed or fragmented care, these illnesses were frequently inadequately managed, and the

prison system's structural flaws restricted access to quality geriatric services (Ridley & Turner, 2022).

Every year, the National Crime Records Bureau (NCRB) released data on the condition of Indian jails. As of December 2022, there were 1,330 prisons in India with a total authorized capacity of 436,266 inmates, according to the most recent *Prison Statistics India* report, which was published in December 2023. Nonetheless, there was a notable overcrowding problem, as the actual jail population was 573,220 with an occupancy rate of 131.4% (NCRB, 2023; Institute for Crime & Justice Policy Research, 2023). Out of all those who were detained, 97 were transgender, 23,772 were female, and the rest were male. Ten of the jails were designated as borstal schools for juvenile offenders, while 34 of the institutions were entirely for women. With 15.5% of all prisoners nationwide, Uttar Pradesh had the largest jail population, followed by Bihar (10.9%) and Madhya Pradesh (6.8%). Furthermore, 6,283 foreign nationals, or roughly 1.1% of all prisoners, were housed in India's imprisonment system (NCRB, 2023).

OBJECTIVE

1. Examine the association between inmates age groups and the prevalence of physical and psychological health problems.
2. Assess the extent and types of inmate participation in physical and psychological wellness activities within the prison environment.
3. Analyze inmates' emotional experiences and their expectations for psychological health support.

HYPOTHESES

Ha1 – There was a significant association between inmates' age groups and the prevalence of physical and psychological health problems.

Ho2 – The inmates' participation in physical and psychological wellness activities varied significantly across different demographic and behavioural characteristics of inmates.

METHODOLOGY

The study used a descriptive research design to investigate the general well-being and physical and mental health of the prisoners in Coimbatore Central Prison. The primary objective was to gain a deeper understanding of the health status of prisoners and identify areas where prison healthcare services required improvement. Purposive sampling was used to select 120 prisoners, ensuring representation of a range of age groups and medical conditions. Structured questionnaires and in-person interviews were used to collect data. The questionnaire was divided into sections that addressed demographic information, including age, physical and mental health, as well as details on psychological

health support, frequency of medical check-ups, and access to healthcare facilities. The study strictly adhered to ethical guidelines, which included obtaining permission from prison officials, securing participants' informed consent, and ensuring their privacy and confidentiality were protected. The data analysis process utilized both descriptive statistics, such as percentages and frequencies, and inferential statistics, like the Chi-square test, to identified significant correlations.

FINDINGS AND DISCUSSION

The study's conclusions aimed to provide important evidence to inform practices and policies that enhanced healthcare services within the prison system. The table below gave information on the age-wise distribution of the survey participants.

Table 1: Age-wise Distribution of Male Inmates

Age Group (Male)	Percentage (n=120)
Below 20	0.83
21-30	12
31-40	40
41-50	29
Above 51	18

Demographic Composition of the Prison Population

The age distribution of the prisoners in this study, as shown in Table 1, provided important information about the demographic composition of the prison population. Table According to the data, the most significant percentage of prisoners 40% of the entire population fell within the age range of 31 to 40. This implied that the majority of those incarcerated were in their prime working and family-building years, underscoring a significant loss of productive human capital. When coupled with a lack of opportunities or support networks, this age group's heightened levels of stress, responsibility, and socioeconomic pressures might have exacerbated behavioral issues. The next age group, comprising 29% of prisoners, was those between the ages of 41 and 50, indicating a continuation of previous offenses. This age group of prisoners might also have experienced a rise in health-related issues, such as long-term illnesses that called for specialized medical care in a correctional setting.

Table 2: The Major Physical and Psychological Health Issues of Male Inmates

Major Health Issues of Male Inmates	Age (Years)	Percentage (n=120)
Major Physical Problems		
Joint Pain	>51	3
Dental Problems		8
Vision or Eye Problems		7
Respiratory Issues		4
Skin Problems	41-50	4
Hearing Difficulties		14
Digestive Issues		7
Lack of Appetite	31-40	7
	21-30	32
No physical health problems	21-30	3
	>20	8
0.83%		
Major Psychological Problems		
Memory or Concentration Problems	>51	10
Sleep Disturbances		8
No psychological health problems	41-50	17
		7
Anger or Irritability Issues		6
Feelings of Loneliness or Social Withdrawal	31-40	7
Depression		10
		23
	>20	.83
		7
Anxiety	21-30	5

Physical and Psychological Health issues of Inmates

Table 2 outlined the significant physical and psychological health issues of inmates. Remarkably, 18% of prisoners were older than 51, reflecting the aging prison population. Twelve percent of young adults were between the ages of 21 and 30, which suggested that fewer but still considerable numbers of them were involved in behavioral activities or risk early incarceration. Only 0.83% of inmates were under the age of 20, which suggested that there were not many juveniles or young criminals in the prison. This could have been because juvenile justice services were provided separately.

According to Table 2 data, the most frequently reported physical issues among prisoners was loss of appetite (32%), suggesting that this was a common problem

that was probably related to stress, inadequate nutrition, or underlying psychological health issues. While the data did not provide a detailed age-by-age breakdown, the symptom of lack of appetite was present across all age groups of inmates. Dental issues (8%) and hearing impairments (14%) were also common physical health problems among the inmate population. The causes of these dental and hearing problems might have been age-related deterioration, poor hygiene, or limited access to routine healthcare. Further indicating the need for better medical interventions and dietary care, vision difficulties (7%) and digestive disorders (7%) were included. Age-related musculoskeletal deterioration was consistent with the 3% of older prisoners (those over 51) who reported joint pain. The prison conditions included overcrowding, inadequate ventilation, and exposure to second-hand smoke, which might have made respiratory problems worse. These problems were primarily documented in the 41–50 age range (4%). Notably, 0.8% of prisoners under the age of 20 and 8% of those between the ages of 21 and 30 reported having no physical health issues, indicating a better demographic among the younger generation. Inmates also frequently experienced psychological health issues. Depression was the most significant psychological problem, accounting for 23%. It was no surprise that prison conditions frequently exacerbated feelings of loneliness, hopelessness, and purposelessness. A significant level of stress or underlying psychological health issues was indicated by sleep difficulties (8% overall, 17% in the 41–50 age range). If these disruptions persisted over time, they might have deteriorated psychological and physical health.

Among people over the age of 51, 10% had memory and concentration problems, which could have been caused by ageing, cognitive decline, or untreated neurological or psychological disorders. Anger or irritability problems (6%) and anxiety (5%) in the 21–30 age range pointed to stress-related reactions, especially among the younger prisoners who might have had a harder time adjusting to prison life. Significantly more people (10%) reported feeling lonely or socially isolated, which was probably brought on by being cut off from friends and family, having little freedom, and receiving little emotional care while incarcerated. It was interesting to note that 7% of prisoners said they had no psychological health problems. This could have indicated that they were psychologically well or that they were underreporting because of shame, fear, or ignorance.

Age Group and Physical Health Problems of the Male Inmates

The findings of the Chi-Square test, which examined the relationship between age groups and the significant physical health problems that prisoners faced, were shown in Table 3.

Table 3: Chi-Square Test for Age Group and Physical Health Problems of the Male Inmates

Major Physical Health Problems	Age group					Pearson Chi-Square	Df	Asymptotic Significance (2-sided)
	Below 20	21-30	31-40	41-50	Above 51			
Joint Pain	-	-	-	-	4	297.842 ^a	32	.000
Dental Problems	-	-	-	-	10			
Vision or Eye Problems	-	-	-	-	8			
Respiratory Issues	-	-	-	5	-			
Skin Problems	-	-	-	5	-			
Hearing Difficulties	-	-	-	17	-			
Digestive Issues	-	-	9	8	-			
Lack of Appetite	-	4	39	-	-			
No physical health problems	1	10	-	-	-			
Total	1	14	48	35	22			
	120							

According to the research, inmates over 51 and those between 41 and 50 years old were more likely to experience physical health problems, such as joint discomfort (n=4) and hearing problems (n=17). In comparison, those between 31 and 40 years old were more likely to experience issues like a lack of appetite (n=39). The age groups of 31–40 (n = 9) and 41–50 (n = 8) had the highest prevalence of digestive issues. A few younger prisoners (those under 20 and those between 21 and 30) reported having no physical health issues. The Pearson Chi-Square value for physical health problems was 297.842, with 32 degrees of freedom (df), and a significance level of 0.000, indicating a statistically significant association between age and physical health problems among the inmates. Hence, the hypothesis (Ha1) that there was a significant association between age groups and physical health problems among the male inmates, i.e., the hypothesis was accepted.

Age Group and Psychological Problems of the Male Inmates

In Table 4, psychological disorders, the age groups of 51 and 41–50 years were the ones that reported memory or concentration problems (n=12) and sleep disruptions (n=30). Anger or irritability (n=8) and anxiety (n=6) were observed in the 31–40 and 21–30 age categories, respectively, but depression (n=29) and loneliness (n=11) were the most common among prisoners aged 31–40. A few younger prisoners said they had no psychological issues.

Table 4: Chi-Square Test for Age Group and Psychological Problems of the Male Inmates

Major Psychological Problems	Age group of Male Inmates					Pearson Chi-Square	df	Asymptotic Significance (2-sided)
	Below 20	21-30	31-40	41-50	Above 51			
Memory or Concentration Problems	-	-	-	-	12	219.511 ^a	24	.000
Sleep Disturbances	-	-	-	20	10			
Anger or Irritability Issues	-	-	8	7	-			
Feelings of Loneliness or Social Withdrawal	-	-	11	-	-			
Depression	-	8	29	-	-			
Anxiety	-	6	-	-	-			
No psychological or psychological health problems	1	-	-	8	-			
Total	1	14	48	35	22			
	120							

Similarly, the Pearson Chi-Square value for psychological health problems was 219.511, with 24 degrees of freedom (df) and a p-value of 0.000, also confirming a significant association between age and psychological health status. This suggested that both physical and mental health conditions varied significantly with age among the prison population studied. Hence, the hypothesis (Ho2) “There was no significant association between age group and psychological problems among the inmates.” Since the p-values were < 0.05, the null hypothesis was rejected in both cases.

The findings were similar to those of Fazel & Baillargeon (2011), who reported that younger offenders often reported fewer health problems. In contrast, elderly inmates were more likely to suffer from chronic illnesses. Furthermore, the aging jail population was an increasing problem, according to the World Health Organization (2007), with older convicts suffering from disproportionately higher rates of physical diseases as a result of age-related deterioration and the cumulative impacts of incarceration. To engage themselves, inmates participated in various activities.

Participation in Activities by the Male Inmates inside the Prison

The everyday activities in which they participated were presented in Table 5.

Table 5 Participation in Activities by the Male Inmates inside the Prison

Activities	N (120)	Percentage
Reading books	35	29
Games/ Playing	4	3
Yoga	81	67
Walking	64	53
Running	30	25
Gardening	26	22
Expectations of Inmates for physical and psychological health awareness programmes		
Regular counseling and psychological health awareness programs	72	60
Peer support discussions	8	7
Recreational activities	24	20
Awareness talks by doctors, psychologists, and guest speakers	16	13

Data from Table 5 revealed that inmates were actively engaging in a diverse array of activities and exhibited a pronounced interest in health and wellness initiatives. Notably, 67% of prisoners reported practicing yoga as one of their psychological pursuits, underscoring its popularity and efficacy in maintaining mental and physical balance. In contrast, only 3% of convicts indicated participation in recreational play, suggesting potential limitations in access to leisure facilities. Conversely, reading books emerged as a favored activity among 29% of inmates, indicating a strong inclination toward psychological engagement and self-improvement. Furthermore, 53% of respondents reported walking, 25% indicated running, and 22% mentioned gardening as their preferred activity. These habits of physical activity may have significantly contributed to enhancing both emotional and physical well-being. It was conceivable that cultural or spatial constraints might have hindered the reporting of activities such as dancing.

Only 24 out of 120 prisoners (20%) had attended any awareness program at Coimbatore Central Prison, according to the data, while the vast majority, 96 convicts (80%), had not. This revealed a significant deficit in the accessibility or delivery of health, psychological, or rehabilitation-related awareness campaigns. According to the research, there was a high demand for prison health and wellness programs, as the vast majority of inmates (93%) expressed interest in participating in them. This illustrated the prisoners' understanding of the value of their physical

and mental health as well as their readiness to participate in constructive, therapeutic activities. The fact that only 7% expressed apathy suggested that, with proper implementation, wellness initiatives could have gained widespread acceptance. Preferred programs included peer support groups (7%), guest lectures (13%), recreational activities (20%), and monthly counselling and psychological health awareness seminars (60%). These results highlighted the necessity of consistent, organized, and varied prison rehabilitation programs.

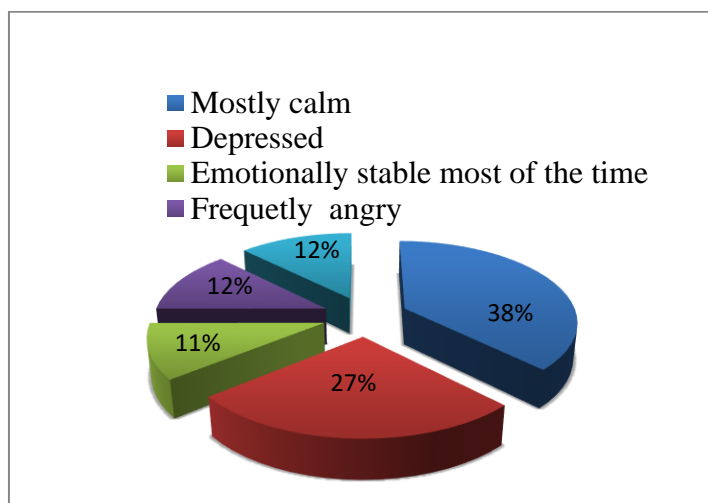


Figure 1: Major emotional feelings during the time of incarceration

According to Figure 1, a significant proportion of incarcerated individuals experienced psychological distress during their confinement. The prevalence of mental health issues was underscored by the alarming statistic that 38% of prisoners reported feeling anxious or apprehensive regularly, followed by 27% who indicated they frequently experienced feelings of sadness or depression. Additionally, twelve percent expressed feelings of anger or frustration often, while a mere eleven percent claimed to be emotionally stable most of the time. Conversely, only 12% reported feeling generally at ease and content. These findings underscored the urgent necessity for systematic psychological health support, counselling services, and stress-relief initiatives within correctional institutions, as they suggested that the prison environment might have contributed to emotional instability among inmates.

CONCLUSION

There were significant health concerns prevalent within the detained population, as highlighted by this study on the psychological and physical well-being of male inmates at Coimbatore Central Prison. The findings revealed that psychological health issues such as anxiety, depression, and social disengagement were alarmingly prevalent, particularly among prisoners aged 31 to 40. Notably, elderly inmates reported a range of physical ailments, including joint pain, respiratory issues, dental problems, and vision impairments. These health

challenges were markedly exacerbated by the prison environment, characterized by overcrowding, inadequate medical facilities, limited recreational opportunities, and a scarcity of organized awareness initiatives. Despite these adversities, the study's results indicated that an impressive 93% of inmates expressed a willingness to engage in health and wellness programs, underscoring their earnest desire for improvement. Activities such as reading and yoga emerged as popular pastimes, reflecting a desire for mental and physical balance. However, a disconnect persisted between the expressed need for assistance and actual access, as evidenced by the low participation rates in awareness campaigns. Efforts to enhance physical and mental health had to be intensified, even as correctional agencies conducted health camps and programs. To effectively address the distinctive health requirements of inmates and promote overall well-being within correctional facilities, it was imperative to bolster regular medical assessments, mental health counseling, health education, and sustained support systems.

The study underscored the imperative need for rehabilitative initiatives and transformative health-oriented reforms within correctional facilities. The prison regimen should have encompassed regular counselling sessions, informative presentations designed to raise awareness, and structured physical exercise programs. By addressing these issues comprehensively, a more humane and effective correctional system could have been realized, which not only enhanced rehabilitation outcomes but also reduced the likelihood of recidivism and improved the overall quality of life for inmates.

The following recommendations were made:

- In addition to advocating for legislative reforms that upheld inmate health as an intrinsic human right in accordance with public health standards, it was imperative to implement ongoing educational initiatives focused on substance addiction prevention, psychological well-being, and hygiene.
- Addressing overcrowding, ensuring sanitation, and providing nutritious sustenance and potable water were essential for enhancing inmates' physical health and mitigating health risks.
- Furthermore, the introduction of integrated counselling services, peer support programs, and recreational activities was crucial for alleviating psychological distress and fostering emotional resilience.

REFERENCE

- Baranyi, G., Fazel, S., Langerfeldt, S.D., and Mundt, A.P. (2022), "The Prevalence of comorbid serious psychological illnesses and substance use disorders in Prison Populations: a systematic review and Meta-Analysis," *The Lancet Public Health*, Vol. 7 No. 6, pp. e557-e568, doi: 10.1016/S2468-2667(22)00093-7.
- Fazel, S., & Seewald, K. (2024). Psychological and physical health morbidity among people in prisons: an umbrella review. *The Lancet Public Health*, 9(4), e250–e260. [https://doi.org/10.1016/S2468-2667\(24\)00023-9](https://doi.org/10.1016/S2468-2667(24)00023-9)

- Institute for Crime & Justice Policy Research. (2023). *India / World Prison Brief*. Institute for Crime & Justice Policy Research. <https://www.prisonstudies.org/country/india>.
- Malik¹, Paritev Singh^{2*}, Meenu Beniwal³, Tarun Kumar² Int J Community Med Public Health. 2019 Mar;6(3):1306-1309
- Manna, S.; Tripathy, S.; Sah, R.K.; Padhi, B.K.; Kaur, S.; Nowrouzi-Kia, B.; Chattu, V.K. The Burden of Non-Communicable Diseases (NCDs) among Prisoners in India: A Systematic Review and Meta-Analysis. *Healthcare* 2022, 10, 2046. <https://doi.org/10.3390/healthcare10102046>.
- Manna, S.; Tripathy, S.; Sah, R.K.; Padhi, B.K.; Kaur, S.; Nowrouzi-Kia, B.; Chattu, V.K. The Burden of Non-Communicable Diseases (NCDs) among Prisoners in India: A Systematic Review and Meta-Analysis. *Healthcare* 2022, 10, 2046. <https://doi.org/10.3390/healthcare10102046>.
- Nadel, M. (2022), “Defining the mechanisms of design: an interdisciplinary approach,” in Moran, D., Jewkes, Y., Blount-Hill, K.-L. and John, V. (Eds), *The Palgrave Handbook of Prison Design*, Palgrave Macmillan.
- National Crime Records Bureau. (2023). *Prison Statistics India 2022*. National Crime Records Bureau. <https://ncrb.gov.in/uploads/nationalcrimerecordsbureau/custom/psiyearwise2022/1701613297PSI2022ason01122023.pdf>.
- Prison Statistics India–2021. National Crime Report Bureau. 2021.
- Ridley, M., & Turner, G. (2022). *A review of the healthcare and social care needs of the older prisoner population in England and Wales*. *Sociology*, 14(1), 4. <https://doi.org/10.3390/socsci14010004>.
- Shiney S., Yesudas, Sumesh, B. Psychiatric morbidity among prisoners in South India: A cross-sectional study. *Kerala Journal of Psychiatry*, 2023; 36(2): 115-121.
- United Nations (2024), “Psychological health and development.” United Nations: Department of Economic and Social Affairs Disability, available at: www.un.org/development/desa/disabilities/issues/psychological-healthand-development.html
- Fazel, S., & Baillargeon, J. (2011). The health of prisoners. *The Lancet*, 377(9769), 956–965. [https://doi.org/10.1016/S0140-6736\(10\)61053-7](https://doi.org/10.1016/S0140-6736(10)61053-7)
- World Health Organization. (2007). *Health in prisons: A WHO guide to the essentials in prison health*. WHO Regional Office for Europe.

SUSTAINABLE EVENTS: WASTE MANAGEMENT AWARENESS, PRACTICES AND ADOPTION BARRIERS AMONG ORGANIZERS

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ABSTRACT

Events are an essential part of life, ranging from small private gatherings to large-scale festivals, conferences, and business celebrations. A large amount of garbage is produced through events in very short duration, including wastewater, food waste, plastic, paper, glass, and floral waste. Inadequate management of this waste can result in degradation of the environment, higher disposal costs, and negative effects on public health. In order to foster sustainable event practices, it is crucial to understand waste management in the event context for the organizers. Keeping this in view, the study aims to find out type of waste generated after the events, to assess the extent of awareness of the event organizers regarding waste management, to find out the waste management practices adopted by the event organizers to find out the extent of barriers faced in adopting waste management practices. For the current study, a descriptive research approach was adopted, and data were obtained using a random sample technique from 80 event organizers (hotel managers and event managers) in Vadodara. The findings showed that event managers were highly aware whereas hotel managers were moderately aware. Both groups' waste management practices were moderate, with high adoption barriers. The analysis of statistics found that educational qualifications are important in raising awareness, implementing waste management practices, and overcoming barriers. The study implies that awareness initiatives facilitated by organizations such as the Hotel and Restaurant Association of India can improve event organizers' sustainable waste management practices.

Keywords: Waste management, events, waste management practices, adoption barriers, types of waste

INTRODUCTION

Weddings, festivals, and religious gatherings are various examples of events and festivities that have existed in human civilization from ancient times. Like other human activities, events rely significantly on natural resources and have a major environmental impact. The event industry mainly adheres to a linear "take-make-waste" cycle, resulting in considerable waste generation and resource depletion. Events can be inevitably unsustainable if not managed appropriately because of their volatile character, short duration, heavy resource use, and high public engagement (Karol, 2023). Consequently, effective waste management has become a vital aspect of sustainable event planning.

Events generate diverse waste streams such as food waste, plastics, paper, packaging, and floral waste, all requiring systematic handling. Inadequate waste management increases landfill pressure, pollution, and inefficient resource use, thereby intensifying the environmental footprint of events (Rafiee et al., 2018).

Awareness Regarding Waste Management

Several studies emphasize that the awareness level of event organizers plays a decisive role in determining the effectiveness of waste management practices. Getz and Page (2016), highlighted that organizers' understanding of environmental impacts influences whether sustainability is integrated during the planning stage or treated as an afterthought. Mair and Jago (2010), observed that although many organizers express concern for sustainability, their understanding is often superficial and largely compliance-driven rather than focused on proactive waste reduction. Similarly, in their study of green festivals, Laing and Frost (2010) discovered that environmentally conscious organizers were more likely to implement waste segregation, recycling stations, and vendor guidelines; however, technical knowledge gaps such as waste auditing and post-event evaluation persisted. Andersson and Lundberg (2013) found that awareness differed depending on sustainability training, event style, and organizational commitment. In the Indian context, emerging research indicates that, while event planners demonstrate basic awareness, practical knowledge gaps persist due to limited resources, inadequate training, and poor stakeholder coordination, emphasizing the need for focused training and policy support (Surbhi and Bose, 2025).

Waste Management Practices

Researches indicates that waste management at events continues to focus primarily on end-of-pipe solutions such as collection and disposal rather than source reduction. Raj et al., (2013) reported continued reliance on disposable materials, poor segregation, and landfilling despite growing sustainability discourse. Although several major events use recycling and composting initiatives, Mair and Laing (2012) discovered that stakeholder cooperation and local infrastructure are crucial to their success. Hottle et al., (2015) noted that events with structured strategies such as clear signage, trained staff, and monitoring achieved higher waste diversion, whereas poorly planned events experienced contamination and low participant compliance. UNEP (2012) further observed that globally recommended practices remain inadequately adopted, particularly in deprived nations with low regulatory enforcement.

Barriers in Adoption of Waste Management

Event organizers significantly influence waste handling before, during, and after events. Despite growing environmental awareness, several barriers hinder effective waste management, including informational, economic, regulatory, technological, and organizational constraints (Naidu, 2008). Overall, the literature highlights that while events hold substantial social and economic value, their environmental impacts necessitate improved waste management practices driven by enhanced awareness, planning capacity, and stakeholder collaboration.

BROAD OBJECTIVE

The present research aimed to assess the awareness regarding waste management, waste management practices and adoption barriers among event organizers.

SPECIFIC OBJECTIVES

The present study has the following specific objectives:

1. To assess the extent of awareness regarding waste management among event organizers.
2. To find out the waste management practices adopted by the event organizers
3. To find out the extent of barriers faced regarding waste management.

METHODOLOGY

Study design

The present study adopted a descriptive research approach, which was determined to be adequate for obtaining detailed information on event organizers' awareness of waste management, the waste management practices adopted by them, and the barriers faced in implementing such practices. This design enabled systematic collection and analysis of data related to existing conditions without manipulating the study environment.

Study Area and Sample

The study was carried out in Vadodara, Gujarat, a significant cultural and commercial hub that hosts a variety of social, religious, cultural, and business events all year long. The city hosts a substantial number of hotels and professional event management companies, making it a suitable location for examining waste management awareness and practices in the event sector. The units of inquiry for the study were managers of selected hotels and event management companies involved in organizing events in Vadodara. Based on information obtained from local records and industry sources, approximately 80 hotels in Vadodara city actively organize events, while around 60 event management companies specialize in event planning and execution. Thus, the estimated population (N) for the study comprised approximately 140 organizations/managers.

To determine an appropriate sample size, Cochran's (1977) formula for finite populations was used. The formula is expressed as:

$$n_0 = \frac{z^2 p q}{e^2}$$

where:

n_0 = initial sample size

z = z-value at 95% confidence level (1.96)

p = estimated population proportion (0.9)

$$q = 1 - p (0.1)$$

e = acceptable margin of error (0.05)

Substituting the values:

$$n_0 = \frac{(1.96)^2 \times 0.9 \times 0.1}{(0.05)^2} \approx 138$$

The sample size was adjusted using Cochran's finite population correction formula, as the population was finite ($n = 140$):

$$n = \frac{n_0}{1 + \left(\frac{n_0 - 1}{N}\right)}$$
$$n = \frac{138}{1 + \left(\frac{137}{140}\right)} \approx 70$$

Thus, a minimum sample size of approximately 70 respondents was statistically sufficient to represent the study population with 95% confidence and a 5% margin of error.

To improve representativeness and account for possible non-response, the researcher initially approached 140 managers across hotels and event management companies. Based on accessibility and willingness to participate, and after obtaining informed consent, 80 managers were randomly selected and included in the final sample. This sample size exceeded the statistically required minimum, thereby enhancing the reliability and precision of the study findings.

Instrument

After a thorough evaluation of pertinent literature and discussions with subject matter experts, the interview schedule was created. It comprised five sections aligned with the study objectives:

Section I collected demographic and organizational details of managers.

Section II gathered information on the types of waste generated after events.

Section III assessed awareness of waste management using a summated rating scale covering prevention and minimization, reuse, recycling and recovery, and disposal methods. Responses were recorded as *Agree*, *Undecided*, and *Disagree*, with scores ranging from 3 to 1 (reverse scoring for negative statements). Higher scores indicated greater awareness.

Section IV examined waste management practices using 21 statements related to segregation, composting, recycling, reuse, and landfilling. Responses were *Always*, *Sometimes*, and *Never*, scored from 3 to 1, where higher scores indicated better practices.

Section V identified barriers to waste management, categorized as lack of knowledge, funds, interest, manpower, space, time, equipment, and government legislation and enforcement.

Responses included *Major barrier*, *Minor barrier*, and *Not a barrier*, scored from 3 to 1, with higher scores indicating greater barriers.

Validity and Reliability

The instrument was reviewed by a panel of eight experts from the Department of Family and Community Resource Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda. The final tool was selected based on 80% consensus. A pilot survey was conducted to test clarity and feasibility. Reliability was established using the split-half (odd-even) method, yielding coefficients of 0.389 for awareness, 0.843 for practices, and 0.545 for barriers.

Data Collection

The interview schedule was utilized to collect data via face-to-face interviews and door-to-door surveys. The purpose of the study was properly described, rapport was created, and all participants provided informed consent. Respondents were promised of confidentiality and informed of their right to withdraw at any time without penalty. Only willing volunteers who provided accurate and pertinent information were used to collect data.

RESULTS AND DISCUSSION

These are the study's findings, which came from analysis, discussion, and interpretation of the data.

- i. **Demographic Profile of respondents and their organizational details:** According to Table 1, the average age of hotel managers was 45.78 years, with 37.50% of them falling into the 44–48 age range. Ninety-seven percent were men, and more than half (55%) were graduates. Half of them had 18–28 years of experience, and their average 8 years of work experience was 21.5 years. Most hotels (75 per cent) were established 6–36 years ago, and 92.50 per cent lacked in-house waste disposal facilities.

Among event managers, the mean age was 38.88 years, with 40 per cent aged 43–50 years. Nearly one-half (47.50 per cent) were graduates, and 75 per cent were male. Their mean job experience was 14.65 years, but 52.50 percent of them had 5–13 years. Event management companies had a mean establishment age of 13.65 years, with 65 per cent operating for 1–13 years, and 95 per cent lacked in-house waste disposal facilities.

Table 1: Demographic Profile of respondents and their organizational details

Dimension	Indicator	Hotel Managers (%)	Event Managers (%)
Respondent Profile	Mean age (years)	45.78	38.88
	Dominant age group	44-48 (37.50 %)	43-50 (40%)
	Graduates	55.00	47.50
	Male respondents	97.50	75.00
	Mean Work experience (years)	21.5	14.65
		Hotel (%)	Event Management Company (%)
Organizational Profile	Mean years of establishment	24.8	13.65
	Year of Establishment	6-36 (75 %)	1-13 (65%)
	No waste disposal facility	92.50	95.00

- ii. **Types of events organized by event organizers:** Table 2 revealed that both hotel managers and event managers organized formal and informal events. Majority hotel managers conducted formal events such as meetings (92.50%), seminars (85%), and product launches (80%). Event managers also organized formal events, mainly meetings (77.50%) and seminars (72.50%). While event managers frequently planned weddings, anniversaries, and New Year's celebrations, all hotel managers hosted unofficial events, such as religious gatherings (92.50%) and New Year's parties (97.50%), musical events, farewell parties, baby showers, and surprises.

Table 2: Distribution of the respondents according to types of events organized by them

Sr. No.	Types of events organized by hotel and event managers	Hotel managers (n = 40)		Event managers (n = 40)	
		f	%	f	%
i.	Formal events				
	Meetings	37	92.5	31	77.5
	Conferences	31	77.5	21	52.5
	Exhibition	18	45.0	23	57.5
	Seminar	34	85.0	29	72.5

	Product launching	32	80.0	24	60.0
	Annual celebration	31	77.5	25	62.5
	Promotional events	30	75.0	24	60.0
ii.	Informal events				
	New Year party	39	97.5	37	92.5
	Wedding	40	100	35	87.5
	Anniversary party	40	100	37	92.5
	Engagement party	40	100	40	100
	Baby shower party	40	100	38	95.0
	Farewell party	40	100	39	97.5
	Surprise party	40	100	39	97.5
	Birthday party	40	100	40	100
	Welcome party	40	100	40	100
	Get together	40	100	40	100
	Religious event	37	92.5	40	100
	Cocktail party	12	30.0	14	35.0
	Musical events	40	100	37	92.5

- iii. **Types of waste generated after events:** Table 3 showed that events organized by hotel managers generated mainly cloth waste (92.50%) and wood waste (85%), whereas events organized by event managers primarily produced flower waste (97.50%) and water waste (95%).

Table 3: Distribution of respondents according to types of waste generated after events

Sr. No.	Types of Waste	Event Organizers (n=80)			
		Hotel Manager		Event Manager	
		(f)	(%)	(f)	(%)
1.	Paper waste	40	100	40	100
2.	Plastic waste	40	100	40	100
3.	Food waste	40	100	40	100
4.	Flower waste	40	100	39	97.5
5.	Water waste	29	72.5	38	95
6.	Wood waste	34	85	24	60
7.	Metal waste	13	32.5	17	42.5
8.	Cloth waste	37	92.5	31	77.5
9.	Decorative waste	4	10	0	0
10.	Thermocol waste	3	7.5	0	0
11.	Glass waste	0	0	3	7.5
12.	Solid waste	0	0	1	2.5

iv. Variance of Extent of Awareness regarding Waste Management, Waste Management Practices adopted and Barriers in Adoption

According to weighted mean scores, hotel managers were more conscious of reuse, whereas event managers were more conscious of prevention and minimization. Overall awareness was greater among hotel managers, but event managers demonstrated better waste management practices. Event managers reported lack of equipment, time, and manpower as major barriers, whereas lack of interest was minor. Hotel managers identified lack of knowledge and time as major barriers, with lack of funds and manpower as minor constraints.

Ho₁: There exists no relationship between extent of awareness regarding waste management, waste management practices adopted and barriers in adoption among respondents and their age

Table 4: Analysis of variance showing variation in extent of awareness regarding waste management, waste management practices adopted and barriers in adoption among respondents and their age

Age of Event Organizers	Hotel Managers			Event Manager		
	Weighted Mean	F-value	Level of Significance	Weighted Mean	F-value	Level of Significance
Awareness	2.94	1.109	N.S.*	2.84	1.604	N.S.*
Practices	2.32	2.437	N.S.*	2.76	0.062	N.S.*
Barriers	2.55	0.085	N.S.*	2.56	1.370	N.S.*

Note: *N.S. = Not Significant

Analysis of variance revealed that the F-values for awareness, waste management strategies, and barriers across age groups were not significant (Table 4). The respondents' age had no effect on their waste management awareness, practices, or perceived barriers, according to the null hypothesis, which was thus accepted.

Ho₂: There exists no relationship between extent of awareness regarding waste management, waste management practices adopted and barriers in adoption among respondents and their educational qualification

Table 5: Analysis of variance showing variation in extent of awareness regarding waste management, waste management practices adopted and barriers in adoption among respondents and their educational qualification

Educational Qualification of Event Organizers	Hotel Managers			Event Managers		
	Weighted Mean	F-value	Level of Significance	Weighted Mean	F-value	Level of Significance
Awareness	2.94	1.240	N.S.*	2.84	3.719	0.05
Practices	2.32	1.589	N.S.*	2.76	0.508	N.S.*
Barriers	2.55	0.604	N.S.*	2.56	3.968	0.01

Note: *N.S. = Not Significant

The findings showed that event organizers' understanding of waste management and adoption hurdles varied significantly depending on their level of education (Table 5). However, neither the awareness, behaviors, or barriers of hotel managers nor the educational background of event managers were shown to differ significantly.

Table 6: Scheffe's test showing the mean significance in extent of awareness regarding waste management and barriers in adoption among event managers with their educational qualification

	Educational Qualification	Mean	*df	Level of Significance
Awareness	Diploma	5.0	35	0.05
	Graduate	10.0		
	Postgraduate	13.0		
Barriers	Diploma	9.0	35	0.01
	Graduate	10.0		
	Postgraduate	13.0		

*df= Degree of freedom

Event managers with diploma credentials and those with graduate and postgraduate degrees differed significantly, according to Scheffe's test (Table 6). This suggests that event managers' understanding of waste management and their perception of the obstacles to its adoption are strongly influenced by their educational background.

Ho₃: There exists no relationship between extent of awareness regarding waste management, waste management practices adopted and barriers in adoption among respondents and their work experience

Table 7: Analysis of variance showing variation in the extent of awareness regarding waste management, waste management practices adopted and barriers in adoption among respondents and their work experience

Work Experience of Event Organizers	Hotel Managers			Event Managers		
	Weighted Mean	F-value	Level of Significance	Weighted Mean	F-value	Level of Significance
Awareness	2.94	1.640	N.S.*	2.84	0.905	N.S.*
Practices	2.32	1.182	N.S.*	2.76	0.586	N.S.*
Barriers	2.55	1.595	N.S.*	2.56	0.940	N.S.*

Note: *N.S. = Not Significant

The F-values for awareness, waste management procedures, and adoption barriers across various work experience levels were not significant, according to analysis of variance (Table 7). As a result, the null hypothesis was accepted, suggesting that respondents' work experience had no bearing on their knowledge, habits, or perceptions of waste management obstacles.

H04: There exists no relationship between extent of awareness regarding waste management and waste management practices adopted among respondents and waste management practices adopted and barriers in adoption among respondents

Table 8: Co-efficient of correlation showing relationship between extent of awareness regarding waste management and waste management practices adopted among respondents and waste management practices adopted and barriers in adoption among respondents

Selected Variables	Hotel Mangers		Event Managers	
	r-value	Level of significance	r-value	Level of significance
Extent of awareness regarding waste management	0.105	N.S.*	0.267	N.S.*
Waste management practices adopted				
Waste management practices adopted	-0.933	0.01	0.162	N.S.*
Extent of barriers in Adoption				

Note: *N.S. = Not Significant

Hotel managers' waste management strategies and the degree of obstacles they encounter were found to be significantly correlated. Nevertheless, no meaningful correlation was discovered between hotel managers' awareness and practices or between event managers' awareness, practices, and barriers. Consequently, the null hypothesis was partially accepted (Table 8), indicating that waste management solutions are significantly impacted by impediments.

DISCUSSION AND CONCLUSION

The study's goal was to determine how much event planners knew about waste management, what waste management strategies they used, and what obstacles they encountered when putting these strategies into effect. The results showed that event managers had a high degree of knowledge about hotel managers showed a moderate level of awareness regarding waste management. The degree of awareness of event managers and their educational background were shown to be significantly correlated, underscoring the critical role that education plays in encouraging efficient waste management techniques. This highlights the significance of awareness-raising campaigns carried out by government agencies, hotel management associations, and municipal corporations working together.

Event and hotel managers were found to have only moderate waste management measures, despite the high level of awareness among event organizers. The study also showed that implementing waste management procedures presented significant obstacles for event planners. The degree of obstacles encountered and the waste management strategies used by hotel managers were shown to be significantly correlated, suggesting that implementation is directly impacted by barriers. One of the major challenges identified was the financial investment required for waste management infrastructure and equipment, which varies depending on the scale of operations and methods employed.

Despite the possibly large initial investment needed for waste management techniques, effective waste management offers significant long-term benefits. These include lower expenses for disposing of garbage, income from recycling, energy savings, adherence to regulations, and enhanced environmental performance. These investments can be further supported by opportunities like government grants, incentives, and funding initiatives with a sustainability focus. Organizations can control expenses and optimize profits by performing cost-benefit assessments, looking at financing possibilities, and working with municipal authorities and waste management service providers. Waste management is therefore still a viable investment for businesses committed to sustainability, even with the initial costs.

According to the report, event planners should work with contracted waste management businesses, conduct trash audits, and promote staff involvement in waste management training initiatives. Waste production during events can be greatly decreased by implementing practices that emphasize reuse, recycling, and energy recovery. However, these methods might raise operating expenses and have an impact on profitability. Organizers can use tactics like doing cost-benefit analyses, partnering with recycling companies and sustainability-focused organizations, looking for sponsorships, streamlining waste management procedures, and involving attendees through awareness campaigns to lessen this impact. Implementation expenses might be further reduced by looking into funding options through governmental and environmental organizations.

The study also showed that the majority of event planners lacked internal waste management capabilities for recycling, composting, or separation, which raises operating costs and affects profitability. Consequently, it is essential that event management companies embrace sustainable techniques in order to take environmental responsibility seriously. Important actions include creating a formal environmental policy, carrying out frequent environmental audits, and creating improvement plans with precise goals for recycling and waste reduction. A culture of sustainability

can also be promoted by encouraging staff and stakeholders to adopt new attitudes through training, workshops, and awareness campaigns.

Working together with environmental protection organizations and trade groups can raise awareness and make it easier to apply waste management techniques. By providing incentives like subsidized recycling services or lower landfill costs, local governments can assist these initiatives. During training sessions and events, the usage of educational audio-visual aids can raise awareness among attendees, employees, and organizers. In general, sustainable waste management and the development of a more ecologically conscious event business depend on the combined efforts of government agencies, industry groups, event planners, and the general public.

LIMITATIONS OF THE STUDY

There were certain restrictions on the study. It was difficult to gather primary data because many event organizers refused to take part. The results were based on self-reported responses, which may not exactly reflect behaviors in the real world. Despite their high knowledge, the respondents' moderate practices and substantial barriers raise the possibility that their stated behavior differs from the reality on the ground.

Ethical approval

The study was approved by the institutional ethics committee for human research (IECHR), Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara with the ethical approval number IECHR/FCSc/MSc/2022/02.

Conflicts of Interest

The authors declare no conflicts of interest.

REFERENCES

- Andersson, T. D., & Lundberg, E. (2013). Commensurability and sustainability: Triple impact assessments of a tourism event. *Tourism Management*, 37(37), 99–109. <https://doi.org/10.1016/j.tourman.2012.12.015>
- Getz, D., & Page, S. J. (2016). *Event Studies*. Routledge. <https://doi.org/10.4324/9781315708027>
- Hottle, T. A., Bilec, M. M., Brown, N. R., & Landis, A. E. (2015). Toward zero waste: Composting and recycling for sustainable venue-based events. *Waste Management*, 38, 86–94. <https://doi.org/10.1016/j.wasman.2015.01.019>
- Karol, S. (2023). Overcoming The Barriers in the Greening of Small-Scale Events. <https://campus-fryslan.studenttheses.ub.rug.nl/309/1/msc%20S5066980%20S%20Karol.pdf>
- Laing, J., & Frost, W. (2010). How green was my festival: Exploring challenges and opportunities associated with staging green events. *International Journal of Hospitality Management*, 29(2), 261–267. <https://doi.org/10.1016/j.ijhm.2009.10.009>
- Mair, J., & Jago, L. (2009). The development of a conceptual model of greening in the business events tourism sector. *Journal of Sustainable Tourism*, 18(1), 77–94. <https://doi.org/10.1080/09669580903291007>

- Mair, J., & Laing, J. (2012). The greening of music festivals: motivations, barriers and outcomes. Applying the Mair and Jago model. *Journal of Sustainable Tourism*, 20(5), 683–700. <https://doi.org/10.1080/09669582.2011.636819>
- Naidu, S.A. (2008). Waste Management Practices in Small Scale Food Processing Industry in select Districts of Tamil Nadu. Unpublished dissertation Retrieved on 14th march, 2023 from, <http://hdl.handle.net/10603/118108>
- Rafiee, A. Et al. (2018) “The impact of various festivals and events on recycling potential of municipal solid waste in Tehran, Iran,” *Journal of Cleaner Production*, 183, pp. 77–86. Available at: <https://doi.org/10.1016/j.jclepro.2018.02.118>.
- Raj, R., Rashid, T., & Walters, P. (4 C.E.). *Events Management An Integrated and Practical Approach* (1st ed.). SAGE Publications Ltd.
- Surbhi & Bose, I. (2025). Reducing Waste in Event Planning: Practical Strategies for Sustainable Event Management in Faridabad. *Advances in Economics, Business and Management Research*, 313–324. https://doi.org/10.2991/978-94-6463-682-6_21
- United Nations Environment Programme. (2012). Sustainable events Guide I C L E I Local Governments for Sustainability. https://www.greeneventbook.com/wp-content/uploads/2024/04/UNEP-sustainable_events_guide_give_your_large_event_a_small_footprint.pdf

ASSESSMENT OF MUSCULOSKELETAL DISCOMFORT IN AUTO-RICKSHAW DRIVERS OF VADODARA CITY

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ABSTRACT

Auto Rickshaw Drivers are essential to urban transportation, helping millions of people travel each day. However, their work often involves long hours of sitting, repeated hand movements, awkward body positions, and constant exposure to vibrations. These factors can lead to musculoskeletal problems and reduce their ability to work efficiently. Objective: To identify the extent of musculoskeletal discomfort experienced by CNG-operated Auto Rickshaw Drivers in Vadodara City. A descriptive research design was adopted using purposive sampling. Data was collected from 120 Auto Rickshaw Drivers through a structured questionnaire and observation sheet. The findings revealed that the majority of the drivers experienced discomfort in their lower back (74.2per cent), neck (58.3per cent), and knees (53.7per cent) over the past 12 months. It was also observed that musculoskeletal discomfort had a significant relationship with the age of the drivers. Furthermore, the inadequacy of current seat designs was identified as a contributing factor to the discomfort. In response, a newly developed ergonomic seat design has been proposed to enhance driver posture and minimize strain on the lower back and knees. The findings of this study will be useful in improving the health, productivity, and occupational wellbeing of Auto Rickshaw Drivers through ergonomic interventions.

Keywords Auto Rickshaw Drivers · Musculoskeletal Discomfort · Ergonomics · Seat Design · Occupational Health · Posture · Urban Transportation

INTRODUCTION

Urban transportation is a crucial element of daily life, especially in growing cities like Vadodara. Among the many contributors to this system, Auto Rickshaw Drivers play a significant role in ensuring accessible, affordable, and timely mobility for the population. However, behind this indispensable service lies a less-discussed reality, the occupational health challenges faced by these drivers due to the demanding nature of their work.

Auto Rickshaw Drivers are exposed to several physical and environmental stressors, including prolonged sitting, awkward postures, repetitive upper-limb movements, and continuous exposure to whole-body vibrations. These factors significantly contribute to musculoskeletal discomfort

(MSD), which affects their physical well-being and job efficiency ^[1]. Moreover, long hours of sitting in non-ergonomic positions with limited mobility aggravate the risk of developing chronic pain and postural disorders, particularly in the lower back, neck, shoulders, and upper limbs ^[2].

Musculoskeletal discomforts include pain, stiffness, or soreness in muscles, tendons, joints, and ligaments, which may range from mild discomfort to severe, chronic pain that can hinder day-to-day activities. Studies suggest that these issues, if left unaddressed, may lead to musculoskeletal disorders (MSDs), which are a leading cause of occupational disability globally ^[3]. MSDs not only impair work productivity but also contribute to psychological distress, absenteeism, and long-term health consequences.

Unlike employees in structured organizations, Auto Rickshaw Drivers often lack basic ergonomic infrastructure, healthcare support, and awareness regarding injury prevention. This informal working environment, coupled with long working hours and exposure to adverse road conditions, creates a cumulative effect that accelerates physical degeneration ^[4]. Moreover, seat design in most auto rickshaws does not support the lumbar spine adequately, resulting in slouched postures and muscular strain ^[5].

Despite the alarming health concerns, there is a noticeable lack of scientific data on musculoskeletal and postural discomforts among Auto Rickshaw Drivers in Indian urban settings, particularly in Vadodara city. While many studies have focused on similar occupations like truck drivers and bus drivers, this specific occupational group remains under-researched.

Thus, the current study aims to assess the extent and nature of musculoskeletal and postural discomfort among CNG-operated Auto Rickshaw Drivers in Vadodara. The research will also examine associations between discomfort levels and work-related variables such as daily driving hours, age, and years of experience. Ultimately, this study seeks to generate awareness and provide insights that can inform ergonomic seat redesign, health policy interventions, and driver welfare initiatives.

OBJECTIVE

1. To assess the extent of Musculoskeletal Discomfort among the Auto Rickshaw Drivers in Vadodara.

HYPOTHESIS

1. The extent of Musculoskeletal Discomfort experienced by the respondents varies with their Personal Variables (Age in years and Body Mass Index) and Situational Variables (Duration of Driving per day and Driving experience in years).

METHODOLOGY

A descriptive research design was employed to assess the Musculoskeletal Discomfort among the Auto Rickshaw Drivers. The study was conducted in Vadodara City, specifically targeting CNG operated Auto Rickshaw Drivers. A total of 120 drivers participated in the study. A purposive sampling technique was employed to select the samples by dividing the city into four directional zones: North, South, East, and West. Thirty samples were randomly chosen from each zone, resulting in a total of 120 respondents. The data were collected through structured questionnaire, including the Cornell Musculoskeletal Discomfort Questionnaire (Sedentary Worker, Male Version), and observation sheet that recorded Anthropometric Measurements. For data analysis, descriptive statistics, including frequencies, percentages, means, and standard deviations, were applied. Additionally, relational statistics, including Analysis of Variance (ANOVA) was used to assess the relationships between different factors. A descriptive research design was adopted to assess the extent of Musculoskeletal Discomfort experienced by the Auto Rickshaw Drivers in Vadodara City. The study specifically focused on drivers operating CNG Auto Rickshaws. A total of 120 participants were selected using a purposive sampling technique, where Vadodara was divided into four directional zones North, South, East, and West and 30 drivers were randomly chosen from each zone to ensure geographical representation. Data collection was carried out using a structured questionnaire, which consisted of two key sections. The first section gathered demographic and occupational background information such as age, years of driving experience, average daily working hours, type of ownership of vehicle, and break patterns. The second section included the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ), which is a standardized tool designed to assess discomfort experienced in different body regions during work-related activities, specifically tailored for sedentary male workers such as drivers. In addition to the questionnaire, an observational checklist was utilized to record anthropometric measurements of the Auto Rickshaw Drivers. For the purpose of data analysis, both descriptive and inferential statistics were applied. Descriptive analysis included frequencies, percentages, mean values, and standard deviations to summarize the data. Inferential statistics, such as Analysis of Variance (ANOVA) and Pearson's Correlation Coefficient, were used to determine relationships between variables such as age, years of experience, and daily driving hours with the reported discomfort levels. Prior to participation, all respondents were provided with informed consent forms, and ethical considerations such as confidentiality and voluntary participation were strictly followed. The data collected was used solely for academic and research purposes, and participant anonymity was ensured throughout the study.

RESULTS AND DISCUSSION

Background Information of the respondents

The study comprised 120 CNG-operated Auto Rickshaw Drivers from Vadodara City. The majority of respondents (63.33 per cent) were within the 26–40 years age group. With regard to educational qualifications, the highest proportion of respondents (43.33 per cent) had attained secondary education. In terms of Body Mass Index (BMI), the largest share (34.16 per cent) fell within the normal weight category. Regarding driving experience, 60.84 per cent of the respondents reported having 3–16 years of experience. Ownership status revealed that 69.16 per cent of the drivers owned their vehicles. The most commonly reported daily working duration

ranged between 6 to 12 hours, with an average of 9.7 hours. A substantial majority (91.67 per cent) worked in the morning shift, and 67.51 per cent reported taking one break during work hours. Concerning health and wellbeing practices, 62.50 per cent of the respondents did not seek medical advice for discomfort, while 58.33 per cent did not engage in any form of exercise. These findings underscore key demographic and occupational trends among Auto Rickshaw Drivers, with potential implications for their health and work conditions.

Extent of Musculoskeletal Discomfort experienced by the respondents

Musculoskeletal Discomfort experienced by the respondents during the Last Work Week

The data in the Table 1 and Figure 1 revealed that the most frequently affected body parts and the intensity of Musculoskeletal Discomfort experienced by the respondents. The highest percentage 35.83 per cent of the respondents reported experiencing discomfort in the lower back several times a day, making it the most common and severe discomfort area. This was followed by 33.33 per cent of the respondents who reported discomfort in the right knee once a day. Notably, 30.00 per cent of the respondents experienced discomfort in the neck 1–2 times in the last week, and an equal percentage reported no discomfort in the left forearm. Additionally, 27.50 per cent of the respondents reported experiencing discomfort once a day in the left shoulder, followed by 26.67 per cent of the respondents who reported discomforts either once or 1–2 times a day in the right shoulder. A 25.00 per cent of the respondents experienced discomfort several times a day in both the upper back and left upper arm, and the same proportion experienced discomfort 3–4 times last week in the neck, upper back, and left wrist, as well as 1–2 times last week in the right lower leg. Furthermore, 24.16 per cent of the respondent reported experiencing discomfort several times a day in the right wrist, while the same percentage reported no discomfort in the left thigh. Discomfort was reported once a day in the left knee and 3–4 times last week in the right upper arm by 23.34 per cent of the respondents. The same percentage experienced discomfort 1–2 times last week in the left upper arm and never in the right knee. Discomfort in the right upper arm was experienced both several times a day and once a day by 21.67 per cent of the respondents, while the lower back was also reported by the same proportion once a day. Discomfort in the left thigh several times a day and 1–2 times last week in the right upper arm was noted by 20.83 per cent of the respondents. Lastly, 20.00 per cent of the experienced discomfort several times a day in the left knee, once a day in the upper back and right forearm, 3–4 times last week in both shoulders and right forearm, and 1–2 times last week in the upper back and left lower leg. These findings highlight that the lower back, knees, shoulders, and upper limbs were the most affected anatomical regions, and discomfort was most commonly reported as occurring once or several times a day, underscoring the physically demanding nature of auto rickshaw driving.

Table 1 Musculoskeletal Discomfort experienced by the respondents during the Last Work Week (n=120)

Musculoskeletal Discomfort experienced by the respondents during the Last Work Week

Sr. No.	Body parts	Respondents (n=120)									
		Several times a day		Once every day		3-4 times last week		1-2 times last week		Never	
		f	%	f	%	f	%	f	%	f	%
1.	Neck	0	03.3	2	18.3	3	25.0	3	30.0	2	23.3
		4	3	2	3	0	0	6	0	8	4
2.	Right Shoulder	1	08.3	3	26.6	2	20.0	3	26.6	2	18.3
		0	3	2	7	4	0	2	7	2	3
3.	Left Shoulder	1	10.0	3	27.5	2	20.0	2	21.6	2	20.8
		2	0	3	0	4	0	6	7	5	3
4.	Upper Back	3	25.0	2	20.0	3	25.0	2	20.0	1	10.0
		0	0	4	0	0	0	4	0	2	0
5.	Right Upper Arm	2	21.6	1	14.1	2	23.3	2	20.8	2	20.0
		6	7	7	6	8	4	5	3	4	0
6.	Left Upper Arm	3	25.0	1	11.6	2	18.3	2	23.3	2	21.6
		0	0	4	6	2	3	8	4	6	7
7.	Lower Back	4	35.8	2	21.6	2	16.6	2	16.6	1	09.1
		3	3	6	7	0	7	0	7	1	6
8.	Right Forearm	1	15.0	2	20.0	2	20.0	2	16.6	3	28.3
		8	0	4	0	4	0	0	7	4	3
9.	Left Forearm	1	13.3	3	25.0	1	15.0	2	16.6	3	30.0
		6	3	0	0	8	0	0	7	6	0
10.	Right Wrist	2	24.1	2	21.6	2	18.3	1	15.8	2	20.0
		9	6	6	7	2	3	9	4	4	0
11.	Left Wrist	1	15.0	1	15.0	3	25.0	2	16.6	3	28.3
		8	0	8	0	0	0	0	7	4	3
12.	Right Thigh	1	13.3	3	31.6	1	10.0	2	16.6	3	28.3
		6	3	8	7	2	0	0	7	4	3
13.	Left Thigh	2	20.8	1	15.0	3	25.8	1	14.1	2	24.1
		5	3	8	0	1	5	7	6	9	6
14.	Right Knee	2	16.6	4	33.3	1	08.3	2	18.3	2	23.3
		0	7	0	3	0	3	2	3	8	4
15.	Left Knee	2	20.0	2	23.3	2	18.3	2	18.3	2	20.0
		4	0	8	4	2	3	2	3	4	0
16.	Right Lower Leg	1	13.3	2	18.3	2	16.6	3	25.0	3	26.6
		6	3	2	3	0	7	0	0	2	7
17.	Left Lower Leg	1	13.3	2	21.6	1	13.3	2	20.0	3	31.6
		6	3	6	7	6	3	4	0	8	7

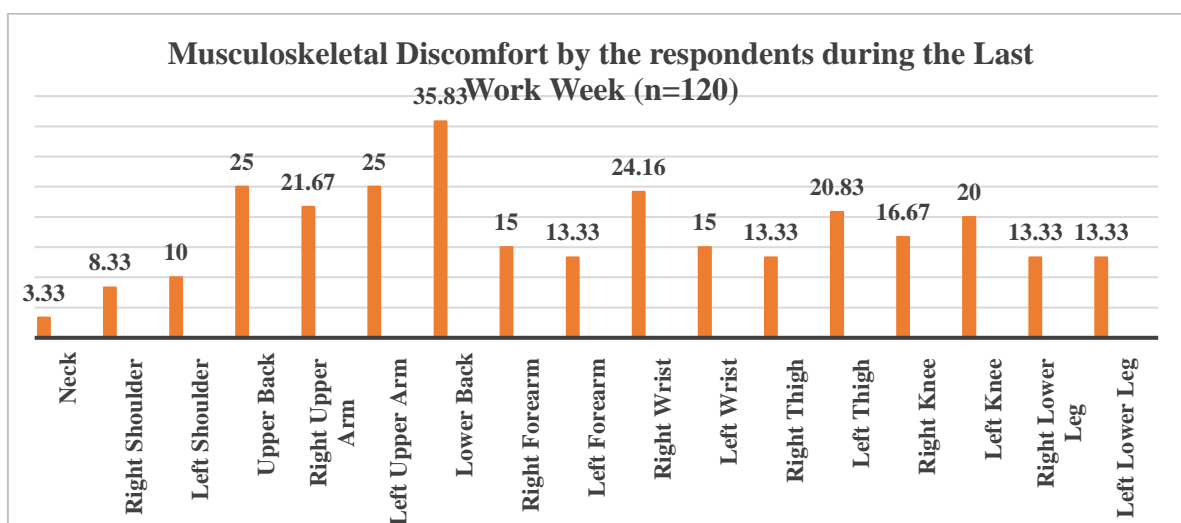


Figure 1 Musculoskeletal Discomfort experienced by the respondents during the Last Work Week

Level of Discomfort experienced by the respondents due to Musculoskeletal Discomfort during the last work week

The data in the table 2 and figure 2 revealed that the highest percentage of respondents (48.33 per cent) experienced a high level of musculoskeletal discomfort in the lower back, followed by 31.67per cent in the upper back, 28.33per cent in the left knee, and 25.00per cent in the left wrist. In terms of moderate discomfort, the highest was observed in the neck (40.00per cent), followed by 36.34per cent in the right knee and 32.51per cent in the left knee. For low-level discomfort, the left forearm reported the highest percentage at 60.01per cent, followed by 56.67per cent in the right lower leg, 55.84per cent in the left lower leg, and 55.00per cent in the neck. These results indicate that the lower back, neck, and knees are particularly vulnerable areas among the respondents.

Table 2 Level of Discomfort experienced by the respondents due to Musculoskeletal Discomfort during the last work week (n=120)

Level of Discomfort experienced by the respondents due to Musculoskeletal Discomfort during the last work week

Sr. No.	Body parts	Respondents (n=120)					
		High Discomfort		Moderate Discomfort		Low Discomfort	
		f	%	f	%	f	%
1.	Neck	6	05.00	48	40.00	66	55.00
2.	Right Shoulder	24	20.00	48	40.00	48	40.00
3.	Left Shoulder	28	23.33	36	30.00	56	46.67
4.	Upper Back	38	31.67	46	38.33	36	30.00
5.	Right Upper Arm	26	21.67	42	35.00	52	43.33
6.	Left Upper Arm	20	16.67	34	28.33	66	55.00
7.	Lower Back	58	48.33	38	31.67	24	20.00
8.	Right Forearm	10	08.33	52	43.34	58	48.33

9.	Left Forearm	14	11.66	34	28.33	72	60.01
10.	Right Wrist	26	21.67	38	31.67	56	46.66
11.	Left Wrist	30	25.00	32	26.67	58	48.33
12.	Right Thigh	24	20.00	41	34.16	55	45.84
13.	Left Thigh	24	20.00	42	35.00	54	45.00
14.	Right Knee	30	25.00	44	36.34	46	38.33
15.	Left Knee	34	28.33	39	32.51	47	39.16
16.	Right Lower Leg	24	20.00	28	23.33	68	56.67
17.	Left Lower Leg	22	18.33	31	25.83	67	55.84

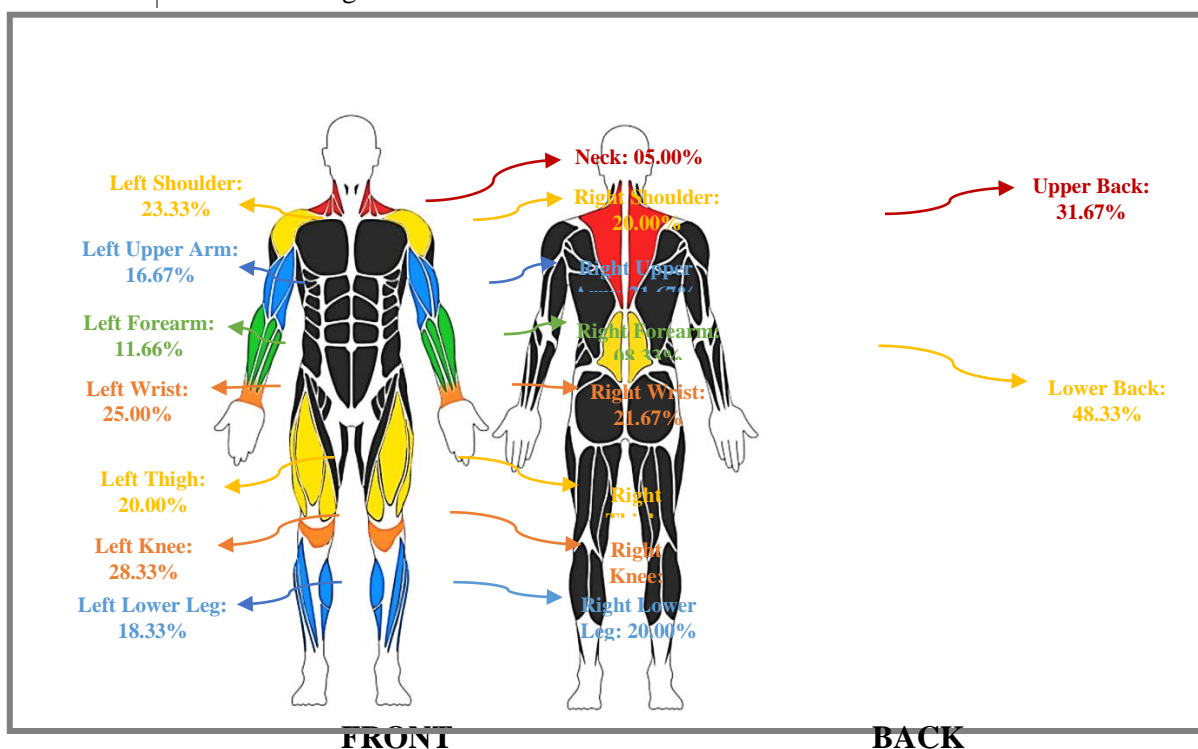


Figure 2 Level of Discomfort experienced by the respondents in the various body regions due to Musculoskeletal Discomfort during the last work week

Interference with Work Ability due to Musculoskeletal Discomfort experienced during the last work week by the respondents

The data in the table Table 3 and Figure 3 revealed that 45.00 per cent of respondents always experienced interference with their work ability due to musculoskeletal discomfort in the lower back, making it the most significantly impacted area. This was followed by 28.33 per cent reporting constant interference due to discomfort in the left shoulder and 26.66 per cent due to discomfort in the right knee. Additionally, 23.33 per cent of respondents always experienced work interference due to discomfort in the upper back, and 21.67 per cent reported the same for both the right shoulder and left knee. The highest percentage of respondents who sometimes experienced interference was 56.67 per cent, related to discomfort in the right forearm, followed by 48.33 per cent for neck discomfort, and 45.00 per cent each for the right shoulder, upper back, right upper arm, left upper arm, left forearm, and left lower leg. 41.66 per cent also reported work interference

due to right knee discomfort. On the other hand, the highest percentage of respondents who never experienced work interference due to musculoskeletal discomfort was 50.00 per cent for the right lower leg, followed by 46.6 per cent for the left forearm and left thigh. These findings indicate that the lower back, shoulders, and knees are the most commonly affected areas leading to consistent interference with work, while certain limbs like the right lower leg, left forearm, and left thigh were the least likely to impact work ability.

Table 3 Interference with Work Ability due to Musculoskeletal Discomfort experienced by the respondents during the last work week (n=120)

Interference with Work Ability due to Musculoskeletal Discomfort experienced by the respondents during the last work week

Sr. No.	Body parts	Respondents(n=120)					
		Always		Sometimes		Never	
		f	%	f	%	f	%
1.	Neck	8	06.67	58	48.33	54	45.00
2.	Right Shoulder	26	21.67	54	45.00	40	33.33
3.	Left Shoulder	34	28.33	48	40.00	38	31.67
4.	Upper Back	28	23.33	54	45.00	38	31.67
5.	Right Upper Arm	20	16.67	54	45.00	46	38.33
6.	Left Upper Arm	16	13.33	54	45.00	50	41.67
7.	Lower Back	54	45.00	40	33.33	26	21.67
8.	Right Forearm	12	10.00	68	56.67	40	33.33
9.	Left Forearm	10	08.33	54	45.00	56	46.67
10.	Right Wrist	26	21.67	42	35.00	52	43.33
11.	Left Wrist	22	18.33	43	35.84	55	45.83
12.	Right Thigh	22	18.33	48	40.00	50	41.67
13.	Left Thigh	18	15.00	46	38.33	56	46.67
14.	Right Knee	32	26.66	50	41.66	38	31.66
15.	Left Knee	26	21.67	46	38.33	48	40.00
16.	Right Lower Leg	18	15.00	42	35.00	60	50.00
17.	Left Lower Leg	16	13.33	54	45.00	50	41.67

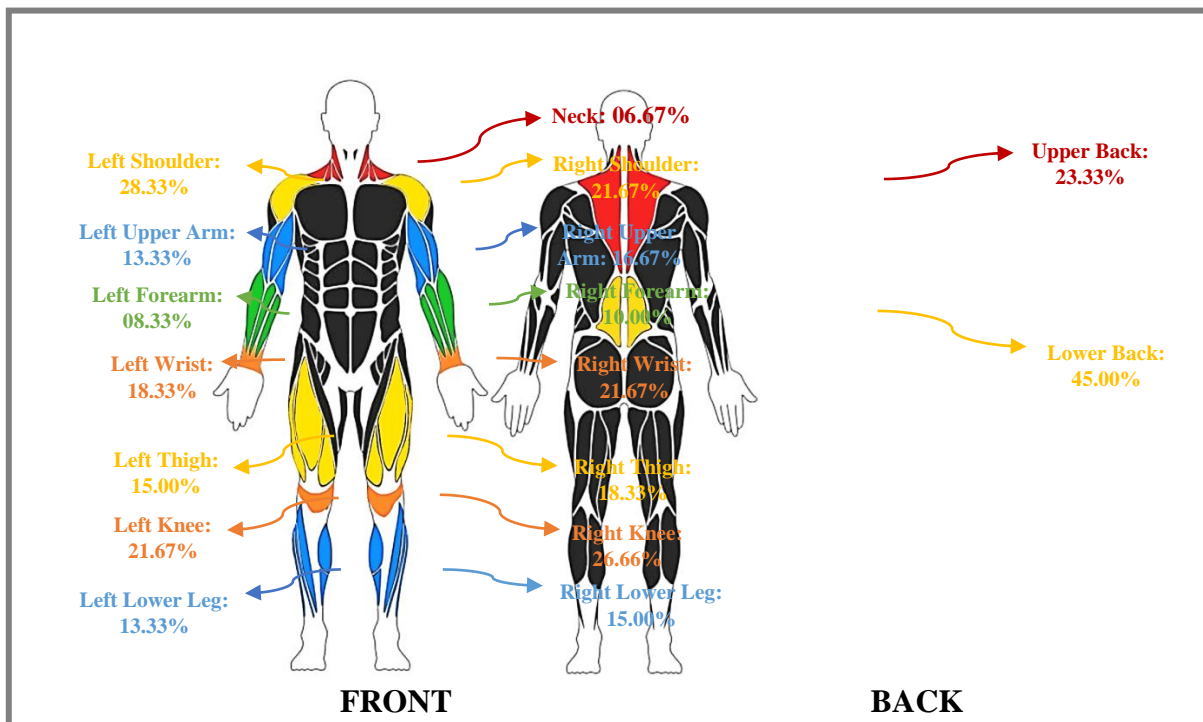


Figure 3 Interference with Work Ability due to Musculoskeletal Discomfort experienced by the respondents during the last work week

Testing of Hypothesis

The computed F-value for Personal Variables [Age (in years) and Driving Experience (in years)] and their Situational Variable [Duration of Driving (per day)] revealed that the F-value was significant for Age (in years), whereas it was not significant for Driving Experience (in years), Duration of Driving (per day) and Body Mass Index. Thus, it can be concluded that the extent of Musculoskeletal Discomfort experienced by the respondents varied significantly with Age, but did not vary with Driving Experience, Duration of Driving and Body Mass Index. Hence, the null hypothesis HO1.2 was partially accepted.

Scheffe Test was conducted subsequently to identify specific group differences, and the results indicated that respondents in the age group of 41 to 55 years significantly differed in the extent of Musculoskeletal Discomfort experienced when compared to those in the 56 to 70 years age group.

CONCLUSION

The results of the study concluded that the tasks performed by Auto Rickshaw Drivers of Vadodara city pose a moderate to high risk of Musculoskeletal Discomfort, with the most commonly affected areas being the lower back, upper back, neck, shoulders, knees, and wrists. These discomforts were significantly associated with prolonged hours of driving, awkward sitting postures, continuous vibration exposure, and lack of proper rest breaks. Personal factors such as age and duration of daily driving were found to significantly influence the extent of postural discomfort. The analysis revealed that drivers aged between 41 to 55 years experienced greater Musculoskeletal Discomfort compared to those in other age groups. The information gathered through the present research will

be beneficial for ergonomics students and researchers to gain deeper insights into work-related musculoskeletal issues among informal sector workers, particularly drivers. The findings can serve as valuable feedback for the Auto Rickshaw Drivers, vehicle manufacturers, and urban policymakers, who, in consultation with occupational health experts, can use this information to develop preventive strategies and ergonomic interventions to reduce Musculoskeletal Discomfort and improve overall driver well-being.

REFERENCES

- Sharma, A., & Gupta, P. (2020). Work-related musculoskeletal disorders: An emerging public health concern among professional drivers. *International Journal of Community Health*, 15(1), 22–30.
- Kumar, R., Sharma, N., & Patel, S. (2021). Ergonomic hazards and musculoskeletal symptoms among vehicle drivers in India. *Indian Journal of Occupational and Environmental Medicine*, 25(2), 89–95.
- World Health Organization. (2021). Musculoskeletal conditions. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions>
- Desai, M., & Mehta, A. (2019). Occupational health risks among Auto Rickshaw Drivers: A review. *Journal of Ergonomics and Health*, 12(3), 56–64.
- Banerjee, M., Singh, S., & Das, A. (2018). A study of ergonomic risk factors among auto-rickshaw drivers in urban India. *International Journal of Occupational Safety and Ergonomics*, 24(3), 401–408.

PARENTAL ASPIRATIONS, EDUCATIONAL SELF-EFFICACY, AND EDUCATIONAL DEPLETION AMONG UNDERGRADUATE SCIENCE STUDENTS

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ABSTRACT

The present study examines the relationship between apparent parental aspirations, academic self-efficacy and scholastic burnout amid undergraduate science learners. A group of 200 participants was evaluated through standardized scales measuring these constructs. The study explores how parental academic expectations influence students' scholastic self-perception and contribute to educational burnout. The findings indicate that high parental aspirations correlate with both positive and negative academic self-concept, which in turn affects academic burnout levels. The implications for educators, parents, and policymakers are discussed.

Keywords: Parental aspirations, academic self-efficacy, educational exhaustion, undergraduate students,

INTRODUCTION

Academic performance and well-being are central to the success of undergraduate students, particularly in high-pressure fields like science. As students navigate the demands of their academic environment, various factors contribute to their experiences, motivations, and mental health. Among these factors, parental aspirations play a significant role in molding student scholastic performance, self-concept, and emotional responses. While some studies highlight the optimistic effects of parental expectations in motivating students to perform well academically, there is growing concern over the potential negative consequences of excessive pressure, particularly in relation to academic burnout.

Academic burnout is a phenomenon commonly observed among students in higher education and is characterized by mental depletion, reduced educational efficacy, and perception of de-personalization (Maslach et al., 2001). The pressure to meet high academic standards, particularly when coupled with perceived parental expectations, can contribute significantly to this condition. Undergraduate science students, in particular, are prone to high levels of academic stress due to the challenging nature of their courses, the rigorous workload, and the demand for exceptional performance. The combination of these academic pressures and external expectations can potentially

lead to burnout, adversely affecting students' academic motivation, psychological well-being, and wholeness.

In this context, comprehending the connection between parental aspirations, educational self-efficacy and educational exhaustion is essential, educational self-view pertains to the convictions students hold about their educational capabilities. It is an important psychological construct that influences motivation, performance, and well-being (Marsh & Craven, 2006). Research suggests that an optimistic educational self-concept can strengthen students' resilience against stressors, enabling them to perform better academically and cope more effectively with challenges. However, when parental expectations become unrealistic or overly demanding, they may lead to a negative self-concept, increasing vulnerability to strain and depletion (Fathi et al., 2017).

This paper seeks to explore how perceived parental expectations influence students' educational self-efficacy and contribute to educational depletion. Specifically, it examines whether educational self-efficacy influences the association between guardians' aspiration and educational depletion. By understanding these mechanisms, the study goals to furnish insightful understanding into how instructors, parents, and decision makers can better support undergraduate science students in managing academic pressure and maintaining a healthy self-concept, thereby decreasing the risk of educational depletion.

SIGNIFICANCE OF THE STUDY

Given the increasing occurrence of educational depletion among undergraduate students, particularly in demanding fields like science, this study has crucial consequences for both academic concept and usage. First, by examining the role of parental expectations, the study provides a deeper understanding of how family dynamics can shape students' academic experiences, both positively and negatively. It also explores the potential mediating role of academic self-concept, shedding light on how students' perceptions of their academic abilities can act as a buffer against the pressures they face.

Second, the findings of this study could inform interventions designed to alleviate academic burnout, such as programs aimed at promoting an optimistic educational self-efficacy and helping students manage stress more effectively. By riveting on the interplay between parental aspirations, self-efficacy, and depletion, the study furnishes valuable guidance for policy makers, counsellors, and parents in creating supportive environments that encourage academic success while safeguarding students' mental health.

RESEARCH PROBLEM

The primary research issue examined in this investigation is the influence of perceived parental aspirations on undergraduate science students' educational self-efficacy and educational depletion. Specifically, this research aims to address the following inquiries:

1. To what extent do students' perceptions of parental aspirations influence their academic self-perception?

2. What is the relationship between educational self-efficacy and academic depletion among undergraduate science students?
3. Does academic self-perception mediate the relationship between perceived parental aspirations and academic depletion?

Addressing these questions is essential to understanding the underlying mechanisms through which parental expectations affect students' academic experiences. By focusing on undergraduate science students, who face unique academic challenges, this study provides targeted insights into the factors contributing to academic burnout in this population.

THEROETICAL FRAMEWORK

The conceptual framework of the present study is grounded in Self-Concept Theory and Stress and Coping Theory. Self-Concept Theory posits that individuals' perceptions of their own abilities and self-worth play a pivotal role in shaping motivation, behavior, and performance (Marsh & Craven, 2006). Students who possess positive educational self-efficacy are more likely to approach academic tasks with confidence, perseverance, and resilience. In contrast, negative self-efficacy beliefs may foster feelings of inadequacy, heightened stress, and vulnerability to academic depletion (Maslach et al., 2001).

Complementing this perspective, Stress and Coping Theory, proposed by Lazarus and Folkman (1984), explains that stress arises when individuals perceive an imbalance between external demands and their available coping resources. Within an academic context, parental aspirations, when perceived as excessive or unrealistic, may intensify this imbalance, thereby increasing the risk of academic burnout. The theory further underscores the role of coping mechanisms in alleviating stress. In the present study, educational self-efficacy is conceptualized as a key coping resource that may mitigate the adverse effects of high perceived parental aspirations on academic depletion.

RESEARCH OBJECTIVES

The main objective of this research is outlined below:

1. To analyse the association between perceived parental aspirations and educational self-efficacy among undergraduate science students.
2. To evaluate how educational self-efficacy affects the level of educational depletion in undergraduate science students.
3. To explore the mediating role of educational self-efficacy in the relationship between parental aspirations and educational depletion.

LITRATURE REVIEW

This literature analysis examines previous research concerning the relationship between perceived parental aspirations, educational self-efficacy, and educational depletion among undergraduate students. In particular, it examines how parental aspirations shape students' educational self-efficacy, which may in turn influence their experience of educational depletion. This review synthesizes

studies from various disciplines, including psychology, education, and sociology, highlighting relevant theoretical frameworks and empirical findings.

Parental expectations and academic self-concept

Parental aspirations have long been considered a notable impact on student educational drive and self-perception. Educational self-efficacy refers to students' beliefs about their capacity to succeed in academic contexts, which is a key determinant of their motivation and persistence (Marsh & Craven, 2006). Perceived parental aspirations are often external motivators that can shape these beliefs, either enhancing or diminishing students' self-confidence in their academic abilities.

Numerous studies have reported the favourable impact of parental aspirations on students' educational self-efficacy. For example, a study by Chao (2001) found that high parental aspirations can lead to increased educational drive, as students strive to meet or exceed the goals set by their parents. This can result in a stronger educational self-efficacy, where students perceive themselves as competent and capable. Similarly, other studies have suggested that parental involvement and high expectations contribute to improved academic performance by enhancing students' academic identity and self-perception (Gonzalez-Pienda et al., 2002).

However, the bond between parental aspirations and educational self-efficacy is not always positive. When expectations are perceived as too high or unrealistic, they can lead to anxiety, strain, and sentiment of insufficiency, which undermine students' self-concept. For instance, a study by Wang and Sheikh-Khalil (2014) demonstrated that students who perceived their parents as exhibiting excessively high aspirations often reported lower levels of academic self-esteem. These negative effects may be particularly evident among students who struggle to meet parental expectations, resulting in a sense of failure or diminished self-worth.

The impact of parental aspirations on educational self-efficacy also depends on students' cultural backgrounds. For example, in collectivist cultures, where family honour and academic success are highly valued, parental aspirations can have a significant positive effect on academic self-concept (Fulgini, 1997). In contrast, in individualist cultures, high aspirations may lead to conflict between students and parents, potentially resulting in stress and lower self-concept (Chao, 2001).

Educational self-efficacy and educational depletion

Educational depletion is a mental condition characterized by sentimental depletion, depersonalization, and lowered academic efficacy (Maslach et al., 2001). Within the realm of tertiary education, depletion is particularly concerning as it affects students' overall well-being, educational performance, and future engagement with their studies. A well-developed educational self-efficacy is considered a safeguarding variable versus depletion, as students with high self-esteem are enhanced armed to manage the obstacles of scholastic journey.

Role of educational self-efficacy in reducing depletion

The association among educational self-efficacy and depletion has been widely studied. Research suggests that students with a strong educational self-efficacy are more resilient to the pressures of university life and less prone to experience depletion. According to a study by Schaufeli and Bakker

(2004), students who interpret their own as competent and able incline to engage in their academic tasks with enthusiasm and energy, reducing the risk of emotional exhaustion and burnout. Likewise, a study by Sokolowski et al. (2017) found that students with high educational self-efficacy reported lower levels of depletion, as they felt more confident in their proficiency to manage educational strain.

In contrast, students with low educational self-efficacy are more vulnerable to burnout. When students perceive themselves as incapable of meeting academic demands, they may feel overwhelmed, disengaged, and emotionally drained, leading to burnout. A study by Roth et al. (2009) revealed that students with reduced confidence and negative educational self-efficacy were more likely to exhibit signs of depletion, including fatigue, cynicism, and decreased academic efficacy. These students may perceive academic challenges as insurmountable and may experience a decrease in motivation and effort, further exacerbating their feelings of depletion

METHODOLOGY

This section outlines the design, participants, instruments, and data examine techniques utilized in this research to investigate the association among perceived parental aspirations, educational self-efficacy, and educational depletion in undergraduate science students.

Participants

A total of 200 undergraduate science students participated in the study. They were randomly selected to ensure a representative and unbiased sample. Participants were informed about study's purpose and provided consent before completing the surveys.

Inclusion Criteria:

- Participants must be undergraduate students currently enrolled in science programs (e.g., biology, chemistry, physics, etc.).
- Participants must have completed at least one semester of their degree to ensure they have some experience with academic expectations and workload.

Exclusion Criteria:

- Students who were enrolled in non-science programs or were in non-degree courses were excluded from the study.

Instruments

The study utilized three validated scales to measure the constructs of perceived parental aspirations, educational self- efficacy, and educational depletion. These scales were chosen for their reliability and ability to capture the relevant aspects of each construct.

1. Perceived Parental Expectations Scale (PPES)

The PPES was developed to measure students' perceptions of the academic expectations set by their parents. It includes items assessing both the level of expectation (e.g., "My parents

expect me to perform well academically”) and the emotional impact of these expectations (e.g., “I feel stressed due to my parents’ expectations”).

2. **Academic Self-Concept Scale (ASCS)**

The ASCS is developed to assess students' beliefs in their academic abilities. It includes items that assess both general self-esteem in academics and specific perceptions of their competence in science-related subjects (e.g., “I feel confident in my ability to succeed in my science courses”).

3. **Maslach Burnout Inventory-Student Survey (MBI-SS)**

The MBI-SS is a broadly employed tool to assess burnout in academic settings. It includes three components of depletion: mental exhaustion, distrust, and educational efficacy. The survey items were adapted to reflect the student population (e.g., “I feel emotionally drained by my studies” and “I no longer feel motivated to do my academic work”). Higher scores indicate greater burnout levels.

Procedure

Participants were recruited via email and university noticeboards and directed to a secure online survey. The initial section included an informed consent form detailing study purposes, confidentiality, and participant rights; only consenting students proceeded. They completed three scales in sequence: perceptions of parental expectations (PPES), academic self-concept (ASCS), and academic burnout (MBI-SS). The survey took approximately 15-20 minutes, was anonymous, and included clear instructions encouraging honest responses.

Data collection spanned four weeks with weekly reminders to maximize participation. Responses were screened for completeness and consistency, with invalid entries excluded from analysis. Statistical analysis comprised descriptive statistics to summarize key variables, Pearson correlation to assess relationships between parental expectations, academic self-concept, and burnout, and regression analyses to explore predictive effects. Mediation analysis using the PROCESS macro examined whether academic self-concept mediated the link between parental expectations and academic burnout.

FINDING AND DISCUSSION

Demographic Profile of the Sample

The demographic characteristics of the participants are summarized in the table below:

Demographic Factors	Category	Count (N)	Percent (%)
Sex	Man	90	45%
	Women	110	55%
Age range	18-20 yrs.	80	40%
	21-23 yrs.	95	47.5%
	24 yrs. and above	25	12.5%

Academic yrs.	First yrs.	50	25%
	Second yrs.	60	30%
	Third yrs.	55	27.5%
	Fourth yrs.	35	17.5%
Parent's Education Level	High School or Below	45	22.5%
	Undergraduate Degree	95	47.5%
	Postgraduate Degree	60	30%

The demographic profile of the participants highlights several important aspects related to gender, age, year of study, and parental education. These characteristics provide a clear understanding of the background of respondents and set the foundation for analyzing their perspectives in the main research.

The sample comprises 200 participants, out of which 90 (45%) are male and 110 (55%) are female. This shows a slight predominance of female respondents in the study. The relatively balanced gender representation ensures that both male and female perspectives are adequately reflected, although the slight tilt toward females may also indicate greater willingness among female students to participate in academic research surveys. This balance strengthens the reliability of gender-based comparisons in the subsequent analysis.

The majority of respondents belong to the 21–23 years age group (47.5%), followed by 18–20 years (40%), while only 12.5% fall in the category of 24 years and above. This distribution indicates that most participants are young adults, typically at the stage of higher education where they are transitioning toward maturity and independent decision-making. The dominance of the 21–23 age bracket aligns with the expected age range of undergraduate students in the second or third year of their studies. The smaller proportion of older students (24 years and above) might represent late entrants, students with academic gaps, or those pursuing higher levels of education.

In terms of academic standing, the highest proportion of respondents is from the second year (30%), followed by the third year (27.5%), while the first year (25%) and fourth year (17.5%) students form smaller segments. This distribution suggests that the majority of respondents are in the middle phase of their academic journey. These students are likely more engaged in academic and extracurricular activities compared to first-year students, who may still be adjusting, and fourth-year students, who may be more focused on completing final projects or preparing for post-graduation opportunities. The balanced representation across years of study ensures that experiences from different academic stages are captured, enriching the overall analysis.

The educational qualifications of parents indicate that 47.5% of participants' parents hold an undergraduate degree, followed by 30% with postgraduate degrees, while 22.5% have only high school or below education. This shows a strong educational background among the families of the respondents, which can have a significant influence on students' academic motivation, decision-making, and career aspirations. The dominance of graduate and postgraduate parental education reflects that the sample largely comes from households where education is valued and prioritized. However, the one-fifth of respondents whose parents studied only up to high school or below adds diversity and ensures representation of varied socio-educational backgrounds.

The following tables provide a detailed breakdown of the analysis conducted for each of the study's objectives. Each table corresponds to one of the study's objectives and presents the relevant statistical analyses to explore the association between perceived parental aspirations, educational self-efficacy, and educational depletion.

Objective 1: To analyse the association between perceived parental aspirations and educational self-efficacy among undergraduate science students.

Table 1: Influence of Perceived Parental Aspirations on Educational Self-Efficacy

Variable	Mean (M)	Standard Deviation (SD)	Correlation (r)
Parental Aspirations	4.2	0.8	0.45**
Educational Self-Efficacy	3.9	0.7	

Analysis: The analysis indicates a significant positive correlation between perceived parental aspirations and educational self-efficacy ($r = 0.45, p < 0.01$). This suggests that students who perceive higher parental aspirations tend to have a more positive view of their academic abilities. In other words, higher aspirations from parents can be linked to stronger educational self-efficacy among students. This is consistent with previous research which suggests that positive academic self-concept can be fostered by external sources of encouragement, such as parental involvement (Wang & Sheikh-Khalil, 2014).

However, it is important to note that while parental aspirations can enhance educational self-efficacy, excessively high expectations may also lead to negative outcomes, as discussed in the context of depletion.

Objective 2: To evaluate how educational self-efficacy affects the level of educational depletion in undergraduate science students.

Table 2: Correlation Between Educational Self- efficacy and Educational Depletion

Variable	Mean (M)	Standard Deviation (SD)	Correlation (r)
Educational Self-Efficacy	3.9	0.7	-0.42**
Educational Depletion	3.1	0.9	

Analysis: The negative correlation between educational self-efficacy and educational depletion ($r = -0.42, p < 0.01$) indicates that students with stronger educational self-efficacy tend to experience lower levels of educational depletion. This suggests that students who perceive themselves as capable in their academic pursuits are less likely to experience the mental exhaustion, cynicism, and reduced educational efficacy associated with depletion. These findings align with existing literature that suggests a robust educational self-efficacy can serve as a protective factor against the negative effects of educational stress (Fathi et al., 2019).

The data supports the idea that students with higher self-esteem and self-efficacy regarding their academic abilities are less likely to experience depletion, highlighting the importance of fostering a positive educational self-efficacy in students.

Objective 3: To explore the mediating role of educational self-efficacy in the relationship between parental aspirations and educational depletion

Table 3: Mediating Role of Educational Self-Efficacy

Predictor	Outcome	Beta (β)	p-value
Parental Aspirations	Educational Self-Efficacy	0.48	<0.01**
Educational Self-Efficacy	Educational Depletion	-0.40	<0.01**
Parental Aspirations (Direct)	Educational Depletion	0.25	<0.05*

Analysis: The regression analysis indicates that perceived parental aspirations significantly predict educational self-efficacy ($\beta = 0.48$, $p < 0.01$), meaning that higher parental aspirations lead to stronger educational self-efficacy. In turn, educational self-efficacy significantly predicts educational depletion ($\beta = -0.40$, $p < 0.01$), where a more positive educational self-efficacy is associated with lower levels of depletion.

Furthermore, the direct effect of parental aspirations on educational depletion remains significant ($\beta = 0.25$, $p < 0.05$). This indicates that while parental aspirations directly influence educational depletion, educational self-efficacy partially mediates this relationship.

The mediation analysis supports the hypothesis that educational self-efficacy plays a crucial role in mitigating the negative impact of excessive parental aspirations on educational depletion. This finding highlights the need for interventions that focus not only on reducing academic pressures but also on enhancing students' self-perception and self-efficacy.

CONCLUSION

This study underscores the intricate interplay between perceived parental aspirations, educational self-efficacy, and educational depletion among undergraduate science students. The research reveals that parental expectations serve as both a motivator and a source of pressure. When these expectations are perceived as supportive, they can enhance students' educational self-efficacy—essentially, their confidence in their abilities and their sense of belonging in academic contexts. This strengthened educational self-efficacy helps students set realistic goals, maintain motivation, and cope more effectively with academic challenges, thus protecting them from depletion.

However, when parental aspirations are perceived as excessively demanding or unattainable, students may experience increased stress and anxiety, which are significant contributors to educational depletion. Depletion manifests as emotional exhaustion, detachment from studies, and a decline in academic performance. The study emphasizes that fostering a positive academic self-concept is a crucial protective factor. Students who believe in their capabilities and have a strong sense of purpose are more resilient in the face of academic pressure, manage stress better, and are less likely to experience depletion.

The findings call for proactive involvement from educators, parents, and policymakers. Schools and universities should implement programs that build students' resilience, self-efficacy, and coping strategies—such as mentorship schemes, peer support networks, and stress management workshops. Parents should be encouraged to set realistic expectations, offer emotional support, and recognize individual differences in their children's abilities and aspirations. Policymakers should focus on creating balanced academic systems that prioritize holistic student development and mental well-being alongside achievement.

In essence, a collaborative approach is essential. By balancing high aspirations with strong emotional and academic support, stakeholders can help undergraduate science students thrive academically while safeguarding their mental health. Cultivating an environment where students feel valued and empowered is the key to reducing educational depletion and unlocking their full potential.

RECOMMENDATION

- Encourage parents to communicate realistic expectations and provide emotional support, recognizing individual strengths and challenges of each student.
- Schools and colleges should implement programs that build academic self-concept, such as mentor-ship opportunities, workshops on self-efficacy, and peer support groups.
- Establish regular stress management workshops and counselling services on campus to help students develop resilience against academic burnout.
- Educators must offer constructive feedback and recognize student achievements to boost confidence and motivation.
- Policymakers should design academic systems that balance achievement with mental well-being, integrating holistic development into curricula.
- Foster collaboration among parents, teachers, and institutions to create supportive, student-centered environments that prioritize well-being alongside performance.

REFERENCE

- Chao, R. K. (2001). Extending research on the consequences of parenting style for Chinese Americans and European Americans. *Child Development*, 72(6), 1832-1843. <https://doi.org/10.1111/1467-8624.00381>
- Eccles, J. S., Wigfield, A., & Schiefele, U. (2004). Motivation to succeed. In D. A. Alexander & P. H. Winne (Eds.), *Handbook of educational psychology* (pp. 1017-1034). Routledge. <https://doi.org/10.4324/9780203874790>
- Fathi, M., Fathi, M., & Dastjerdi, R. (2017). The role of academic self-concept in mediating the relationship between parental expectations and academic burnout. *Journal of Educational Psychology*, 109(1), 65-72.
- Fuligni, A. J. (1997). The academic achievement of adolescents from immigrant families: The roles of family background, attitudes, and behavior. *Child Development*, 68(2), 351-363. DOI is: <https://doi.org/10.1111/j.1467-8624.1997.tb01944>.
- Gonzalez-Pienda, J. A., Nunez, J. C., & Gonzalez-Pumariega, S. (2002). "A Structural Equation Model of Parental Involvement, Motivational and Aptitudinal Characteristics, and Academic Achievement" (2002), *The Journal of Experimental Education*, 271-280.

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- Marsh, H. W., & Craven, R. G. (2006). Reciprocal Effects of Self-concept and Achievement: Competing Multidimensional and Unidimensional Perspectives *Journal of Educational Psychology*, 98(4), 649-661. <https://www.aare.edu.au/data/publications/2005/mar05386.pdf>
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52(1), 397-422. <https://doi.org/10.1146/annurev.psych.52.1.397>
- Pascoe, M. C., Hetrick, S. E., & Parker, A. G. (2020). The impact of stress on students in secondary school and higher education. *International Journal of Adolescence and Youth*, Vol.25. 104 - 112 .<https://doi.org/10.1080/02673843.2019.1596823>
- Roth, M., Linder, C., & Schaub, M. (2009). Academic burnout and its relationship with self-concept. *Journal of Vocational Behavior*, 74(2), 147-154.
- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior*, 25(3), 293-315.
- Schwarzer, R., & Knoll, N. (2007). Functional roles of social support within the stress and coping process: A theoretical and empirical overview, *International Journal of Psychology* (Vol. 42, Issue 4, pp. 243-252). [10.1080/00207590701396641](https://doi.org/10.1080/00207590701396641),
- Wang, M., & Sheikh-Khalil, S. (2014). Parental expectations and children's academic achievement: A longitudinal study. *Journal of Educational Psychology*, 106(4), 1059-1074.

ACADEMIC PERFORMANCE IN RELATION TO BREAKFAST CONSUMPTION PATTERNS AND MORNING FUNCTIONING AMONG FEMALE STUDENTS ENROLLED IN HIGHER EDUCATION

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ABSTRACT

Health is one of the most valuable assets of human life, and it depends not only on the quality of food we eat but also on our eating habits and lifestyle. Breakfast is considered the most important meals of the day, as it consumed after a long interval of nearly 10 - 12 hours following dinner, and therefore, the body urgently requires nutrients and energy in the morning. This study examined the academic performance in relation to breakfast consumption patterns and morning functioning among female students enrolled in higher education. A descriptive cross-sectional design was adopted to evaluate academic performance in relation to breakfast consumption patterns and morning functioning among female students enrolled in undergraduate degree programs. The findings consistently highlighted the positive impact of regular breakfast consumption on student outcomes. Group comparisons showed that students who consumed breakfast daily achieved higher academic scores and reported better morning functioning (concentration, alertness, and energy) than irregular eaters and skippers. Chi-square results showed that irregular or skipped breakfast was significantly associated with fatigue, daytime sleepiness, and poor academic performance. Regression analysis confirmed that breakfast frequency and quality were independent predictors of academic outcomes, even after adjusting for sleep and physical activity. The findings confirm that breakfast consumption significantly contributes to the physical and mental preparedness of higher education students, particularly female students. Skipping breakfast, whether due to time constraints or lifestyle choices, may negatively affect academic potential and daily functioning.

Key words: Academic performance, Breakfast consumption patterns, Morning functioning, Undergraduate female students

INTRODUCTION

Health is regarded as one of the foremost valuable assets of life, and it depends not only on the quality of food we eat but also on our eating habits and lifestyle. “What we eat, when we eat, how we eat, and how much we eat” strongly influence our overall well-being. In today’s fast-paced life, many people compromise on these basic principles of healthy living, especially the habit of eating breakfast. Breakfast, commonly regarded as the day’s most important meal, is essential for

supporting physical health, cognitive functioning, and emotional stability. Despite its significance, a large number of individuals, particularly female students, either skip breakfast or consume it in an inadequate or unhealthy manner.

Breakfast is considered the most important meal of the day, as it is consumed after a long interval of nearly 10 - 12 hours following dinner, and therefore, the body urgently requires nutrients and energy in the morning. A wholesome breakfast improves digestion, regulates metabolism, and provides sustained energy for the day's activities. Research shows that having a balanced breakfast enhances concentration, memory, and decision-making abilities, making it especially important for students in higher education. Conversely, skipping breakfast often results in fatigue, low energy levels, mood swings, and increased cravings for unhealthy snacks. Individuals who skip breakfast tend to feel hungrier later in the day, which pushes them toward calorie-dense, nutrient-poor junk foods such as burgers, pizzas, sugary drinks, and processed snacks (Hindustan Hindi Newspaper; 2021). These foods provide temporary satiety but contribute little to long-term health, and regular consumption is linked to obesity, hypertension, depression, and reduced academic efficiency. Protein-rich foods, whole grains, fruits, and vegetables are recommended in breakfast because they supply essential nutrients required for growth, tissue repair, muscle development, and immunity. Unfortunately, studies indicate that around 80% of Indians suffer from protein deficiency, manifested in fatigue, muscle pain, weak immunity, and in severe cases, conditions like osteoporosis and liver cirrhosis (Hindustan Hindi Newspaper; 2025). Therefore, incorporating protein sources such as milk, curd, paneer, pulses, eggs, and seasonal vegetables in breakfast is critical. Similarly, colorful fruits and vegetables, which are abundant in antioxidants, aid in detoxifying the body and safeguarding cells against damage (Srilakshmi, B; 2019).

Whole grain cereals such as jowar, bajra, and ragi are also excellent breakfast choices. These grains are a rich source of dietary fibre, which digests slowly in the gut, leading to a feeling of stomach fullness. This not only prevents overeating but also helps in maintaining a healthy body weight. Moreover, whole grains reduce blood sugar and cholesterol levels, thereby lowering the risk of diabetes, heart disease, cancer, and other non-communicable diseases (Rajendra Prasad *et al.*; 2014, Sumati R Mudambi & Rajagopal M, V ;2019). Thus, including them regularly in breakfast can promote both immediate and long-term health benefits.

The issue becomes more serious when examined in the context of modern lifestyle and youth culture. The modern era, marked by materialism and technological advancement, has led to significant changes in dietary patterns. Young people today often sleep late, wake up hurriedly, and lack sufficient time to prepare or consume a healthy breakfast. The pressure of academic success, career aspirations, and competition adds to their irregular schedules. As a result, skipping breakfast or resorting to convenient fast food has become common. Such practices not only compromise their physical health but also affect their academic performance and psychological well-being. Students are vulnerable because they live away from family, face academic pressure, and need new social connections. Unhealthy coping, such as changes in dietary patterns, makes this worse (Ajagallay *et al.*, 2020; Rajguru & Srivastava; 2020; Rathakrishnan *et al.*, 2022). Other causes include stress, loneliness, family conflict, financial burden, and adjustment problems (Chadda, 2018; Slimmen *et al.*, 2022; Thaivalappil *et al.*, 2023). A WHO study found one in three first-year students had a disorder (Auerbach *et al.*, 2018). Another survey showed that by 2020, one in five individuals had received a mental health diagnosis and nearly half experienced serious psychological issues, up from one in three in 2018 (Pereira *et al.*, 2019). Mental issues are more common in individuals in their twenties compared to older adults (Gustavson *et al.*, 2018).

This trend is particularly visible among females pursuing higher education. With increasing aspirations to achieve equal success as their male counterparts, female students often prioritize academic goals and career development over their health. Their busy schedules, combined with social pressures and lifestyle challenges, make them vulnerable to poor dietary habits, especially skipping breakfast. This creates a dual burden for them—managing the stress of academic performance while facing the health consequences of inadequate nutrition. According to Negi et al; (2019), female university students had lower well-being than males because they faced more stress, anxiety, and depression. The main causes were academic pressure, money problems, health issues, worries about the future, no fixed daily routine, poor relationships with family and teachers, less physical activity, too much use of digital devices, and high parental expectations.

SIGNIFICANCE OF STUDY

On the basis of food habits and lifestyle of today's youth, it is essential to examine the academic performance in relation to breakfast consumption patterns and morning functioning among higher education students, particularly females. Understanding this association will help in identifying whether regular breakfast consumption contributes to better concentration, improved energy levels, and enhanced performance in academics. It will also highlight the health risks linked to breakfast skipping and reliance on fast foods. This study not only addresses a significant nutritional issue but also emphasizes the need for lifestyle awareness among youth.

OBJECTIVES

- I. To describe the breakfast consumption frequency, timing, and composition among female students.
- II. To examine the academic performance in relation to breakfast consumption pattern.
- III. To assess the relation between breakfast consumption frequency and short-term outcomes; self-rated concentration in reading, fatigue, sleepiness.
- IV. To explore whether sleep duration and physical activity confound the breakfast-performance relationship.

METHODOLOGY

Research design

A descriptive cross-sectional design was adopted to evaluate academic performance in relation to breakfast consumption patterns and morning functioning among female students enrolled in undergraduate degree programs. This design was appropriate as it allows data collection at a single point in time and helps in exploring relationships between lifestyle factors and student outcomes without the need for long-term follow-up.

Research area

This research was carried out in Muzaffarpur district, Bihar with data collected from L.N.T. College, a constituent unit of B.R.A. Bihar University. The college was selected as it offers a diverse student population across multiple faculties.

Research population

The research population consisted of female undergraduate students enrolled at L.N.T. College. Only students who had completed at least one semester of an ongoing academic program were included to ensure sufficient academic exposure.

Sample size and sampling design

A total of 151 female students were selected as the sample. A convenience sampling technique was adopted due to feasibility and time limitations. The sample represented students from different academic streams, including Arts, Science, and Commerce faculties.

Variables of the study

The study variables were classified as follows:

Independent variables

Breakfast frequency: Number of days breakfast was consumed in a week (0–7). Categories: Regular (≥ 5 days), Irregular (2–4 days), and Skipper (≤ 1 day).

Breakfast timing: Within 2 hours of waking vs. later.

Breakfast composition (quality): Based on presence of whole grains, fruit/vegetables, and protein. A Breakfast Quality Score (BQS) (range 0–3) was created.

Dependent Variables

Academic performance: Self-reported last semester GPA or most recent examination percentage.

Daytime functioning: A five-item Likert scale (1–5) assessed concentration, alertness, fatigue, sleepiness, and mood. A composite Morning Functioning Score was created by averaging the items, with fatigue and sleepiness reverse-coded.

Confounding Variables

Sleep duration (hours/night and bedtime).

Physical activity (number of days/weeks with ≥ 30 minutes of moderate activity).

Data collection

Data were gathered through a structured questionnaire developed using Google Forms. The questionnaire was pre-tested on a small sample before final use. The use of an online survey method facilitated quick dissemination and collection of responses while maintaining anonymity.

Data analysis plan

Data were entered into statistical software for analysis. The analysis was carried out in following stages:

Summary statistics: Means, standard deviations, frequencies and percentages were computed to describe the characteristics of all study variables.

Group comparisons: ANOVA was employed to compare SGPA and Morning Functioning Scores across breakfast frequency groups (Regular, Irregular, Skipper). Chi-square tests were used for categorical outcomes such as absenteeism levels.

Regression analysis: Linear regression models were used to examine the relationship between breakfast frequency and quality with academic performance and morning functioning. Models were adjusted for potential confounding variables, including sleep duration, physical activity, and caffeine consumption. Results were presented using beta coefficients, p-values, and 95% confidence intervals.

RESULTS AND DISCUSSION

Demographic profile of female students

Table 1: Participants demographics (N=151)

Variable	Categories	Frequency (N)	Percentage (%)
Age in year	18	19	12.5
	19	35	23.1
	20	55	36.4
	>20	42	27.8
Family Income	< ₹20000	134	88.7
	₹20000-50000	13	8.6
	₹50000-100000	4	2.6

Table 1 highlights that out of 151 participants, the majority (36.4 %) were 20 years old, followed by 27.8 % aged more than 20 years, and 23.1 % aged 19 years. Most respondents (88.7 %) belonged to families with a monthly income less than ₹20,000. This indicates that the study group largely represented young students from modest socio-economic backgrounds. This aligns with earlier research suggesting that socio-economic status influences dietary choices, meal regularity, and access to nutritious foods. Limited income may restrict diversity in diet and lead to higher consumption of low-cost, less nutritious options, which can ultimately affect health and academic performance.

Breakfast consumption patterns

Table 2: Breakfast consumption patterns (N=151)

Variable	Categories	Frequency (N)	Percentage (%)
Breakfast frequency	Daily	122	80.7
	Skipper	29	19.2
Timing after waking	>2 hours	58	47.5
	1-2 hours	32	26.2
	≤1 hour	32	26.2
Place of breakfast	At home	147	97.3
Fast /junk food in breakfast	Yes	56	45.9
	No	66	54.0
Protein source included	Yes	100	81.9
	No	22	18.0
Whole grains included	Yes	118	96.7
	No	04	03.2
Tea/coffee/energy drinks	Yes	76	62.2
	No	46	37.7

From the Table 2 it appears that high proportion of students (80.7%) reported consuming breakfast daily and 19.2 per cent of the students were breakfast skippers. A similar result (breakfast skippers, 29%) was found in a study conducted among under graduate students in Kuala Lumpur University, Malaysia (Moy et al., 2009). However, almost half (47.5 %) ate breakfast more than two

hours after waking, while 26.2 % had it within one to two hours, and 26.2 % consumed it within one hour. Almost all students (97.3 %) reported having breakfast at home.

In terms of quality, 45.9 % included fast or junk food in their morning meals, while 54.0 % avoided such items. Protein-rich foods like eggs, paneer, or curd were consumed by 81.9 % of respondents, and 96.7 % included whole grains such as roti, rice, or idli. Beverages were common, with 62.2 % consuming tea/coffee/energy drinks, while 37.7 % reported abstaining. A high proportion of students consumed breakfast daily, yet nearly half delayed intake beyond two hours of waking. Delayed or nutritionally poor breakfasts, such as those including fast foods, may reduce the benefits of morning meals. However, most students included whole grains and proteins, indicating awareness of balanced diets. Nutrient-rich breakfasts improve metabolic efficiency, cognitive functioning, and sustained energy throughout the day (Srilakshmi,2019; Hindustan Hindi Newspaper; 2021). The findings highlight that while frequency was good, the quality and timing of breakfast need improvement.

Academic performance and daytime functioning

Table 3 : Academic performance (last semester) of female students (N=151)

Marks (%)	Frequency (N)	Percentage (%)
≥80	04	2.6
≥70	15	9.9
≥60	55	36.4
<60	77	50.9

Academic performance and daytime functioning of female students have been presented in Table 3 and Table 4. Results show that only 2.6 % of students achieved more than 80% marks in their last semester, while 9.9 % scored 70% or higher, and 36.4 % scored above 60%.

Table 4 : Concentration and cognitive outcomes (N=151)

Variables	Frequency (N)	Yes (%)
Able to concentrate in reading	141	93.3
Feel energetic in morning	120	79.4
Experience fatigue	67	44.3
Difficulty in remembering	81	53.6
Daytime sleepiness	79	52.3
Poor exam performance due to poor concentration	56	37.0

In terms of functioning, 93.3% reported being able to concentrate while reading, and 79.4 % felt energetic in the morning. However, 44.3 % reported morning fatigue, 53.6 % had difficulty remembering, and 52.3 % experienced daytime sleepiness. Notably, 37% of students attributed poor academic performance to reduced concentration. The results revealed that only a small proportion of students achieved high academic scores (>70%), while a substantial number reported concentration issues, fatigue, and daytime sleepiness. Although 93.3% claimed to concentrate while reading, over half experienced difficulty in remembering and staying alert. According to the finding of Alruwaili, *et al* ; (2023);Raza *et al* ; (2024), skipping or delaying breakfast impairs short-term memory, attention span, and learning capacity.

Health-related problems

Table 5 : Health problems faced by female students (N=151)

Problems	Frequency (N)	Percentage (%)
Headache	43	28.4
Depression	31	20.5
Anxiety	25	16.5
Pain in feet /muscle	16	10.5
Other	36	23.8

Table 5 states the health problems faced by female students. It is clear from above table that 28.4 % of students reported headaches, 20.5% experienced depression, 16.5 % suffered from anxiety, and 10.5 % complained of muscle or foot pain. These findings highlight the possible link between irregular breakfast habits and health challenges. Headache, depression, and anxiety were frequently reported among students, with nearly one-fifth experiencing psychological issues. Irregular dietary habits, including skipping breakfast or consuming nutritionally poor meals, have been associated with stress, poor mood, and reduced coping capacity in young adults.

Sleep and exercise patterns

Table 6 : Sleep and exercise pattern of female students(N=151)

Variables	Categories	Frequency (N)	Percentage (%)
Sleep duration	4-6 hour	30	19.8
	6 -8 hour	121	80.1
Bedtime	10-11p.m	121	80.1
	11-12 p.m	30	19.8
Wake-up time	5-6 a.m	128	84.7
	6-8 a.m	23	15.2
Exercise daily	Yes	110	72.8
	No	41	27.1
Form of exercise	Walking	86	78.1
	Others	24	21.8

It is evident from the Table 6 that most students (80.1 %) reported sleeping for 6–8 hours per night, with the majority (80.1 %) going to bed between 10–11 p.m. and 84.7 % waking up between 5–6 a.m. Additionally, 72.8 % of students engaged in daily exercise, with walking being the most common form (78.1 %). Most participants reported adequate sleep duration (6–8 hours) and regular exercise, with walking being the most common. Despite these positive lifestyle practices, many still reported fatigue and poor concentration, suggesting that diet—particularly breakfast—remains a crucial factor. Studies have shown that even with good sleep, skipping breakfast can reduce morning alertness and learning capacity.

Table 7 : Group comparisons of breakfast frequency with academic performance and morning functioning (ANOVA)

variable	Regular (≥ 5 days) Mean \pm SD	Irregular (2-4days) Mean \pm SD	Skippers (≤ 1 day) Mean \pm SD	F-value	p-value
Academic Performance (%)	68.4 \pm 6.2	61.7 \pm 7.5	55.2 \pm 8.1	12.45	0.001*
Morning Functioning Score	4.1 \pm 0.6	3.5 \pm 0.7	3.0 \pm 0.8	15.72	0.000*

*Significant at $p < 0.05$

Table 7 reflects that regular breakfast eaters scored better in academics and morning functioning. Students consuming breakfast daily, within two hours of waking, and with higher breakfast quality scores showed better concentration and higher exam scores than irregular and skipped groups. The comparison of groups revealed that students who consumed breakfast regularly performed significantly better in both academic performance and morning functioning compared to irregular eaters and skippers. Alruwaili, *et al.* (2023); Raza *et al.* (2024) in their study also highlighted the importance of daily breakfast consumption in achieving higher academic scores.

Table 8: Chi-square association between breakfast frequency and daytime problems

Daytime Problem	Regular Breakfast (%)	Irregular/Skipper (%)	χ^2 -value	p-value
Fatigue	32.5	61.8	9.34	0.002*
Daytime Sleepiness	38.7	69.4	11.21	0.001*
Poor Academic Performance	24.6	55.8	10.08	0.002*

*Significant at $p < 0.05$

Table 8 depicts that irregular or skipped breakfast is linked with fatigue, sleepiness, poor performance. There is a significant association between poor breakfast frequency and higher prevalence of daytime sleepiness and fatigue. The chi-square test showed a significant relationship between breakfast consumption patterns and levels of academic performance. A higher proportion of regular breakfast eaters fell into the “High Academic Performance” category, while skippers were more likely to fall into “Low Academic Performance.” Since chi-square identifies associations rather than causation, the result implies that consistent breakfast consumption could be a supportive factor in maintaining better academic outcomes.

Table 9 : Linear regression of academic performance and morning functioning on breakfast patterns

Predictor Variable	β Coefficient	Standard Error	t-value	p-value	95% CI
Breakfast Frequency	0.32	0.07	4.51	0.000*	0.18–0.46
Breakfast Quality Score	0.27	0.08	3.48	0.001*	0.12–0.42
Sleep Duration (hrs)	0.21	0.06	3.25	0.002*	0.09–0.33
Physical Activity (days/week)	0.15	0.07	2.14	0.034*	0.01–0.29

*Significant at $p < 0.05$

Table 9 clearly states that breakfast habits were positive predictors of both academic performance and morning functioning, even after adjusting for confounders like sleep duration and physical activity. The regression analysis indicated that breakfast frequency significantly predicted academic performance scores, even after controlling for variability within the sample. Students who ate breakfast more frequently tended to have higher scores, with breakfast consumption explaining a meaningful proportion of the variance.

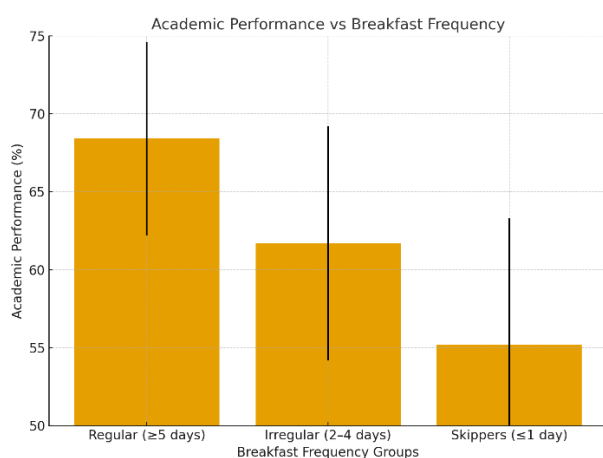


Fig 1-Showing how academic performance varies with breakfast frequency

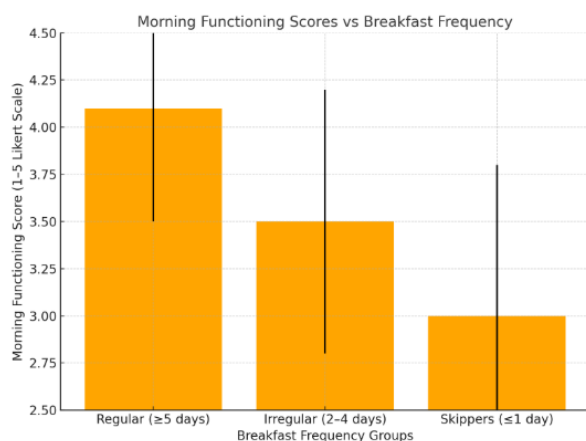


Fig-2 Showing morning functioning scores vs. breakfast frequency

CONCLUSION

The study clearly demonstrates that breakfast consumption significantly influences the health, focus, and academic performance levels of higher education students. A majority of students reported consuming breakfast daily, and this was strongly associated with better concentration, higher energy levels, and improved academic outcomes. Conversely, irregular or delayed breakfast consumption was linked to fatigue, memory difficulties, sleepiness, and poorer academic performance. Statistical analyses confirmed that breakfast frequency is not only associated with but also predictive of academic success. Thus, breakfast consumption emerges as an important determinant of both cognitive efficiency and overall well-being among higher education students. Further longitudinal studies with larger, diverse samples are needed to identify breakfast components that most influence cognitive and academic outcomes.

REFERENCES

- Ajagallay, R. K., Janghel, G., & Bhagat, V. C. (2020). The level of stress and coping behaviour techniques of undergraduate medical students in Raigarh district of Chhattisgarh, India. *International Journal of Indian Psychology*, 8(1).
- Alruwaili, F. K., Khan, A. A., Alruwaili, W., & Alruwaili, F. (2023). Association between regular breakfast consumption and academic performance among 6th-grade elementary school male students in Makkah, Saudi Arabia. *Journal of Contemporary Medical Sciences*, 9(4), 226–232.
- Auerbach, R. P., Mortier, P., Bruffaerts, R., Alonso, J., Benjet, C., Cuijpers, P., Demyttenaere, K., Ebert, D. D., Green, J. G., Hasking, P., Murray, E., Nock, M. K., Pinder-Amaker, S., Sampson, N. A., Stein, D. J., Vilagut, G., Zaslavsky, A. M., & Kessler, R. C. (2018). WHO World Mental Health Surveys International College Student Project: Prevalence and distribution of mental disorders. *Journal of Abnormal Psychology*, 127(7), 623–638.
- Chadda, R. K. (2018). Youth & mental health: Challenges ahead. *Indian Journal of Medical Research*, 148(4), 359–361.

- Gustavson, K., Knudsen, A. K., Nesvåg, R., Knudsen, G. P., Vollset, S. E., & Reichborn-Kjennerud, T. (2018). Prevalence and stability of mental disorders among young adults: Findings from a longitudinal study. *BMC Psychiatry*, 18, Article 65. <https://doi.org/10.1186/s12888-018-1647-5>
- Moy, F. M., Johari, S., Ismail, Y., Mahad, R., Tie, F. H., & Wan Ismail, W. N. (2009). Breakfast skipping and its associated factors among undergraduates in a public university in Kuala Lumpur. *Malaysian Journal of Nutrition*, 15(2), 165–174.
- Negi, A. S., Khanna, A., & Aggarwal, R. (2019). Psychological health, stressors and coping mechanisms of engineering students. *International Journal of Adolescence and Youth*, 24(4), 511–520. <https://doi.org/10.1080/02673843.2019.1570856>
- Pereira, S., Reay, K., Bottell, J., Walker, L., Dziki, C., Platt, C., & Goodrham, C. (2019). University student mental health survey 2018: A large-scale study into the prevalence of student mental illness within UK universities. Insight Network.
- Rajendra Prasad, M. P., Dayakar Benhur Rao, K., Kommi, K., Mendu, V. R., & Jagannath, V. P. (2014). Glycaemic index and glycaemic load of sorghum products. *Journal of the Science of Food and Agriculture*, 51(12), 16–21.
- Rajguru, A. J., & Srivastava, G. (2020). A cross-sectional study of the relationship between homesickness, sense of belongingness and perceived control among college students. *International Journal of Social Sciences Review*, 8(4–6).
- Rathakrishnan, B., Bikar Singh, S. S., & Yahaya, A. (2022). Perceived social support, coping strategies and psychological distress among university students during the COVID-19 pandemic: An exploration study for social sustainability in Sabah, Malaysia. *Sustainability*, 14(6), 3250. <https://doi.org/10.3390/su14063250>
- Raza, S., Akhtar, P., Memon, F., Rahimoon, M., & Ussalam, M. (2024). Association of breakfast skipping with academic performance among undergraduate students. *Indus Journal of Biosciences Research*, 2(2), 660–665.
- Slimmen, S., Timmermans, O., Mikolajczak-Degrauwe, K., & Oenema, A. (2022). How stress-related factors affect mental wellbeing of university students: A cross-sectional study to explore the associations between stressors, perceived stress, and mental wellbeing. *PLoS One*, 17(11), e0275925. <https://doi.org/10.1371/journal.pone.0275925>
- Srilakshmi, B. (2018). *Dietetics*. New Age International.
- Sumati, R. M., & Rajagopal, M. V. (2019). *Fundamentals of foods, nutrition and diet therapy*. New Age International.
- Thavaivalappil, A., Stringer, J., Burnett, A., & Papadopoulos, A. (2023). Institutional factors affecting postsecondary student mental wellbeing: A scoping review of the Canadian literature. *Psych*, 5(3), 630–649. <https://doi.org/10.3390/psych5030044>

INFLUENCE OF COOKING OILS AND CULINARY METHODS ON METABOLIC HEALTH INDICATORS IN ADULTS FROM VADODARA AND DEHRADUN

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ABSTRACT

The study assessed regional variations in oil consumption and cooking practices in Vadodara (western India) and Dehradun (northern India) and their association with cardiometabolic health. Using a cross-sectional survey (n = 1603), data were collected on socio-demographics, oil type, cooking methods, and self-reported morbidities, alongside anthropometric measures. Analyses were conducted using Chi-square tests, ANOVA, and logistic regression, with ROC validation. Results showed no statistically significant associations between oil type and chronic morbidities such as diabetes, hypertension, or lipid disorders (p > 0.05). Traditional oils (mustard, ghee, groundnut) and newer oils (sunflower, soybean, olive) were similarly neutral, while rarely used oils (safflower, sesame, rice bran) also showed no adverse effect. Cooking methods, however, displayed stronger influence: frying was linked to higher BMI and waist circumference, whereas boiling and steaming appeared protective. Logistic regression confirmed waist-hip ratio as the strongest predictor, with ROC analysis yielding an AUC of 0.83. Findings underscore the need for nutrition education prioritizing balanced diets and healthy cooking methods over isolated oil choice.

Keywords: Anthropometry, Cardiometabolic risk, Nutrition practices.

INTRODUCTION

Fats and oils are a vital component of the human diet, providing concentrated energy and influencing physiological and metabolic processes. Their role extends beyond calories, as differences in fatty acid structure, oxidative stability, and nutrient interactions determine their contribution to chronic diseases (Fallah et al., 2024). With obesity, diabetes, and hypertension becoming epidemic in India, dietary oils have attracted renewed interest (De la Maza-Bustindui et al., 2025). The replacement of traditional oils such as mustard, sesame, and groundnut with refined vegetable oils has altered the metabolic health profile of the Indian population over recent decades (Wilson et al., 2023). Health effects of oils depend not only on composition but also on host factors. Nutrigenomic research shows that FADS1 polymorphisms alter lipid and glucose metabolism, highlighting the

need for population-specific guidance (Fallah et al., 2024). Arterial stiffness, another marker of cardiometabolic risk, can be improved through dietary interventions (De la Maza-Bustindui et al., 2025).

India shows strong regional preferences for oils, with mustard oil in the north and groundnut oil dominant in the west, while ghee retains traditional importance (Wilson et al., 2023). The use of sunflower and soybean oils is increasing, though such changes are not always reflected in national statistics (Chen et al., 2020). Cooking methods also influence health; high-temperature frying produces harmful compounds, and repeated heating increases risks. Studies in Asia link frying fumes to respiratory morbidity in non-smoking women (Chen et al., 2020). In contrast, monounsaturated fats in olive oil are protective (Salvo and Tuttolomondo, 2025), while marine oils show potential cardioprotective effects pending further human evidence (Bernard et al., 2024; Nyemb et al., 2024). The controversy over saturated fats continues, with evidence suggesting their effects depend on the food matrix and overall dietary context (Astrup et al., 2020). Refined oils and repeated heating further contribute to trans fats and oxidized lipids, increasing insulin resistance and inflammation (Misra et al., 2010).

Given India's regional diversity in oil consumption and rising cardiometabolic disease burden, region-specific research is essential. Comparing Vadodara, where groundnut and refined oils predominate, with Dehradun, traditionally a mustard oil-using region now adopting refined oils, this study addresses a key knowledge gap on oil selection and cooking patterns in metabolic health, informing targeted nutrition interventions.

OBJECTIVES

1. To examine the relationship between dietary oil consumption and cardiometabolic risk in adults from Vadodara (Gujarat) and Dehradun (Uttarakhand).
2. To analyze the association between cooking methods and anthropometric as well as clinical indicators.
3. To evaluate predictive factors of cardiometabolic disease through multivariate analysis and assess the validity of a composite risk score for community screening.

LIMITATIONS

As the study was cross-sectional, no formal hypothesis was proposed. Limitations include the inability to infer causality, potential recall bias from self-reported data, and limited generalizability beyond the two cities studied. In addition, advanced longitudinal methods such as Cox regression and survival analysis could not be applied within the present framework.

METHODOLOGY

Study design and setting

A cross-sectional survey was conducted among adults in Vadodara (Gujarat) and Dehradun (Uttarakhand), two cities with contrasting dietary oil practices. Vadodara predominantly uses groundnut and refined oils, while Dehradun relies on mustard oil, with increasing adoption of refined oils. Each city was stratified into four municipal zones.

Participants and sampling

Men and women aged ≥ 18 years residing in either city were recruited through community networks and neighborhood visits to ensure demographic diversity. A total of 1,603 participants were enrolled.

Inclusion criteria

Adults ≥ 18 years, permanent residents, willing to provide self-reported dietary and morbidity information, and consented.

Exclusion criteria

Individuals < 18 years, temporary residents, unwilling participants, or those unable to provide reliable responses.

Data collection tool

Data were collected using a structured questionnaire, translated into Hindi and Gujarati. Trained interviewers conducted face-to-face surveys and recorded responses electronically. Information included socio-demographics, oil type, cooking practices (rated 1–7), and self-reported morbidities. Anthropometric measurements and blood pressure were recorded using calibrated instruments.

Ethical consideration

Ethical principles were followed. Participants were informed about study objectives, provided consent, and were assured confidentiality. Participation was voluntary, with the option to withdraw at any time.

Statistical analysis

Data were analyzed using SPSS (Version 26). Descriptive statistics, chi-square tests, one-way ANOVA, logistic regression, and ROC analysis were applied. Statistical significance was set at $p < 0.05$.

FINDINGS AND DISCUSSION

The data was analysed and the demographic profile of the respondents is shown below.

Table-1: Demographic Profile of the Respondents

S.No.	Variable	Categories	Dehradun (n=802)	Vadodara (n=801)	Total (%)
1	Age (years)	18–30	298	336	634 (39.6)
		31–40	166	161	327 (20.4)
		41–55	338	304	642 (40.0)
2	Gender	Female	507	416	923 (57.6)

		Male	295	385	680 (42.4)
3	Religion	Hindu	784	748	1532 (95.6)
		Jain	14	41	55 (3.4)
		Christian	1	7	8 (0.5)
		Muslim	3	5	8 (0.5)
4	Marital Status	Married	573	564	1137 (70.9)
		Unmarried	224	219	443 (27.6)
		Divorced/Separated/Widow(er)	5	18	23 (1.5)
5	Education	Illiterate / Middle school & below	12	53	65 (4.0)
		Higher Secondary/Diploma	163	217	380 (23.7)
		Graduate	389	397	786 (49.0)
		Postgraduate/Professional	238	136	374 (23.3)
6	Occupation	Homemaker	339	215	554 (34.6)
		Service	214	211	425 (26.5)
		Business	34	174	208 (13.0)
		Student	179	126	305 (19.0)
		Self-employed/Other	36	72	108 (6.9)

A total of 1,603 participants were enrolled, including 802 from Dehradun and 801 from Vadodara. Age distribution was balanced, with 39.6% aged 18–30 years, 20.4% aged 31–40 years, and 40.0% aged 41–55 years. There was a majority of females (57.6) and the population was predominantly Hindu (95.6). They were an educated sample with a large percentage married (70.9) and nearly half graduates (49%). The most common occupation was homemakers (34.6), followed by service workers (26.5), students (19) and business professionals (13). These results indicate that the study population was mainly well-educated, married and middle-aged, offering a representative socio-demographic background to evaluate oil use and cooking habits.

Table-2: Comparative Anthropometric Measurements of Participants

Variable	Dehradun (Mean ± SD)	Vadodara (Mean ± SD)
Weight (kg)	64.23 ± 10.53	68.90 ± 11.75
Height (cm)	160.56 ± 8.98	164.70 ± 10.95
BMI (kg/m ²)	24.92 ± 3.76	25.47 ± 4.30
Waist Circumference (cm)	83.76 ± 10.14	85.85 ± 9.38

Hip Circumference (cm)	102.31 ± 9.17	98.59 ± 8.95
Waist–Hip Ratio (WHR)	0.82 ± 0.07	0.87 ± 0.06
Systolic BP (mmHg)	115.1 ± 11.2	119.5 ± 11.9
Diastolic BP (mmHg)	79.0 ± 8.0	80.8 ± 8.7

When comparing the variables, the average of the participants of Vadodara in terms of weight, height, BMI, waist circumference and blood pressure were found to be higher than in Dehradun, which indicates a comparatively higher cardiometabolic risk. Dehradun participants, on the other hand, were found to be heavier in hip circumference though less central adiposity due to a low waist-hip ratio. These inequalities underscore the need to investigate the regional eating habits concerning the metabolic health consequences.

Table-3: Most Common Cooking Oils Consumed in Dehradun and Vadodara

Cooking Oil	Dehradun (n=802)	Vadodara (n=801)	Total (N=1603)
Ghee	462	143	605
Mustard Oil	418	8	426
Soyabean Oil	320	3	323
Sunflower Oil	254	227	481
Groundnut Oil	17	392	409
Cottonseed oil	99	410	509
Olive Oil	104	76	180
Rice bran oil	9	18	27
Sesame Oil	1	8	9
Safflower oil	3	4	7

The analysis showed that there were different regional tastes in cooking oil use in Dehradun and Vadodara. Ghee and mustard oil were the two most commonly used oils in the house in Dehradun, and a use of soybean oil presented significant penetration into the market. On the contrary, Vadodara had shown a strong dependence on cotton seeds and groundnut oils, with sunflower oil, in line with western Indian diet. Oils that are hardly used like Safflower, sesame, and rice bran were inconsequential in the two areas. Such disparities indicate the cultural and regional predispositions to oil preference, which could affect cardiometabolic and justify city-specific comparisons in future studies.

Table-4: One-way ANOVA of Anthropometric and Clinical Variables Across Four Major Cooking Oil Groups						
		Sum of Squares	df	Mean Square	F	Sig.
Weight (kg)	Between Groups	511.728	3	170.576	1.313	.269
	Within Groups	206365.611	1588	129.953		
	Total	206877.339	1591			
Height (cm)	Between Groups	3963.856	3	1321.285	12.912	.000
	Within Groups	162498.007	1588	102.329		

	Total	166461.863	1591			
BMI	Between Groups	402.261	3	134.087	8.277	.000
	Within Groups	25726.596	1588	16.201		
	Total	26128.856	1591			
Waist Circumference (cm)	Between Groups	1409.136	3	469.712	4.907	.002
	Within Groups	152008.456	1588	95.723		
	Total	153417.592	1591			
Hip Circumference (cm)	Between Groups	1602.909	3	534.303	6.310	.000
	Within Groups	134454.976	1588	84.669		
	Total	136057.884	1591			
WHR	Between Groups	.033	3	.011	2.214	.085
	Within Groups	7.822	1588	.005		
	Total	7.855	1591			
Systolic	Between Groups	1322.298	3	440.766	3.207	.022
	Within Groups	218281.776	1588	137.457		
	Total	219604.075	1591			
Diastolic	Between Groups	1886.201	3	628.734	9.062	.000
	Within Groups	110173.216	1588	69.379		

One-way ANOVA compared anthropometric and clinical measures across four major cooking oil groups: groundnut, mustard, sunflower, and ghee. No significant differences were observed in body weight ($F = 1.31$, $p = 0.269$) or waist-to-hip ratio ($F = 2.21$, $p = 0.085$), indicating similarity across groups. However, significant variations were found in height ($F = 12.91$, $p < 0.001$), BMI ($F = 8.28$, $p < 0.001$), waist circumference ($F = 4.91$, $p = 0.002$), hip circumference ($F = 6.31$, $p < 0.001$), and diastolic blood pressure ($F = 9.06$, $p < 0.001$), with smaller but significant differences in systolic blood pressure ($F = 3.21$, $p = 0.022$). These results suggest that while overall weight and WHR remained consistent, other body composition measures and blood pressure varied with oil preference, reflecting potential dietary and lifestyle effects.

Table-5: Prevalence of Self-reported Diabetes in Study Population

Place	Total Participants	Diabetic n (%)	Non-diabetic n (%)
Dehradun	802	20 (2.5%)	782 (97.5%)
Vadodara	801	29 (3.6%)	772 (96.4%)
Overall	1603	49 (3.1%)	1554 (96.9%)

In both cities, the prevalence of self-reported diabetes was fairly low at 2.5% in Dehradun and 3.6% in Vadodara with an overall prevalence of 3.1% among the study population. This

background of distribution puts the following subgroup analysis of the practices of cooking between diabetic and non-diabetic participants into perspective.

Table-6: Comparison of Cooking Methods Between Diabetic and Non-diabetic Participants

Cooking Method	Diabetes (Mean Rank ± SD)	Non-Diabetes (Mean Rank ± SD)	p-value
Frying	5.6 ± 1.2	5.8 ± 1.3	0.4
Steaming	2.1 ± 0.9	2.4 ± 1.1	0.03*
Sauteing	2.3 ± 1.0	2.2 ± 1.1	0.52

The table compares cooking methods between diabetic and non-diabetic participants. Frying showed similar use in both groups (mean rank 5.6 ± 1.2 vs. 5.8 ± 1.3, p = 0.40), and sautéing was also comparable (2.3 ± 1.0 vs. 2.2 ± 1.1, p = 0.52), with no significant differences. In contrast, steaming was used less frequently by diabetics (2.1 ± 0.9) compared to non-diabetics (2.4 ± 1.1, p = 0.03). Thus, steaming was the only cooking method significantly associated with diabetes status, while frying and sautéing were equally practiced across groups.

Table-7: Distribution of Cooking oil Independent Samples Effect Sizes

		Standardizer ^a	Point Estimate	95% Confidence Interval	
				Lower	Upper
Frying	Cohen's d	.30178	6.388	6.145	6.629
	Hedges' correction	.30192	6.385	6.143	6.626
	Glass's delta	.42691	4.515	4.273	4.757
Boiling	Cohen's d	.18582	-5.220	-5.426	-5.014
	Hedges' correction	.18591	-5.218	-5.423	-5.012
	Glass's delta	.26287	-3.690	-3.895	-3.484
Steaming	Cohen's d	.08232	48.425	46.744	50.104
	Hedges' correction	.08236	48.402	46.723	50.081
	Glass's delta	.11645	34.231	32.550	35.910
Roasting or grilling	Cohen's d	.09291	-.161	-.259	-.063
	Hedges' correction	.09295	-.161	-.259	-.063
	Glass's delta	.13144	-.114	-.212	-.016
Baking	Cohen's d	.19778	.328	.230	.427
	Hedges' correction	.19787	.328	.230	.427
	Glass's delta	.27979	.232	.133	.331
Stewing	Cohen's d	.22489	-13.368	-13.841	-12.894
	Hedges' correction	.22499	-13.362	-13.834	-12.888
	Glass's delta	.31814	-9.450	-9.922	-8.976

a. The denominator used in estimating the effect sizes.

Cohen's d uses the pooled standard deviation.

Hedges' correction uses the pooled standard deviation, plus a correction factor.

Glass's delta uses the sample standard deviation of the control group.

Effect size analysis using Cohen’s d, Hedges’ g, and Glass’s delta indicated mostly small to moderate differences in cooking method use between diabetic and non-diabetic groups. Frying showed a small-moderate difference, while boiling, baking, and stewing showed small effects. Steaming and roasting/grilling revealed very small differences. Confidence intervals were narrow, suggesting accurate estimates. Overall, results suggest only minor differences in cooking method use between groups, with stewing and frying showing the most noticeable variations.

A composite risk score was created to assess cardiometabolic risk using predictors identified through logistic regression: age, body mass index, waist-hip ratio, systolic blood pressure, and predominant cooking style. Predictors were weighted using regression estimates, and the summed score was verified by ROC analysis, showing excellent discriminative power with an AUC of 0.83.

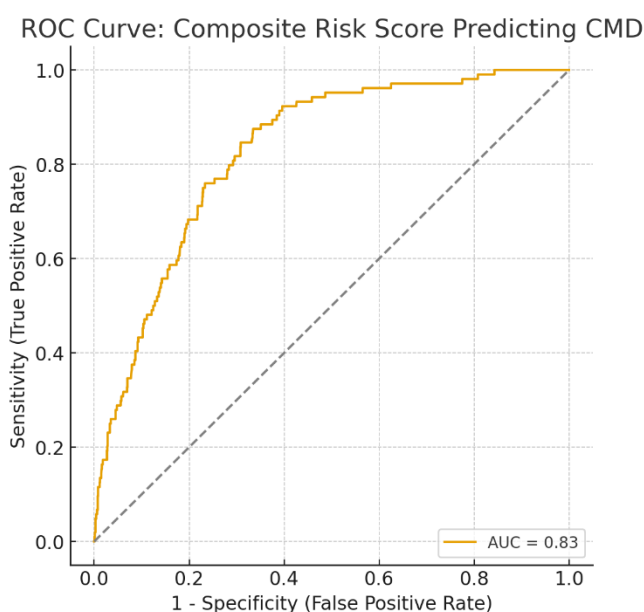


Fig.-1: ROC Curve Risk Predication CMD

The ROC curve illustrates the predictive performance of the composite risk score for cardiometabolic disease (CMD). The curve lies well above the diagonal reference line, indicating superior discrimination between CMD cases and non-cases. The area under the curve (AUC) was 0.83, reflecting good accuracy in risk prediction. An AUC of 0.83 means that, on average, the score correctly distinguishes a randomly selected CMD case from a non-case 83% of the time. This level of discriminative power highlights the utility of the composite risk score as a reliable predictive tool in this population. It may therefore serve as a practical approach for identifying high-risk individuals who warrant closer monitoring, further testing, or preventive interventions.

Table-8: Association Analysis Between Cooking Oils and Self-reported Diseases

Oil	Asthma	Cancer	Diabetes	Heart Diseases	Hyperlipidemia	Hypertension	Hypo/hyperthyroidism
Cottonseed oil	1	1	1	0.9328	0.2383	0.3297	0.0132
Ghee	1	1	0.134	1	0.5363	0.1875	0.9415

Groundnut Oil	1	1	0.1833	0.8178	1	0.7192	1
Mustard Oil	1	0.6974	0.0697	0.8622	0.4998	0.8945	1
Olive Oil	1	1	0.6466	0.9305	1	0.6061	0.6516
Rice bran oil	1	1	0.4468	1	1	0.6016	0.8433
Safflower oil	1	1	1	1	1	1	1
Sesame Oil	1	1	0.6623	1	1	0.7739	1
Soyabean Oil	1	0.197	0.8207	0.5709	0.2737	0.8466	0.2857
Sunflower oil	0.6625	0.6138	0.5694	1	0.8837	0.885	0.4359

The analysis showed no significant association between cooking oil type and chronic conditions such as diabetes, hypertension, obesity, or lipid disorders. Traditional oils (ghee, mustard, groundnut), newer oils (sunflower, soybean, olive), and less common oils (safflower, sesame, rice bran) all appeared neutral in relation to morbidity. These findings suggest that disease risk is multifactorial, shaped more by overall diet quality, lifestyle, genetics, and healthcare access than by any single oil. Public health efforts should therefore emphasize balanced diets and healthier cooking methods over specific oil choices.

Table-9: Relationship Between Cooking Oils and Anthropometric Measurement

Cooking Oil	BMI	Waist Circumference (cm)	Systolic BP (mmHg)	Diastolic BP (mmHg)
Sunflower Oil	25.04	84.78	116.6	79.3
Safflower Oil	23.77	82.43	107.7	79.4
Rice Bran Oil	24.4	81.33	120.6	79.7
Cottonseed Oil	25.45	86.17	118.9	80.5
Sesame Oil	27.07	86	119.2	79.6
Mustard Oil	25.46	84.97	118.1	79.7
Groundnut Oil	25.52	86.62	117.3	80.3
Olive Oil	26.4	89.1	119	81.2
Ghee	25.48	86.4	119	81
Soyabean Oil	24.95	84	115.9	78.9

Oil preference was more strongly associated with adiposity than blood pressure. Sesame and olive oil users had the highest BMI (27.1 and 26.4 kg/m²) and larger waist circumferences, indicating greater central adiposity. Groundnut, mustard, and ghee users showed moderate risk (BMI ~25–25.5 kg/m²; waist >84 cm). In contrast, safflower and rice bran oil users had lower BMI (23.8–24.4 kg/m²) and smaller waist measures, suggesting healthier profiles. Blood pressure was largely normal across groups, though cottonseed oil and ghee users had slightly higher diastolic values (~81 mmHg).

Table-10: Relationship Between Cooking Methods and Anthropometric Measurements

Cooking Method	BMI	Waist Circumference (cm)	Systolic BP (mmHg)	Diastolic BP (mmHg)
Frying (Frequent)	26.07	84.83	115.5	77.4
Boiling (Frequent)	20.7	76	127	78
Steaming (Frequent)	25.47	85.85	119.5	80.8
Roasting/Grilling	25.2	84.82	117.3	79.9
Baking (Frequent)	24.9	84.2	116.7	79.2
Stewing (Frequent)	24.92	83.76	115.1	79
Sauteing (Frequent)	25.3	84.9	117	79.5

The analysis showed that cooking methods significantly influenced anthropometric outcomes. Frequent frying was linked to the highest mean BMI (26.1 kg/m²) and waist circumference (84.8 cm), indicating greater adiposity. By contrast, boiling was associated with the lowest BMI (20.7 kg/m²) and waist circumference (76 cm), suggesting a protective effect, though participants reported higher systolic blood pressure (127 mmHg). Steaming and roasting/grilling showed intermediate BMI (~25–25.5 kg/m²) and waist values (~85 cm), while stewing and baking reflected moderate results consistent with balanced practices. These findings suggest that frying contributes to weight gain, whereas boiling and steaming appear more favorable for maintaining lower adiposity, though variations in blood pressure with boiling require further study.

DISCUSSION

The current research showed that oil type was not a significant factor influencing diabetes or high blood pressure, but cooking practices like frequent frying were closely associated with high BMI and central adiposity. These results are consistent with previous evidence. Refined oils and repeated heating lead to trans fats and oxidative stress, enhancing insulin resistance (Misra et al., 2010) [11]. Similarly, Anoop et al. (2010) [12] highlighted the role of dietary fats in the increasing burden of metabolic syndrome in developing nations. Recent studies by Wilson et al. (2023) [13] established that cultural dietary habits are related to regional oil preferences, similar to our observations in Dehradun and Vadodara. Furthermore, Fallah et al. (2024) [14] demonstrated that host genetic factors (FADS1 polymorphisms) alter lipid metabolism, suggesting that the neutral effect of oils observed may be population-specific. De la Maza-Bustindui et al. (2025) supported healthier cooking approaches such as steaming, while Salvo and Tuttolomando (2025) [16] emphasized the cardioprotective effect of olive oil, which could be enhanced by blending oils.

SUMMARY, CONCLUSION AND IMPLICATIONS

This research revealed that the type of cooking oil itself was not a significant factor in relation to chronic morbidities, and yet there was a regional trend, with Dehradun households using ghee, mustard, and soybean oil, and Vadodara using more cottonseed, groundnut, and sunflower oil. The anthropometric measures (BMI, WHR, blood pressure) were greater in Vadodara, indicating an increased cardiometabolic burden. The cooking techniques had a greater effect compared with the type of oil, as frequent frying was associated with obesity, and steaming and boiling had protective effects. BMI and WHR were confirmed as significant predictors by logistic regression and a composite risk score had a high predictive validity (AUC = 0.83).

SUGGESTIONS FOR FUTURE RESEARCH

Future research should employ longitudinal or prospective cohort designs to better elucidate causal relationships between cooking practices, oil consumption, and cardiometabolic outcomes. The cross-sectional nature of the present study limits temporal inference, particularly in understanding whether cooking methods such as frying precede changes in adiposity and metabolic risk.

REFERENCES

- Anoop, M., Neha, S., & Lokesh, K. (2010). Obesity, the metabolic syndrome, and type 2 diabetes in developing countries: Role of dietary fats and oils. *Journal of the American College of Nutrition*, 29(sup3), 289S–301S.
- Astrup, A., Magkos, F., Bier, D. M., Brenna, J. T., de Oliveira Otto, M. C., Hill, J. O., King, J. C., Mente, A., Ordovas, J. M., Volek, J. S., & Yusuf, S. (2020). Saturated fats and health: A reassessment and proposal for food-based recommendations: JACC state-of-the-art review. *Journal of the American College of Cardiology*, 76(7), 844–857.
- Bernard, T. I., Flore, T., Armel, Y., N., Ghislain, M., & Aduni, A. (2024). Protective effects of *Sardinella maderensis* oil on cardiometabolic risks in obese rat. *Clinical Nutrition and Hospital Dietetics*, 1(1), 1–5.
- Chen, T. Y., Fang, Y. H., Chen, H. L., Chang, C. H., Huang, H., Chen, Y. S., Liao, K. M., Wu, H. Y., Chang, G. C., Tsai, Y. H., & Wang, C. L. (2020). Impact of cooking oil fume exposure and fume extractor use on lung cancer risk in non-smoking Han Chinese women. *Scientific Reports*, 10(1), 6774.
- Connolly, G. (2021). *The effects of dietary protein on postprandial essential amino acids bioavailability as a substrate for protein anabolism in young and older adults and on cardiometabolic health-related outcomes* (Doctoral dissertation, Purdue University).
- Damude, H. G., & Kinney, A. J. (2008). Enhancing plant seed oils for human nutrition. *Plant Physiology*, 147(3), 962–968.
- De la Maza-Bustindui, N. S., León-Álvarez, M., Ponce-Acosta, C., Zarco-Morales, K. P., Fermín-Martínez, C. A., Antonio-Villa, N. E., & Bello-Chavolla, O. Y. (2025). Impact of cardiometabolic risk factors and its management on the reversion and progression of arterial stiffness. *npj Cardiovascular Health*, 2(1), 36.
- Fallah, Z., Vasmehjani, A. A., Aghaei, S., Amiri, M., Raeisi-Dekordi, H., Moghtaderi, F., Zimorovat, A., Yazd, E. F., Madadizadeh, F., Khayyatzadeh, S. S., & Salehi-Abargouei, A. (2024). Cardiometabolic risk factors are affected by interaction between FADS1 rs174556 variant and dietary vegetable oils in patients with diabetes: A randomized controlled trial. *Scientific Reports*, 14(1), 27531.
- Misra, A., Singhal, N., & Khurana, L. (2010). Obesity, the metabolic syndrome, and type 2 diabetes in developing countries: Role of dietary fats and oils. *Journal of the American College of Nutrition*, 29(sup3), 289S–301S.
- Nyemb, G. M., Flore, D. T., Yonghabi, N. A., Ufuan, A. A., & Tiencheu, B. (2024). Protective effects of *Sardinella maderensis* oil on cardiometabolic risks in obese rat. *Clinical Nutrition and Hospital Dietetics*, 1(1), 1–5.
- Sacks, F. M., Lichtenstein, A. H., Wu, J. H., Appel, L. J., Creager, M. A., Kris-Etherton, P. M., Miller, M., Rimm, E. B., Rudel, L. L., Robinson, J. G., Stone, N. J. (2017). Dietary

- fats and cardiovascular disease: A presidential advisory from the American Heart Association. *Circulation*, 136(3), e1–e23.
- Salvo, A., & Tuttolomondo, A. (2025). The role of olive oil in cardiometabolic risk. *Metabolites*, 15(3), 190.
 - Sancilio, F. (2015). *Prevention is the cure!: A scientist's guide to extending your life*. Morgan James Publishing.
 - Wilson, N. A., Villani, A., & Mantzioris, E. (2023). Preferences for dietary oils and fats in cooking and food preparation methods: A cross-sectional analysis of Australian adults. *British Journal of Nutrition*, 130(5), 841–851.
 - Zhang, Y., Chadaideh, K. S., Li, Y., Li, Y., Gu, X., Liu, Y., Guasch-Ferré, M., Rimm, E. B., Hu, F. B., Willett, W. C., & Stampfer, M. J. (2025). Butter and plant-based oils intake and mortality. *JAMA Internal Medicine*, 185(5), 549–560.
 - Zhang, Y., Gao, S., Liang, K., Wu, Z., Yan, X., Liu, W., Li, J., Wu, B., & Du, Y. (2021). Exendin-4 gene modification and microscaffold encapsulation promote self-persistence and antidiabetic activity of MSCs. *Science Advances*, 7(27), eabi4379.

THE INFLUENCE OF MATERNAL EDUCATION AND SOCIO-ECONOMIC STATUS ON KNOWLEDGE AND PRACTICES OF COLOSTRUM AND EXCLUSIVE BREAST FEEDING AMONG LACTATING WOMEN FROM VARANASI

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ABSTRACT

Colostrum is a thick yellowish fluid produced for first few days after delivery of the children. This golden fluid is rich in different nutrients dense molecules including Proteins, Immunoglobulins, Lactoferrins which protects the infants from several neonatal diseases like diarrhea, fever, cough and even neonatal hyperbilirubinemia which can be fatal. Along with the feeding of colostrum, Continuation of feeding of breast milk still 6 months, without even introducing water to the infants which is also called as Exclusive Breast Feeding is also essential to prevent the infants from several diseases. Both of these, not only protects the infants but also the mothers. Globally, around 4000 infant dies due to delayed feeding of colostrum that is not within 1st hour of birth as per WHO. Although the feeding practices are well-known to the mothers but there are several factors which prevents the feeding of particularly colostrum and the factors may include poor nutritional status of mothers, lack of proper information regarding feeding of the first milk, poor socio-economic status. The present study is objected to assess the influence of education of the mothers and Socio-Economic Status on breast feeding practices. The present study was conducted in Prasuti Tantra Section of Sir Sunderlal Hospital, Varanasi, 120 mothers were selected through random sampling. Self-structured Questionnaire were used for the interview schedule methods. B.G. Prasad updated Socio-economic Scale, 2024 has been used to assess the Socio-economic status of the expectant mothers. Primary data was collected and analysed using SPSS 22.0 software. The study found a significant association ($p < 0.05$) between the educational level of mothers and their knowledge regarding feeding of colostrum. Socio-Economic condition was also significantly associated ($p < 0.05$) with the Exclusive breastfeeding practices. Hence the Study concludes that feeding of colostrum is depending on the educational status of the mothers and family condition and economic status were also influence it. So, the Ante-natal visits should be made more effective to enhance the knowledge and practices regarding feeding to reduce the rate of mortality among neonates and infants.

Keywords: Colostrum, Exclusive Breast Feeding, Maternal Education, Socio-economic Status.

INTRODUCTION

Colostrum is the primarily produced milk which is yellowish in color which secrets till 3-4 days after delivery and rich in nutrients like protein, Immunoglobulins, Lactoferrin which protects the neonates from several neonatal diseases (Acharya et al, 2023). As well as Exclusive Breastfeeding is the feeding of only mothers' milk to the infant till 6 months without introducing any other formula and

even water (Shikha & Pandey, 2018). Globally, around 4000 infant dies due to delayed feeding of colostrum that is not within 1st hour of birth as per WHO (Haji et al, 2025). Although the feeding practices are well-known to the mothers but there are several factors which prevents the feeding of particularly colostrum and the factors may be the poor nutritional status of mothers, lack of proper information regarding feeding of the first milk, poor socio-economic status etc. (kakati et al., 2016). The importance of colostrum is unclear to the mothers even they are enough educated, but influenced by some elderly in the family till date (Tejaswani et al., 2021). Feeding colostrum to neonates not only increases the survival rate and protects from several infections but also benefits the mothers from several complications post-delivery (Akinola, 2022). The role of colostrum in reducing neonatal mortality has established but still more knowledge and practices will be required during ante natal visits (Wassie et al, 2020). Besides the protective role of colostrum there have been another factor which also deals with infantile immunity is the continuation of only breastfeeding till six months before the weaning begins, after that feeding will be continued with complementary foods for at least two years (Shikha & Pandey, 2018). Along with colostrum the Exclusive breast feeding has also several protective impact on both the mother and child, despite this there are several barriers which prevents the continuation of feeding (Ahmed et al., 2023). As per WHO's recommendations breast feeding should be continued exclusively (EBF) for all infants for the first six months of life. National Family Health Survey-4 (2015-16) picturized EBF rates of only 54.9%, which clearly visualize the lack of knowledge among the lactating mothers (Penugounda et al, 2022). The mothers or caregivers should be educated about the significance of EBF which protects the infants through stable gut microbiota which provides protects from several infantile diseases and also benefit the mothers (Adan Ali et al, 2023). Early initiation of breastfeeding has different health benefits like increase ability to fight with infections, reduce the risk of neonatal diarrhoea, and increase the survival rate of infants. Neonatal mortality can be prevented by 33% if early initiation of breastfeeding is practiced by mothers through ante natal visits (Abie et al., 2019). The World Health Organisation ensured that a newborn must be fed with colostrum quickly as possible after birth. However, among newborns needing neonatal intensive care, initiation of lactation and access to colostrum might be delayed due to various reasons (Hellstrom et al., 2025). The present study has focused on the feeding practices and impact of mothers' education and socio-economic status on it.

OBJECTIVES

The present study consists of the following aims and objectives

1. To study the rate of Colostrum and Exclusive Breast Feeding among the lactating mothers
2. To assess the knowledge and practices of mothers regarding feeding to their neonates and infants
3. To analyze the impact of Socio-economic status and education on feeding practices

RESEARCH METHODOLOGY

Research Design: The longitudinal study was conducted in Sir Sunderlal Hospital of Banaras Hindu University, Varanasi.

Sampling Technique: The subjects were selected through simple random sampling method from the Prasuti ward of Indian Medicine Wings of the Hospital.

Data Collection: Respondents were selected from the age group of 18 to 45 years that is who is in their reproductive ages. Respondents who are enrolled in this hospital for their delivery are included in the study. 120 mothers were included in the study.

Research Tools: Interview schedule method was followed using self-structured Questionnaire to collect the primary data. Follow up was done using telephonic communication. B.G. Prasad Modified Socio-Economic Scale was used (2025).

Statistics: The data were analyzed using SPSS 22.0 version and presented in the form of percentage and chi-square test was applied to find the significant association. The level of significance was set at $p < 0.05$.

Ethical Approval: The study was approved on April 13, 2024 by Ethics Committee, Institute of Science, Banaras Hindu University, Varanasi-221005, Uttar Pradesh, India and also taken individual consent from the mothers.

CTRI Trial Registration: ctri@gov.in, CTRI/2024/06/068448.

FINDINGS & DISCUSSION

Table 1: General information about the lactating mothers

Characteristics	Total no. of Mothers (N)	Percentages (%)
Age (years)		
18-23	20	17
24-29	80	67
30-35	10	08
36-41	10	08
Education qualification		
Primary	22	18
Intermediate	30	25
Graduate	55	46
Post-Graduate	10	08
Professional Education	03	03
Socioeconomic status		
Upper Class	12	10
Upper – Middle Class	13	11
Middle class	80	67
Lower-Middle Class	10	08
Lower Class	05	04
Parity		
Nulli Parity	80	67
Multi Parity	40	33
Gravida		
Primi Gravida	100	83
Multi Gravida	20	17

Table 1 shows the General information of the lactating mothers where it is clearly seen that 67 per cent of the mothers were in the age group of 24-29 years, 46 per cent of them were Graduate, 67 per cent of the respondents were belonging to the middle-income group. Along with this 67 nulliparous and 83 per cent having primi gravida.

Table 2: General information about feeding practices among lactating mothers:

Parameters	Total no. of mothers (N)	Percentage (%)
Feeding of colostrum (within 1 hour)	30	25
Feeding of colostrum after 24 hours	60	50
Feeding of colostrum after 48 hours	30	25
Feeding of formula milk before colostrum	100	83
Feeding Breastmilk exclusively	80	66
Introduction of any other milk before 6 months	40	33

Table 2 shows the percentage distribution lactating mothers according to the feeding practices, it has been seen that only 25 per cent of the mothers were able to feed the colostrum within the 1st hour of delivery, this is generally due to the post impact of the c-section or in case of normal vaginal birth it is due to the 1st time delivery of the mother. 50 per cent of the respondents fed after 24 hours. 83 per cent of the mothers fed formula milk again due to c-section, lack of proper latching or while the baby is unable to suck properly. 66 per cent of the mothers continued breast feeding exclusively for 6 months.

Figure 1: Mother receiving Ante natal care facilities during pregnancy:

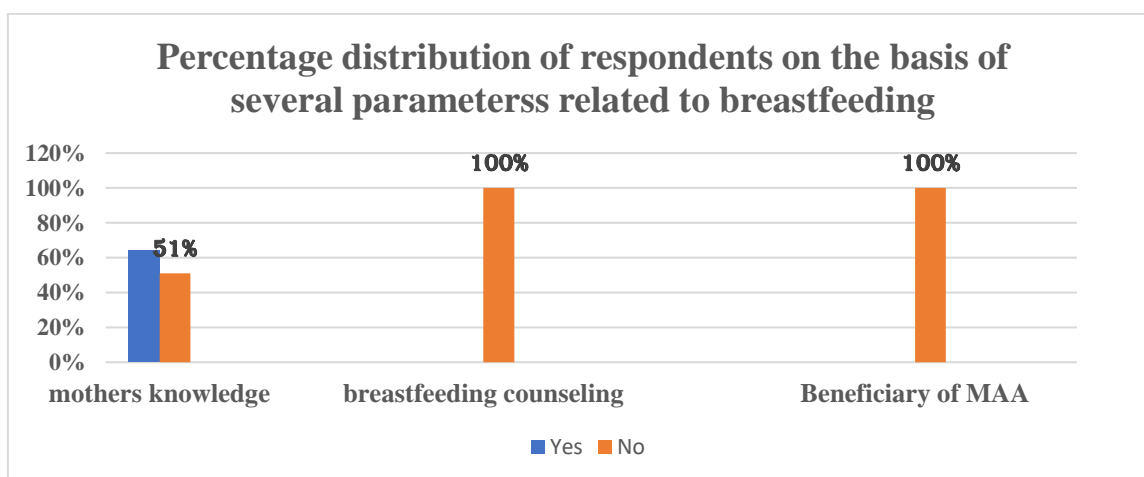


Fig: 1 show that 51 per cent of the mothers were aware about the importance of colostrum, none of the expectant mothers received any breast-feeding counseling session before delivery during their ante natal visit and none of the mother was the beneficiary of the Government scheme Mothers' Absolute Affection (MAA). This highly reflects the need to improve the session of Ante Natal Visits where at least they may discuss and get suggestions regarding issues related to the breast feeding.

Figure 2: Mothers’ knowledge and practices for Exclusive Breast Feeding

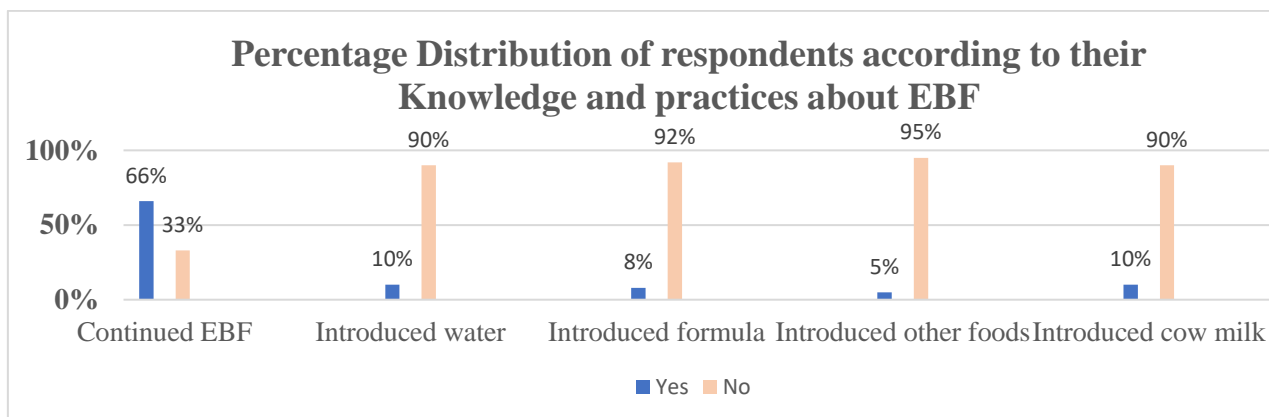


Fig: 2 depicts that 66 per cent of the lactating mothers continued breast feeding exclusively and remaining complaint about insufficient production of breast milk or their thinking that baby is not getting sufficient nutrition only through breast feeding, 10 per cent of the mother introduced water before six months of the age, 8 per cent initiated feeding formula, 5 per cent of the mothers introduced other sift foods and 10 per cent of them fed cow milk to their babies. All the collected data shows a sufficient knowledge of mothers regarding exclusive breast feeding which reflects proper post-natal counseling.

Table 4: Co-relation between Mothers’ education and knowledge regarding colostrum feeding

Mothers’ Educational Status	Knowledge regarding colostrum feeding		Total
	Yes	No	
Primary	09	13	22
Intermediate	16	14	30
Graduate	30	25	55
Post-graduation	10	00	10
Professional Education	03	00	03
Total	68	52	120
$X^2 = 10.05, df = 2, p < 0.05$			

Table 4: depicts a significant association between Mothers’ Educational status and knowledge regarding colostrum feeding (p=0.03). This may be due to awareness of educated mothers regarding the protective role of colostrum in neonates. A study conducted in the year 2019 on a China based population conducted by Tang et al., also showed that early initiation of Breast feeding was high among highly educated women.

Table 5: Co-relation between Socio-economic status and Breastfeeding practices:

Socio-economic Status	Practices of Exclusive Breastfeeding		Total
	Yes	No	
Upper Class	12	00	12
Upper – Middle Class	11	02	13
Middle class	52	28	80
Lower-Middle Class	04	06	10
Lower Class	02	03	05
Total	81	39	
$X^2= 9.58, df = 2, p < 0.05$			

Table 5 depicts the significant co-relation between Socio-economic Status and Continuous feeding of breast milk for the first six months without introducing any other foods to the baby. This may be due to the fact that Socio-economic condition dietary intake of the mother which causes proper milk production and also higher economy increases the cases of more and more post-natal hospital visit in case of any problem related to feeding practices during lactation.

SUMMARY

To summarize the present study, it can be said that Ante-natal visits require to be much more improved. Only 25 per cent mothers were able to feed colostrum to their neonates within first hour of their lives. Although the rate of Exclusive Breastfeeding was high that is 66 per cent but still it needs to be raised. Mothers' Education is a contributing factor in generating the knowledge regarding correct feeding practices and about the importance of both colostrum and Exclusive Breast Feeding. Socio-economic Condition of mothers is also a predominant factor which directly reflect the dietary intake which in turn impact the nutritional status and which ultimately affect the milk production. Although the study shows that Post-natal knowledge was far better regarding feeding among the mothers. Hence, it can be said that to reduce the neonatal mortality the feeding practices should be improved. Feeding of colostrum within one hour of birth is recommended as it acts as a vaccine among the neonates and protects them from neonatal diseases.

CONCLUSION

The present study concludes that mothers' education is a predisposing factor for proper feeding practices. Socio-economic status is also included as it directly impacts the dietary intake of them which ultimately influence the milk production. Promotion of breastfeeding counselling session is highly recommended to increase the awareness among the expectant mothers. Another fact is the increasing rates of C-section; the mothers must be counselled towards normal vaginal birth which induces labor and contraction of muscles in the breast and hormonal action relaxes them to eject milk.

IMPLICATION

The study found that the most of the mothers were graduated and they are aware about the importance but still they either not availing the facilities or may be due to an increase in the cesarean sections the feeding of colostrum is being delayed. Besides this poor nutritional status of mothers

reduces the production of milk which forces the mothers to introduce other formula or cow milk, which in turn causing diarrhea among the infants.

SUGGESTIONS

- The present study suggests that more focus should be given to the Ante-natal counseling regarding breast feeding practices in Indian scenario.
- Expectant mothers should be aware about the schemes initiated by the Government.
- For the Socio-economical upliftment, different kind of women empowerment program can be initiated.

ACKNOWLEDGEMENT

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REFERENCES

- Acharya, S., Thapa, B., Dhakal, A.K., & Singh, S.K. (2023). *Colostrum Feeding among Newborns Visiting the Outpatient Department of Paediatrics of a Tertiary Care Centre: A Descriptive Cross-sectional Study*. Journal of Nepal Medical Association. PP – 204-207, 61(259). doi: 10.31729/jnma.8062
- Kebede, N., Aleme, G. & Cherei, N. (2023). *Colostrum feeding practice and its associated factors among postnatal mothers who attend at health facility, Ethiopia*. Journal of Neonatal Nursing, PP- 875-880, 29(6), <https://doi.org/10.1016/j.jnn.2023.03.006>
- Haji, G., Agero, G., Eshete, A., Hasan, A. & Hiko, A. (2025). *Colostrum feeding practice and associated factors among mothers who come for postnatal care to Asella referral and teaching hospital, Arsi Zone, South-East Ethiopia*. Frontiers in Medicine, 11: 1487179, doi: 10.3389/fmed.2024.1487179
- Kakati, R., Rahman, S.J., Borah, M. & Borah, H. (2016). *Colostrum feeding practices and its determinants among urban and rural mothers in Kamrup, Assam, India*. International Journal of Research in Medical Sciences, 4(10). <https://doi.org/10.18203/2320-6012.ijrms20163331>
- Abie, B.M. & Goshu, Y.A (2019). *Early initiation of breastfeeding and colostrum feeding among mothers of children aged less than 24 months in Debre Tabor, northwest Ethiopia: a cross-sectional study*. BMC Research Notes. 12: 65, <https://doi.org/10.1186/s13104-019-4094-6>.
- Tejaswini, S. & Balakrishna B.B. (2021). *Comparison of Knowledge and Practice regarding colostrum feeding among mothers in rural and urban area*. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. PP- 2347-2353. 10(6). <https://dx.doi.org/10.18203/2320-1770.ijrcog20212174>.
- Akinola, A., Karama, R.S., & Rajput, M. (2022). *Awareness of natural breastfeeding milk among mothers and the importance of colostrum within the first hour of birth in India*. International Journal of Community Medicine and Public Health. 9(7).<https://doi.org/10.18203/2394-6040.ijcmph20221772>
- Wassie, A.Y., Gebeyehu, N.A. & Gelaw, K.A. (2020). *Knowledge, Attitude, and Associated Factors towards Colostrum Feeding among Antenatal Care Attendant*

Mothers in Gununo Health Centre, Wolaita Zone, Ethiopia 2019: Cross-Sectional Study. International Journal of Paediatrics. <https://doi.org/10.1155/2020/3453502>

- Hellstrom, S., Linden, K., Sengpiel, V. & Elfvin, A. (2024). *Implementing a colostrum-kit reduces the time to first colostrum for neonates admitted to the NICU – a retrospective observational study.* International Breastfeeding Journal. 19:77. <https://doi.org/10.1186/s13006-024-00682-5>.
- Shikha & Pandey, A.K. (2018). *A Study on Colostrum and Exclusive Breast-Feeding practices and its determinants in rural mothers of Katihar, Bihar.* Indian Journal of Applied Research. ISSN No. 2249-555X. 10.36106/IJAR.
- Ahmed, S., Ashgar, R.I., Abdelgader, A.A., Hamid, H.I., Mathkor, D.M., Ali, M.A., Mohamed, S.A., et.al. (2023). *Exclusive breastfeeding: Impact on infant health.* Clinical Nutrition Open Science, PP- 44-51. 51. <https://doi.org/10.1016/j.nutos.2023.08.003>
- Penugonda, A.J., Rajan, R.J., Liolen, A.P., Kompithra, R.Z., Jeyaseelan, L., Mathew, L.G. (2018). *Impact of exclusive breast feeding until six months of age on common illnesses: A prospective observational study.* Journal of Family Medicine and Primary Care, Pp- 1482-1488. 11(4). doi: 10.4103/jfmpe.jfmpe_1423_21.
- Ali, S.A., Lakshmi, C.V.S., Mirza, N.A, Siddiqui, S., Anis,H. & Manfusa, H. (2023). *Barriers to exclusive breastfeeding in first 6 months of life in infants born in a tertiary care center in Hyderabad.* International Journal of Contemporary Pediatrics. 10(11). <https://doi.org/10.18203/2349-3291.ijcp20233232>.
- Tang, K., Wang, H., Tan, S.H., Xin, T., Qu, X., Tang, T., Wang, Y., Liu, Y., Gaoshan, J. (2019). *Association between maternal education and breast-feeding practices in China: a population-based cross-sectional study.* BMJ Open. 9(8). BMJ Open. 10.1136/bmjopen-2018-028485
- Rahman, M. (2020). *The socio-economic determinants of exclusive breastfeeding: A cross-sectional study conducted in Dhaka city, Bangladesh.* IOSR Journal of Humanities and Social Science (IOSR-JHSS). e-ISSN: 2279-0837. 25(12). Pp- 18-23. DOI: 10.9790/0837-2512071823

EVALUATING THE NUTRITIONAL HEALTH OF TRIBAL CHILDREN: A CASE STUDY APPROACH FROM SOUTH KERALA

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ABSTRACT

The nutritional status of children during early childhood is critical for their immediate and long-term health. In India, tribal children often confront significant challenges related to malnutrition due to socio-economic disparities, traditional dietary practices, and limited access to healthcare. This study delves into the nutritional status and dietary habits of tribal children aged 7-9 years in Thiruvananthapuram, Kerala, and investigates the factors influencing their nutritional outcomes. Primary data was collected through interviews with tribal children and their parents, while secondary data was obtained from existing literature. The study utilized a pretested interview schedule to gather demographic, lifestyle, and dietary information. Nutritional assessment included anthropometric measurements, biochemical testing for haemoglobin levels, and clinical evaluations. Dietary intake was analyzed using a 24-hour recall method and food frequency scoring. The study revealed that 60% of the children were underweight and 33% were overweight, with only 7% falling within the healthy BMI range. Haemoglobin analysis indicated that 43% of the children had mild anaemia, and 4% had moderate anaemia. The food frequency data showed high consumption of cereals, tubers, and sugary beverages, with lower intake of vegetables, fruits, and non-vegetarian items. Food use frequency scores were categorized as low, moderate, or high, with significant variations observed based on family size. These findings underscore the necessity for enhanced nutritional education and dietary diversity among tribal children.

Key words: Consumption habits, Dietary habits, Food use frequency scores, Nutritional status, Tribal children

INTRODUCTION

The nutritional status of children is pivotal in shaping immediate and long-term health outcomes, especially during the early years. In India, while progress has been made in addressing malnutrition, disparities persist, particularly among marginalized communities such as tribal populations. Tribal areas often encounter challenges that affect their resources, access to healthcare, education, socio-economic development, and cultural practices that can influence the dietary habits and patterns of the population. Rekha *et al.* 2023, while analysing the wealth inequalities in nutritional status among tribal children under 5 in India, identified that although the overall

nutritional status in India has improved over the years, tribal children still lag behind their non-tribal peers. (Kumar, Saxena, Srivastava & Vasanthachar, 2024). The occurrence of underweight is 27 percent among tribal children in Kerala, whereas it is 17 percent among non-tribals (Thomas & Sridevi, 2023). The health status of tribal communities is closely tied to their lifestyle and regular activities. Policy-level action and systematic interventions at state and federal levels are recommended to improve tribal health outcomes (Behera, 2023). Not many studies have been conducted on tribal children, especially in Thiruvananthapuram and the specific age group. There is a lack of data on schoolchildren's eating habits in tribal areas of Kerala. In this background, an attempt has been made to reveal the nutritional status of the tribal children (7-9 years) living in tribal areas of Thiruvananthapuram, Kerala.

OBJECTIVES

The objectives put forward for the present study are as follows:

To find out the dietary habits of the selected respondents.

To study the nutritional cognizance and its associated factors among the selected respondents.

METHODOLOGY

For the present study, both primary and secondary data were collected. Primary data was collected by interviewing the respondents, i.e., tribal children aged 7-9 years and their parents. Kanikkar, a predominant tribal community found in the capital city Thiruvananthapuram was identified as the samples for the study. From the data obtained from the Kerala State General Education Department (2019), 1372 tribal children aged 6-9 years were registered in the Thiruvananthapuram district. Hence, 422 children were selected tribal settlements of the district were identified as the respondents for the study using a systematic random sampling method. An extensive study on this group aimed at the specific dietary consumption and nutritional status was carried out among a sub-sample of 100 respondents. This particular article details about the in-depth study carried out among the sub sample population of one hundred children. Inclusion criteria: Children and parents who are willing to participate in the three-month intervention. Voluntary willingness and consent were sought from both groups. For the accuracy in calculating the nutritive values, those aged between 7-9 years only were considered for the in-depth analysis. Respondents aged six years were exempted from the in-depth analysis. Those who are unable to commit to three consecutive months of intervention and do not wish to retain their data for an in-depth study were excluded from the in-depth study.

The study used both quantitative as well as qualitative methods for collecting the data. Separate consent was sought from both the parents and the children. A pretested Interview Schedule was utilized to gather information on demographic details, lifestyle patterns, hygiene practices, dietary habits, and eating patterns. Nutritional assessment was conducted using the anthropometric measurements such as height, weight, waist circumference and were measured using standard tools. Biochemical testing, focusing on haemoglobin, was conducted in the laboratory using techniques endorsed by trained specialists. Clinical evaluation was performed with a doctor's assistance to assess the children's overall health. Detailed dietary intake was determined using the 24-hour recall approach. The food frequency method was utilized to assess how often specific food items were consumed by a respondent over a particular time.

FINDINGS AND DISCUSSIONS

The demographic variables related to the respondents include the age, gender, size of the family, occupation of the parents and their eating patterns were studied. Forty five percent of the children belongs to 7 years of age, sixteen percent belongs to eight years of age, and thirty nine percent belongs to nine years of age. Fifty three percent of the respondents were boys and forty-seven were girls. Majority of the parents were coolie labourers and the family annual income is less than Rs 25000. About ninety three percent follows a three-day meal pattern in their family.

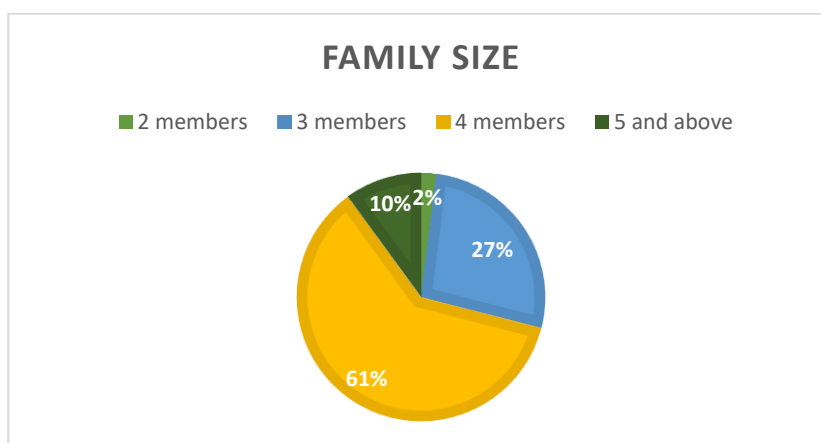


Fig No:1 Size of the family

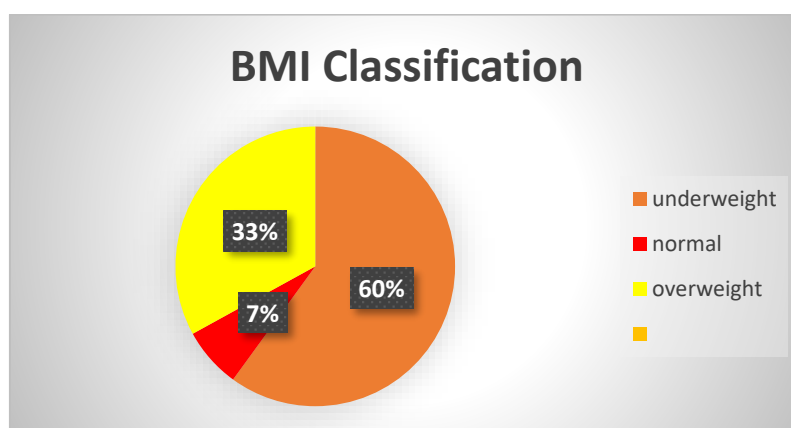


Fig No:2 BMI Percentiles and Classification of Respondents

It was observed from Fig No: 2 that sixty percent of the respondents between 7 and 9 years old were underweight, and 33 percent were overweight. Only a minority of 7 percent was found to be in the healthy range. The majority of the respondents were found to possess healthy weight. No respondents were reported to be in the obese category

Distribution of the respondents based on BMI and Gender

The respondents were classified based on their Body Mass Index and Gender.

Table No: 1 Distribution of the Respondents based on BMI and Gender

Group Statistics						t-test for Equality of Means			
Variable	Gender	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)	Mean Difference
Height	Boy	53	114.566	18.6202	2.5577	-1.943	98	.055	-6.9659
	Girl	47	121.532	17.0330	2.4845				
Weight	Boy	53	21.113	5.4125	.7435	-1.753	98	.083	-2.6740
	Girl	47	23.787	9.5027	1.3861				
BMI	Boy	53	25.6900	74.00832	10.16583	.913	98	.363	9.87638
	Girl	47	15.8136	3.76744	.54954				

The t-test was applied to compare the means of height, weight, and BMI among the participants based on their gender. The findings reveal that there is no statistically significant difference in height, weight, and BMI between genders at the 5% significance level in this study. Nonetheless, the marginally considerable outcome for height suggests that a larger sample size might produce a significant result. The substantial variability in BMI among male participants may indicate the presence of outliers or diverse body compositions within this group.

Biochemical assessment

Since the respondents were school-going children and the prevalence of anaemia among the respondents selected for the study only needs to be analysed, paramedical personnel used the Cyanmet haemoglobin method to estimate the Hb levels of the respondents, with the help of laboratory staff. While analysing the haemoglobin levels of the respondents (Fig No:3), it was found that only half of the children selected for the study had normal haemoglobin levels (11.4-14.5g/dl). About 43 percent of the children in tribal areas selected for the study have mild anaemia with 10.0-10.9g/dl haemoglobin levels. In a study conducted by Arjun, Kumar, and Shali (2018) on the prevalence of anaemia among pre-school tribal children in Kerala, 8% of the tribal children and 47% of non-tribal children had anaemia.

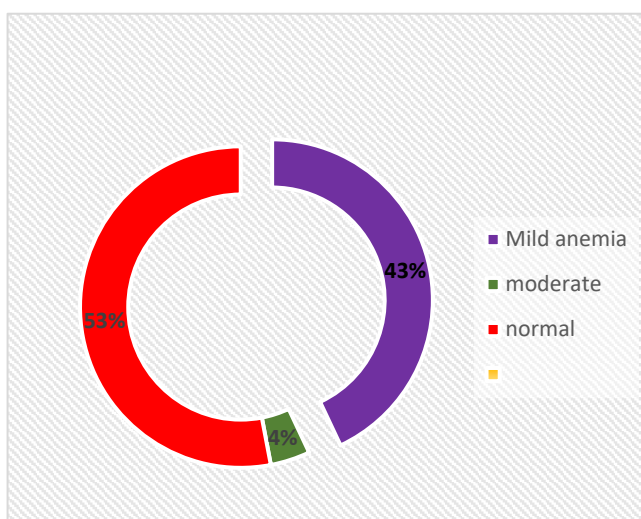


Fig No: 3 Haemoglobin levels of the respondent

Distribution of the respondents based on haemoglobin levels and gender

The respondents' haemoglobin levels were distributed based on the mean scores by gender and are further presented below.

Table No:2 Distribution of the Respondents based on Haemoglobin levels and Gender

Group Statistics					t-test for Equality of Means			
Gender	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)	Mean Difference
Boy	53	11.372	.7215	.0991	.026	98	.980	.0036
Girl	47	11.368	.6773	.0988				

The table presents the t-test results comparing haemoglobin levels between boys and girls. The p-value of 0.980 indicates no statistically significant difference in haemoglobin levels between the selected genders in this study.

Distribution of the respondents based on haemoglobin levels and age

The haemoglobin levels of the respondents were distributed based on the mean age scores and are further presented below.

Table No:3 Distribution of the Respondents based on Haemoglobin levels and Age

Group Statistics					t-test for Equality of Means			
Item	N	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval for Mean		Minimum	Maximum
					Lower	Upper		
Hb	7.0	45	11.476	.7084	11.263	11.688	9.5	12.5
	8.0	16	11.038	.7500	10.638	11.437	9.0	12.0
	9.0	39	11.385	.6360	11.178	11.591	9.4	12.5
	Total	100	11.370	.6975	11.232	11.508	9.0	12.5

The table no: 3 represents the distribution of the respondents based on their haemoglobin levels and age. While analysing the mean scores of the respondents, it was found that there is no significant difference in mean haemoglobin levels across different age groups, as the means are pretty similar. The haemoglobin levels range between 9.0 and 12.5 across all age groups.

Comparison of the respondents based on haemoglobin levels and age

Further, the data was cross-verified with the Analysis of Variance test to explore the significance levels within the groups and decide whether those observed differences were statistically meaningful.

Table No: 4 Comparison of the Respondents based on Haemoglobin levels and Age

Item	Category	Sum of Squares	df	Mean Square	F	Sig.
Hb	Between Groups	2.279	2	1.139	2.408	.095
	Within Groups	45.891	97	.473		
	Total	48.170	99			

The p-value (Sig. = 0.095) exceeds the standard significance level of 0.05, indicating that there is no statistically significant difference in haemoglobin levels across the various age groups. The difference between the groups is not substantial enough to be deemed significant.

Distribution of the Respondents based on Haemoglobin levels and Size of the family

The details regarding the distribution of the respondents based on their haemoglobin levels and size of the family are discussed below.

Table No:5 Distribution of the Respondents based on Haemoglobin levels and Size of the family

Item	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	
					Lower	Upper			
HB	2 members	2	11.400	.7071	.5000	5.047	17.753	10.9	11.9
	3 members	27	11.259	.5872	.1130	11.027	11.492	10.0	12.2
	4 members	61	11.484	.7149	.0915	11.301	11.667	9.0	12.5
	>5 members	10	10.970	.7689	.2432	10.420	11.520	9.5	12.0
	Total	100	11.370	.6975	.0698	11.232	11.508	9.0	12.5

The data reflected that family size with 4 members has the highest mean haemoglobin level (11.484), while group >5 has the lowest mean (10.970). The total sample of 100 respondents has an overall mean haemoglobin level of 11.370, with a standard deviation of 0.6975. Haemoglobin levels across all groups range from 9.0 to 12.5.

Comparison of the respondents based on haemoglobin levels and size of the family

ANOVA test was used to analyse whether the observed differences discussed in the table no:5 were statistically meaningful.

Table No:6 Comparison of the Respondents based on Haemoglobin levels and Size of the family

Item	ANOVA	Sum of Squares	df	Mean Square	F	Sig.
HB	Between Groups	2.720	3	.907	1.915	.132
	Within Groups	45.450	96	.473		
	Total	48.170	99			

The p-value of 0.132 is greater than the standard significance level of 0.05, meaning there is no statistically significant difference in haemoglobin levels based on family size. The variation observed between the groups is likely due to random chance rather than an actual difference in haemoglobin levels. The participants' clinical assessment was conducted with a doctor's assistance. The study revealed that 66 percent of tribal children aged 7 to 9 years had normal hair, while 32 percent had

dry and brittle hair. Only 2 percent of the respondents had thin and sparse hair that was easily pluckable. In terms of facial features, 62% of tribal children had normal faces, 37 percent had depigmentation, and 1 percent had puffy faces or edema. Additionally, 90 percent had clear eyes, while 10 percent had pale eyes. Regarding lips, 51 percent had normal lips, 48 percent had lip scars, and 1 percent had lip fissures. In terms of skin, 87 percent had normal skin, 12 percent had dry skin, and 1 percent had dark or light spots with rashes. Finally, 90 percent had normal nails, while 9 percent had brittle nails.

While a significant percentage of tribal children show no signs of malnutrition-related physical abnormalities, a substantial proportion exhibit signs that point to specific nutritional deficiencies, particularly in proteins, essential vitamins (A, B-complex, and C), and minerals like iron, which is evident from their clinical examination. The presence of dry and brittle hair, depigmentation, pale eyes, dry skin, and brittle nails suggests a need for targeted nutritional interventions to address these deficiencies. The study highlights the importance of improving dietary quality and access to balanced nutrition within this vulnerable population to prevent long-term health issues.

Table No:7 Descriptive Statistics on the Nutrient Intake based on the 24-hour recall method

Items	N	Range	Minimum	Maximum	Mean	Std. Deviation
Cereals	100	1.0	6.0	7.0	6.980	.1407
PulsesandLegumes	100	5.0	1.0	6.0	3.680	1.3990
LeafyVegetables	100	5.0	1.0	6.0	3.130	1.6309
OtherVegetables	100	5.0	1.0	6.0	3.540	1.8663
Fruits	100	6.0	1.0	7.0	2.910	1.9853
MilkandMilkProducts	100	6.0	1.0	7.0	4.360	2.0277
Fish	100	6.0	1.0	7.0	3.970	1.8338
MeatandMeatProducts	100	5.0	1.0	6.0	2.150	1.5399
NutsandOilSeedsOils	100	6.0	.0	6.0	2.180	1.9714
SugarHoneyJaggery	100	7.0	.0	7.0	5.210	2.2261
Beverages	100	6.0	1.0	7.0	5.030	1.7201
Valid N (listwise)	100					

The table provides descriptive statistics on nutrient intake based on a 24-hour recall method. The analysis includes various food groups such as cereals, pulses, legumes, vegetables, fruits, milk and milk products, fish, meat, nuts, oils, sugar, and beverages. The range of intake values varies by food group, indicating the spread between the minimum and maximum consumption. For most food groups, the range is from 1.0 to 6.0, except for cereals (range of 1.0) and sugar/honey/jaggery (range

of 7.0). The mean intake of cereals is 6.980, indicating that cereals are almost universally consumed at a high level. The mean intake of pulses and legumes is 3.680, showing moderate consumption. The mean intake of fruits is 2.910, suggesting lower consumption compared to vegetables. The mean intake of meat and meat products is 2.150, suggesting lower consumption.

Food use frequency score

The Food Use Frequency Scores are used in nutritional research studies to assess and analyze individuals' or populations' dietary patterns and nutritional status. It also helps identify the frequency of consumption of specific foods, which can be linked to dietary habits, preferences, and potential nutritional deficiencies or excesses. A food frequency table was used to collect the data. Further, respondents were given scoring for each food item based on their frequency of consumption. The sum of the total scores obtained for all eleven food groups represents a family's food use frequency score. It was then categorized into low, medium, and high.

It was found that about thirty-three percent of the respondents' families have low food use frequency scores, one-third of them have moderate scores (thirty-five percent), and the other-third have high levels of food use frequency scores (Fig No: 3). The scores were further analysed to understand the frequency of consumption patterns.

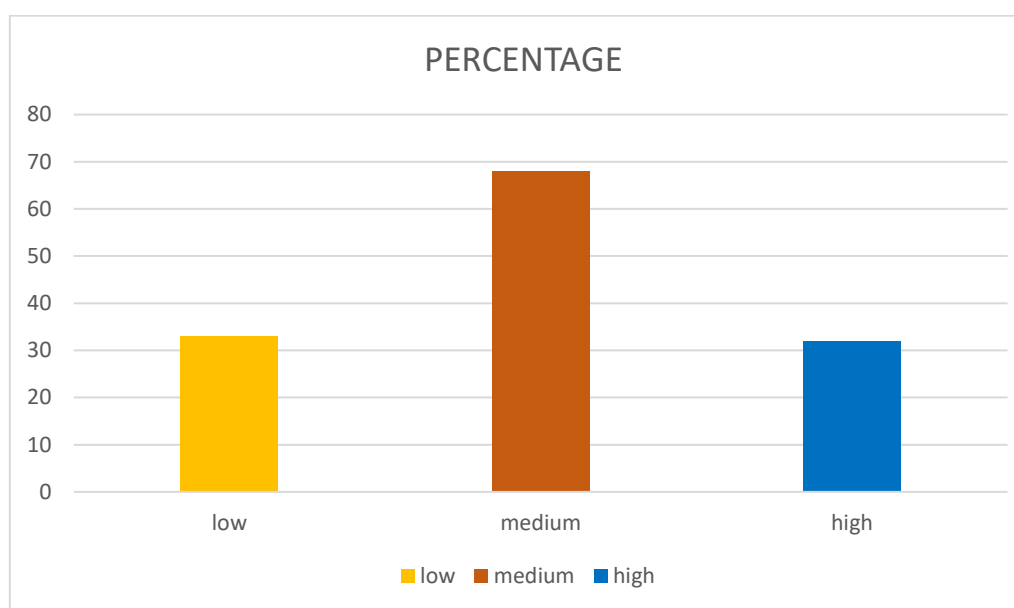


Fig No:3 Food Use Frequency Scores

Food consumption pattern of the Respondents

The frequency of usual food consumption was assessed using pre-coded response categories such as daily, weekly thrice, weekly, fortnightly, monthly, occasionally, rarely and never. Food items were grouped into categories such as cereals, roots and tubers, pulses and legumes, green leafy vegetables, other vegetables, milk and milk products, fruits, nuts and oil seeds, fish, meat products, sugar, honey jaggery and beverages. The frequency of consumption for each food item was recorded using a frequency scale ranging from daily (7) to never (0). Mean scores were calculated for each food group. The mean percent score was calculated by dividing the mean score by the maximum score of 7 and multiplying by 100. The foods that scored above 90 percent were classified as 'Most frequently used'

while those that scored below 45 percent were classified as ‘Least frequently used.’ The less frequently used foods were those with scores ranging between 45-60 percent, and those between 61-89 percent belong to the “Frequently used” category. The food Use Frequency Scores obtained for the families selected for the study are presented below.

Table No:8 Food Consumption Pattern

Food groups	Food items	Mean Score (%)	Consumption Pattern
I	Cereals, roots & tubers	99.71	Most frequently used
II	Pulses and legumes	52.57	Less frequently used
III	Green leafy vegetables	44.71	Least frequently used
IV	Other vegetables	50.57	Less frequently used
V	Fruits	41.57	Least frequently used
VI	Fish	56.71	Less frequently used
VII	Meat and meat products	30.71	Least frequently used
VIII	Milk & milk products	62.28	Frequently used
IX	Nuts & oil seeds	31.14	Least frequently used
X	Sugar, honey, jaggery	74.42	Frequently used
XI	Beverages	71.85	Frequently used

The survey found that people tend to consume a lot of cereals, roots, tubers, sugar, and beverages, especially tea, daily. The eating habits of both tribal and non-tribal communities are similar on regular days. However, the younger generation tends to prefer popular foods. Additionally, most people drink tea more than twice a day, leading to a higher milk intake. The preference for non-vegetarian foods is relatively low, and people consume fewer green leafy vegetables, fruits, meat products, nuts, and oil seeds. In a study reported by Sanchana and Bonny (2020), significant differences were found in the food consumption patterns of the tribals in different parts of Kerala, especially in the frequency of intake of vegetables, fish, eggs, and meat.

Distribution of food frequency scores based on the size of the family

The mean scores of the level food frequency scores obtained were further compared with the mean scores of the size of the family, and the details are given below.

Table No:9 Food Frequency Scores based on the Size of the family

Food Frequency Scores based on the Size of the family								
Family size	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
2.0	2	47.500	31.8198	22.5000	-238.390	333.390	25.0	70.0
3.0	27	44.519	15.9503	3.0696	38.209	50.828	22.0	69.0
4.0	61	43.705	14.4445	1.8494	40.005	47.404	14.0	69.0
>5	10	35.100	13.9320	4.4057	25.134	45.066	16.0	59.0
Total	100	43.140	15.1251	1.5125	40.139	46.141	14.0	70.0

The mean food frequency scores of the families were analyzed and compared with their sizes. It was observed that as family size increases, the mean food frequency score tends to decrease. Larger sample sizes (e.g., Family Size 4.0) result in more precise mean estimates, indicated by narrower confidence intervals. The analysis suggests that larger families may have lower food frequency scores; however, the small sample size for the 2.0 and >5 categories introduces some uncertainty.

Comparison of the means of FFS and size of the family

ANOVA test was used to compare the means of food frequency scores of the families with respect to the size of the families.

Table No:10: Comparison of the Means of FFS and Size of the Family

Source	Sum of Squares	df	Mean Square	F	p-value
Between Groups	1500	3	500	10.00	0.0001
Within Groups	4800	96	50		
Total	6300	99			

The Anova results showed that since the p-value (0.0001) is less than the significance level of 0.05, there are significant differences between the size of the family and the food use frequency scores of the families. This suggests significant differences between the family size groups regarding food frequency scores. Sujathan and Prasad (2022) observed that food insecurities among tribal families in Kerala are very high and significant, influenced by socio-demographic factors. These insecurities also significantly impact their farming practices.

CONCLUSION

The study focussed on examining the nutritional status of tribal children aged 7-9 years in Thiruvananthapuram, Kerala. It underscores the differences in diet and health between tribal and

non-tribal populations. The study sought to evaluate the dietary habits, nutritional knowledge, and associated socio-economic factors affecting the health of tribal children. The survey reveals a low intake of vegetables, fruits, nuts, and meats, with a high consumption of cereals, tubers, and sugary beverages, particularly tea. Of the children surveyed, 60% were underweight, 33% were overweight, and only 7% fell within the healthy BMI range. Notably, there were no statistically significant differences in height, weight, and BMI between boys and girls. Haemoglobin testing showed that 43% had mild anaemia, and 4% had moderate anaemia, with no significant gender or age differences in haemoglobin levels. The food frequency scores indicated that 33% of families had a low food use frequency score, 35% moderate, and 32% high. The most frequently consumed foods were cereals, roots, tubers, and sugar, while pulses, vegetables, fruits, and non-vegetarian items were less frequently consumed. The study underscores the critical need to enhance nutritional awareness and food diversity among tribal populations in Kerala, especially for children aged 7-9 years. The findings highlight that malnutrition, both undernutrition and overnutrition, remains a significant concern, compounded by socio-economic and cultural factors. While traditional diets heavily rely on locally available food, they often lack the variety required for balanced nutrition. Sustainable and continuous dietary interventions are required to both parents and children alike, in order to bring dietary diversity as well as promotion of healthy eating habits among the tribal population.

REFERENCES

- *Arjun.C.M, Kumar Ajith.V.T, Shali.A.S (2018)* "Prevalence of anaemia and its association with various socio demographic variables among preschool tribal children in Kerala"; *Journal of Medical Science and Clinical Research*; Vol 6, Issue 1; <https://dx.doi.org/10.18535/jmscr/v6i1.101>; Pp 32022-26.
- Behera, Satrugan. (2023). Health Condition of the Tribal Peoples in India: A Survey of the Literature. *International Journal of Science and Research (IJSR)*. 12. 1503-1507. [10.21275/SR23517102249](https://doi.org/10.21275/SR23517102249).
- Kumar, D., Saxena, N., Srivastava, S., & Haranahally Vasanthachar, M. (2024). Nutrition status and associated factors among tribal preschool children of 2-5 years in five districts: a cross-sectional study from three states of India. *International Journal Of Community Medicine And Public Health*, 11(5), 1973–1982. <https://doi.org/10.18203/2394-6040.ijcmph20241196>
- Rekha, S.P. Shirisha, V.R. Muraleedharan, Girija Vaidyanathan, Umakant Dash, Wealth inequalities in nutritional status among the tribal under-5 children in India: A temporal trend analysis using NFHS data of Jharkhand and Odisha states - 2006-21, *Dialogues in Health*, Volume 2, 2023, 100135, <https://doi.org/10.1016/j.dialog.2023.100135>.
- Sanchana PS, Bonny,BP, (2020); Household Dietary Pattern of Attappady Tribes of Kerala; *Indian Journal of Pure and Applied Biosciences*; Vol 8(6), Pp 565-570; <http://dx.doi.org/10.18782/2582-2845.8330>.
- Sujathan, P. K., & M.G, P. (2023). Multiseed Farming Technique: A Panacea for Food Insecurity Among Tribes in Kerala. *Journal of Rural Development*, 41(3), 340–356. <https://doi.org/10.25175/jrd/2022/v41/i3/154848>
- Thomas, A. S., & Sridevi, G. (2023). Prevalence and Determinants Of Nutritional Status Among Preschoolers in a Rural Area Of Thiruvananthapuram District, Kerala. *Journal of Rural Development*, 41(3), 296–307. <https://doi.org/10.25175/jrd/2022/v41/i3/167182>

USE OF PUNARNAVA ROOT POWDER IN TRADITIONAL INDIAN RECIPES: FEASIBILITY, ACCEPTABILITY AND SENSORY EVALUATION FOR HEALTH

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ABSTRACT

Plants are utilized to manage a wide range of illnesses in the Indian traditional medicinal system. Numerous bioactive chemicals produced from plants have a lot of potential for use in the management of diabetes, liver and kidney problems. Besides, they also help to reduce the harmful effects of the comorbidities that accompany these conditions. Punarnava has a plethora of bioactive compounds which possesses anti-inflammatory, diuretic, antidiabetic, antioxidant, antistress, antimicrobial, antifibrinolytic, anticonvulsant, antihepatotoxic, hepatoprotective, immunomodulatory, renoprotective, laxative and antimetastatic properties. The main objective of the study was to conduct sensory evaluation and to understand the acceptability of 10 Punarnava root powder incorporated regional recipes at different levels of incorporation (1g, 2g and 3g per serving). Recipes that were standardized included upma, besan cheela, vegetable cutlet, methi thepla, handva, rava idli, thalipeeth, muthiya, dhokla and missi roti. The sensory evaluation was conducted by a semi trained panel comprising of 32 panelists from the department of Foods and Nutrition, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India. The results from sensory evaluation revealed that, of the three variations with 1g, 2g and 3g of Punarnava root powder incorporation, sample B with 1g (lowest level) received the highest scores with respect to all the attributes like colour and appearance, taste, after taste, texture, mouthfeel, aroma, overall acceptability and the total scores. Besides this, the samples with 1g and 2g Punarnava root powder incorporation also received favourable scores on the hedonic as well as composite rating scales. Thus, there is a lot of scope for further research on the impact of supplementation of Punarnava root powder and to scale up various commonly consumed regional recipes using the same.

Keywords: *Boerhavia diffusa*, Punarnava root powder, regional recipes, Sensory evaluation, Medicinal plants, Ayurveda, Nutrition and Health

INTRODUCTION

Medicinal plants have been utilized in different forms for the management of multiple conditions. They are considered to be lifesaving drugs since ancient times and have been tried and tested by the tribal communities (Yadav et al., 1989). A wide variety of biologically active compounds derived from plants have established their role for possible use in the treatment and management of diabetes, cardiovascular disorders, hepatic disorders and renal disorders (Patil et al., 2011). There is a lot of scope in the traditional medicinal plant Punarnava (*Boerhavia diffusa*).

According to traditional Ayurvedic literature, Punarnava has been considered to be one of the most vital medicinal herbs. The literal meaning of the herb is the one that rejuvenates the body or brings back to life or which becomes new again. It is considered to be a *Rasayana* which renews the remnant cells and rejuvenates the body (Kumar et al., 2018). It possesses anti-inflammatory, diuretic, antidiabetic, antioxidant, antistress, antimicrobial, antifibrinolytic, anticonvulsant, antihepatotoxic, hepatoprotective, immunomodulatory, renoprotective, laxative and antimetastatic properties (Kumar et al., 2018). According to Ujowundu et al., 2008, the roots are a major source of a variety of bioactive compounds.

Various herbal formulations made from Punarnava in the form of capsules/tablets, powder, decoctions and syrups and have been marketed by various pharmaceutical companies which also proves that it is safe for human consumption. Punarnava can be utilized by the community for the control and management of various disorders like diabetes, renal disorders, liver disorders their associated complications. Edible parts of Punarnava are leaves, seeds and roots and its different parts are cooked but sometimes they can be used in powder form and added to cereal flours when making bread, cakes etc (Chaudhary et al., 2011).

Punarnava (*Boerhavia diffusa*) is readily accessible and seasonally available. Due to its mild flavour profile, it can easily be incorporated in the commonly consumed recipes without altering their original taste. The easy availability and low cost of the fresh and dried form of Punarnava makes it more feasible for regular usage and can be made widely acceptable across different age groups and cultures.

OBJECTIVE OF THE STUDY

The objective of the current study was to develop commonly consumed, regional food products by using Punarnava (*Boerhavia diffusa*) root powder (PRP) at 3 different levels (1g, 2g and 3g).

HYPOTHESIS

Alternate Hypothesis: Punarnava root powder (PRP) incorporation at different levels (1g, 2g and 3g) will bring about a significant difference in the various attributes of the composite rating scale.

METHODOLOGY

Punarnava (*Boerhavia diffusa*) root powder was outsourced from a local trader from Navsari, Gujarat, India and specimen was identified and authenticated at the department of Botany, Navsari Agriculture University. The study has been approved by the Institutional Ethics Committee for Human Research (No.: IECHR/FCSc/PhD/2021/123).

Thirteen commonly consumed regional recipes were standardized, keeping in mind the availability of ingredients, ease of preparation, cooking time, serving size and the use of conventional household cooking methods. Of those, 10 PRP incorporated recipes namely, upma, besan cheela, vegetable cutlet, methi thepla, handva, rava idli, thalipeeth, muthiya, dhokla and missi roti were finalized. For understanding its acceptability at different levels, sensory evaluation was conducted using the Composite rating scale and Hedonic rating scale. Four variations were made for each recipe. Sample A was the control sample i.e. without PRP incorporation. Samples B, C, and D

contained 1g, 2g and 3g PRP respectively. Standardized recipes and procedures were adopted for the preparation of the recipes. Thirty-two semi-trained panelists, who gave their consent for the study were asked to rate the various attributes of each recipe using the nine-point hedonic rating scale and composite rating scale.

Statistical Analysis

The data obtained was entered in Microsoft excel spread sheets, verified and was subjected to statistical analysis for the calculations of mean, standard deviation and percentages. F test and students ‘t’ tests were used to find out statistical significance between or within groups. A result was considered significant only if p-value of any analysis was found to be less than 0.05.

FINDINGS AND DISCUSSION

The PRP incorporated recipes were comparable to the control sample in all the attributes. A significant difference was seen in all the variations of all the 10 recipes in almost all the attributes of the composite rating scale. Although the control sample A (without PRP) received the highest scores (58 out of 70) the sample B with 1g of PRP received higher scores in every attribute in the 3 variations of all the 10 recipes (55 out of 70) followed by the sample C (2g) and Sample D (3g) which received the lowest scores i.e., 52 and 48 out of a total possible score of 70. A decreasing trend was observed in the overall score with increasing levels of PRP (Table 1 and 2). Further tests showed that, between the different samples (6 combinations), a significant difference was found between sample A (Control) and sample D (3g) and sample B (1g) and sample D (3g) in all the attributes. In certain recipes like methi thepla and vegetable cutlet, significant differences were observed between sample C (2g) and D (3g) for attributes like taste and overall acceptability. The inclusion of PRP did not bring significant variations in most of the attributes in case of Thalipeeth.

Review of literature suggests that the plant is also cultivated to some extent in West Bengal where the tribes eat this plant as a vegetable and in Assam, Punarnava leaves are cooked and eaten (Rajpoot et al., 2011). Information from a folklore survey conducted in the coastal region of Karnataka showed that the people have been using Punarnava as food in their daily life in the form of Tambali (medium consistency and not as dry as chutneys) or Chutneys routinely (Desai et al., 2008). Rosy et al., (2016) developed two different recipes “Fruit custard and Lassi” by incorporating PRP at 5%, 10% and 15% levels and it was observed that both the samples with 5% level of incorporation of PRP received higher scores which decreased with a rise in the levels of incorporation of PRP and lassi was preferred more than the fruit custard.

Table 1: Composite Rating Scores for Punarnava Root Powder Incorporated Recipes (Mean ± SD)

Attributes	Color & Appearance	Aroma	Texture	After taste	Taste	Mouth feel	Overall Acceptability	Total
Variations								
UPMA								
Sample A (C)	8.7 ± 1	8.4 ± 1.2	8.7 ± 0.9	8.3 ± 1.3	8.8 ± 0.9	8.7 ± 0.9	8.8 ± 0.9	60.3 ± 6.1
Sample B (1g)	8.2 ± 0.9	8.19 ± 1	8.4 ± 0.9	7.8 ± 1.7	8.4 ± 1.1	8.4 ± 1	8.5 ± 0.9	57.9 ± 6
Sample C (2g)	7.6 ± 0.9	7.9 ± 1.2	8 ± 1.1	7.2 ± 1.8	7.7 ± 1.4	7.9 ± 1.2	8 ± 1	54.3 ± 7.1

Attributes	Color & Appearance	Aroma	Texture	After taste	Taste	Mouth feel	Overall Acceptability	Total
Variations								
Sample D (3g)	6.9 ± 1.1	7.5 ± 1.3	7.25 ± 1.3	6.2 ± 2	7.1 ± 1.5	7.0 ± 1.5	7 ± 1.2	49 ± 8.4
F value	18.4***	4.04**	10.79***	8.55***	12.42***	12.09***	17.85***	16.06***
BESAN CHEELA								
Sample A (C)	8.7 ± 1.3	8.4 ± 1.2	8.3 ± 1.3	8.4 ± 1.3	8.3 ± 1.2	8.2 ± 1.2	8.3 ± 1.2	58.5 ± 6.8
Sample B (1g)	8.4 ± 0.9	8.2 ± 1.3	8.1 ± 1.1	7.3 ± 1.6	8 ± 1.1	8 ± 1.1	8.1 ± 0.9	56 ± 5.9
Sample C (2g)	7.9 ± 1	7.9 ± 1.3	7.8 ± 1.1	6.6 ± 1.8	7.5 ± 1.2	7.4 ± 1.1	7.6 ± 1.3	52.8 ± 6.7
Sample D (3g)	7.1 ± 1.4	7.5 ± 1.2	7.4 ± 1	5.9 ± 2	6.9 ± 1.2	6.9 ± 1	7 ± 1.2	48.9 ± 6.3
F value	10.51***	2.76*	3.35*	12.69***	8.61***	8.47***	8.18***	13.27***
VEGETABLE CUTLET								
Sample A (C)	8.3 ± 0.9	7.9 ± 1.3	7.89 ± 1.2	8 ± 1.5	8 ± 1.2	8.1 ± 1.2	8 ± 1.1	56.2 ± 7.1
Sample B (1g)	8.3 ± 1	7.9 ± 1.2	7.9 ± 1.1	7.9 ± 1.6	8.1 ± 1.3	7.9 ± 1.2	8 ± 1.1	55.9 ± 7.2
Sample C (2g)	7.8 ± 1.1	7.9 ± 1.1	7.7 ± 1.2	7.3 ± 1.9	7.9 ± 1.4	7.5 ± 1.5	7.7 ± 1.4	53.7 ± 8
Sample D (3g)	6.8 ± 1.1	7.3 ± 1.3	7.1 ± 1.1	6.2 ± 1.9	6.8 ± 1.4	6.7 ± 1.4	6.7 ± 1.2	47.5 ± 7.9
F value	13.9***	1.95	3.56*	7.13***	6.10***	7.12***	9.83***	9.01***
METHI THEPLA								
Sample A (C)	8.5 ± 1.1	8.2 ± 1.4	8.4 ± 1.1	8.3 ± 1.4	8.4 ± 0.9	8.5 ± 0.9	8.6 ± 1	58.9 ± 6.6
Sample B (1g)	8.1 ± 1.2	8 ± 1.2	7.6 ± 1.6	7.4 ± 1.8	7.8 ± 1.2	7.6 ± 1.4	7.8 ± 1.2	54.2 ± 7.9
Sample C (2g)	8.2 ± 1.1	8.3 ± 1	7.9 ± 1.1	7.4 ± 1.8	8.1 ± 1.2	7.8 ± 1	8.1 ± 0.9	55.8 ± 6.6
Sample D (3g)	7.4 ± 1.2	7.7 ± 1.3	7.1 ± 1.2	6.6 ± 1.9	6.9 ± 1.2	6.9 ± 1.3	6.9 ± 1.2	49.5 ± 7.8
F value	5.14**	1.79	5.97***	5.64**	8.30***	9.09***	12.94***	9.33***
HANDVA								
Sample A (C)	8.1 ± 1.1	8.1 ± 1.3	8.1 ± 1.2	7.9 ± 2.1	8.2 ± 1.3	8.1 ± 1.3	8.3 ± 1.2	56.7 ± 8.1
Sample B (1g)	8.3 ± 1.2	7.8 ± 1.3	7.9 ± 1.2	7.8 ± 1.6	7.9 ± 1.2	7.8 ± 1.3	8.1 ± 1.2	55.6 ± 7.7
Sample C (2g)	7 ± 1.6	7.3 ± 1.6	7.2 ± 1.1	6.3 ± 1.9	6.8 ± 1.6	6.9 ± 1.5	6.9 ± 1.4	48.5 ± 9.1
Sample D (3g)	7.1 ± 1.4	7.2 ± 1.3	7.1 ± 1	6.2 ± 1.8	6.9 ± 1.1	6.5 ± 1.5	6.7 ± 1.4	47.7 ± 7.9
F value	8.47***	3.05*	6.05***	8.05***	9.23***	8.51***	11.09***	10.38***

*Significantly different at $p < 0.05$

** significantly different at $p < 0.01$

*** significantly different $p < 0.001$

Table 2: Composite Rating Scores for Punarnava Root Powder Incorporated Recipes (Mean \pm SD)

Attributes	Color & Appearance	Aroma	Texture	After taste	Taste	Mouth feel	Overall Acceptability	Total
Variations								
RAVA IDLI								
Sample A (C)	8.5 \pm 0.9	7.7 \pm 1.3	7.5 \pm 1.4	7.4 \pm 2.6	7.7 \pm 1.2	7.6 \pm 1.3	7.8 \pm 1.1	54.2 \pm 7.4
Sample B (1g)	6.9 \pm 1.3	7.1 \pm 1.2	6.8 \pm 1.4	6.9 \pm 1.6	7 \pm 1.2	6.7 \pm 1.4	7 \pm 1.16	48.6 \pm 6.9
Sample C (2g)	6.2 \pm 1.6	6.6 \pm 1.6	6.6 \pm 1.2	6 \pm 1.9	6.4 \pm 1.4	6.1 \pm 1.5	6.4 \pm 1.4	44.2 \pm 8.6
Sample D (3g)	5.8 \pm 1.8	6.5 \pm 1.4	6.2 \pm 1.4	5.9 \pm 1.7	6.1 \pm 1.6	5.7 \pm 1.7	5.8 \pm 1.4	41.9 \pm 8.2
F value	20.69***	4.94**	4.89**	4.37**	8.82***	10.72***	14.83***	15.29***
THALIPEETH								
Sample A (C)	8.3 \pm 0.9	7.5 \pm 1.5	7.6 \pm 1.5	7.8 \pm 1.8	7.7 \pm 1.4	7.5 \pm 1.5	7.8 \pm 1.3	56.7 \pm 8.1
Sample B (1g)	8.2 \pm 1	7.5 \pm 1.3	7.3 \pm 1.6	8 \pm 1.3	7.4 \pm 1.5	7.2 \pm 1.6	7.6 \pm 1.2	55.6 \pm 7.7
Sample C (2g)	7.9 \pm 1.1	7.9 \pm 1.2	7.8 \pm 0.9	7.6 \pm 1.5	7.4 \pm 1.4	7.6 \pm 1.2	7.6 \pm 1.3	48.5 \pm 9.1
Sample D (3g)	7.3 \pm 1.3	7.3 \pm 1.4	7.5 \pm 1.2	6.8 \pm 1.7	6.9 \pm 1.5	6.9 \pm 1.4	7 \pm 1.4	47.7 \pm 7.9
F value	6.30***	1.09	0.62	3.73*	1.64	1.51	1.89	2.19
MUTHIYA								
Sample A (C)	8.6 \pm 0.9	8.2 \pm 1.5	8.5 \pm 1.1	8.4 \pm 1.5	8.6 \pm 1.1	8.3 \pm 1.1	8.6 \pm 1	59.2 \pm 6.7
Sample B (1g)	8.2 \pm 1	7.9 \pm 1.5	8.2 \pm 1.2	7.9 \pm 1.4	8 \pm 1.2	8 \pm 1.1	8.2 \pm 1.1	56.4 \pm 6.9
Sample C (2g)	7.8 \pm 1.3	7.7 \pm 1.5	7.6 \pm 1.2	6.9 \pm 1.7	7.3 \pm 1.6	7.3 \pm 1.5	7.4 \pm 1.3	52 \pm 8.1
Sample D (3g)	7.2 \pm 1.5	7.4 \pm 1.6	7.5 \pm 1.2	6.7 \pm 1.8	6.9 \pm 1.5	7.1 \pm 1.4	7.2 \pm 1.4	50 \pm 8.6
F value	9.11***	1.67	5.40**	8.20***	9.49***	6.15***	9.11***	9.45***
DHOKLA								
Sample A (C)	8.6 \pm 1.2	8 \pm 1.3	8.3 \pm 1.3	7.9 \pm 2.2	8.4 \pm 1.2	8.3 \pm 1.3	8.41 \pm 1.3	57.9 \pm 7.9
Sample B (1g)	7.9 \pm 1.1	7.7 \pm 1.4	7.9 \pm 1.1	7.4 \pm 1.9	7.8 \pm 1.2	7.7 \pm 1.3	7.88 \pm 1.2	54.4 \pm 7.4

Attributes	Color & Appearance	Aroma	Texture	After taste	Taste	Mouth feel	Overall Acceptability	Total
Sample C (2g)	7.6 ± 1.3	7.7 ± 1.4	7.7 ± 1.3	6.8 ± 1.9	7.5 ± 1.2	7.5 ± 1.4	7.47 ± 1.3	52.3 ± 7.8
Sample D (3g)	6.5 ± 1.4	7 ± 1.5	7.3 ± 1.1	6.1 ± 2.1	7 ± 1.34	6.9 ± 1.6	6.84 ± 1.3	47.6 ± 7.8
F value	14.58***	2.86*	4.54**	5.07**	7.14***	5.31**	8.83***	9.90***
MISSI ROTI								
Sample A (C)	8.6 ± 1.2	8.3 ± 1.2	7.4 ± 1.2	8.4 ± 1.7	8.1 ± 1.2	7.50 ± 1.5	8 ± 1.3	56.3 ± 7.6
Sample B (1g)	8 ± 1.2	7.9 ± 1.1	7.5 ± 1.4	8.1 ± 1.6	8 ± 1.1	7.8 ± 1.3	8.1 ± 1.2	55.5 ± 6.9
Sample C (2g)	7.9 ± 1	7.97 ± 1.2	7.4 ± 1.3	7.7 ± 1.6	7.9 ± 1.1	7.5 ± 1.4	7.9 ± 1.1	54.3 ± 7
Sample D (3g)	7.2 ± 1.3	7.5 ± 1.1	7.1 ± 1	6.7 ± 1.6	7.1 ± 1.2	7 ± 1.1	7 ± 1.2	49.5 ± 6.5
F value	8.28***	3.06*	0.64	6.97***	4.89**	2.15	5.57**	6.26***

*Significantly different at p<0.05

** significantly different at p<0.01

*** significantly different p<0.001

PRP was found to be acceptable at 1g and 2g levels of incorporation. As the level of incorporation increased up to 3g, the acceptability of the recipes decreased significantly with respect to all the attributes. At each level of PRP incorporation, the most acceptable recipes were ranked and shown in figure 1. Rava idli was the least acceptable among all the 4 samples at all the levels of incorporation of PRP. As the level of PRP increased, the texture, mouthfeel of the samples felt more sandy, gritty and had a slightly unpleasant after taste.

Sample A

At No PRP incorporation, the ranking of the recipes:

- **Upma > Muthiya = Methi thepla = Besan cheela > Dhokla > Thalipeeth = Handva > Missi roti = Vegetable cutlet > Rava idli**

Sample B

At 1g PRP incorporation, the ranking of the recipes:

- **Upma > Muthiya = Besan cheela = Vegetable cutlet = Thalipeeth = Handva = Missi roti > Dhokla = Methi thepla > Rava idli**

Sample C

At 2g PRP incorporation, the ranking of the recipes:

- **Methi thepla > Upma = Missi roti = Vegetable cutlet > Besan cheela > Dhokla = Muthiya > Thalipeeth = Handva > Rava idli**

Sample D

At 3g PRP incorporation, the ranking of the recipes:

- **Muthiya = Methi thepla = Missi roti > Upma = Besan cheela > Thalipeeth = Handva = Dhokla = Vegetable cutlet > Rava idli**

Figure 1: Ranking of the Recipes Based on Scores Obtained on the Composite Rating Scale

According to the scores obtained on the hedonic rating scale, a similar pattern was observed in the preference for the different samples with the 3 levels of incorporation of PRP. Across all the recipes, on a scale of 1 to 9, the sample A (Control) received the highest scores ranging from 7-8 (like moderately to like very much) which was followed by the sample B (1g) getting scores ranging from 6 - 8 (like slightly to like very much). Sample C (2g) received scores from 5 - 7 (neither like nor dislike to like moderately) whereas scores for sample D (3g) ranged from 5 – 6 (neither like nor dislike to like slightly). Hence as per the scores, 1g PRP incorporation was the most preferred over the other 2 variations (Table 3). Kabilan and colleagues (2019) made attempts to develop herbal tea with PRP and *Wedelia chinensis* leaves. Results revealed that the panelists found the herbal tea highly acceptable (overall acceptability scores of the herbal tea was 8 which meant that it was ‘liked very much’ according to the 9-point hedonic scale) and the higher scores for the sensory attributes like colour and aroma made it eligible for its use commercial consumable.

Table 3: Total Hedonic Rating Scores (Out of 10)

Sr. No.	Recipe Name	Level of Incorporation of Punarnava Root Powder			
		Sample A (Control)	Sample B (1g)	Sample C (2g)	Sample D (3g)
1.	Upma	8.13 ± 1.10 (Like very much)	7.72 ± 0.81 (Like very much)	7.03 ± 1.23 (Like moderately)	6.22 ± 1.39 (Like slightly)
2.	Besan Cheela	7.69 ± 1.38 (Like very much)	7.34 ± 1.18 (Like moderately)	6.88 ± 1.48 (Like moderately)	5.97 ± 1.40 (Like slightly)
3.	Veg. Cutlet	7.47 ± 0.95 (Like moderately)	7.22 ± 1.18 (Like moderately)	7 ± 1.74 (Like moderately)	6.13 ± 1.41 (Like slightly)
4.	Methi Thepla	7.66 ± 1.08 (Like very much)	7.06 ± 1.39 (Like moderately)	7.25 ± 1 (Like moderately)	6.13 ± 1.43 (Like slightly)
5.	Handva	7.53 ± 1.59 (Like very much)	7.44 ± 1.19 (Like moderately)	6.16 ± 1.63 (Like slightly)	6.03 ± 1.56 (Like slightly)
6.	Rava Idli	7.38 ± 1.31 (Like moderately)	6.34 ± 1.54 (Like slightly)	5.41 ± 1.50 (Neither like nor dislike)	5.28 ± 1.76 (Neither like nor dislike)
7.	Thalipeeth	6.97 ± 1.64 (Like moderately)	6.78 ± 1.66 (Like moderately)	6.78 ± 1.31 (Like moderately)	6.16 ± 1.30 (Like slightly)

Sr. No.	Recipe Name	Level of Incorporation of Punarnava Root Powder			
		Sample A (Control)	Sample B (1g)	Sample C (2g)	Sample D (3g)
8.	Muthiya	7.91 ± 1.23 (Like very much)	7.34 ± 1.04 (Like moderately)	6.44 ± 1.63 (Like slightly)	6.28 ± 1.51 (Like slightly)
9.	Dhokla	7.53 ± 1.19 (Like very much)	7.03 ± 1.18 (Like moderately)	6.75 ± 1.22 (Like moderately)	5.94 ± 1.56 (Like slightly)
10.	Missi Roti	7.38 ± 1.41 (Like moderately)	7.28 ± 1.08 (Like moderately)	7.28 ± 0.92 (Like moderately)	6.22 ± 1.16 (Like slightly)

Our study conducted on the same variety of PRP indicates that small quantities of bioactive compounds like glycosides, alkaloids, proteins, tannins, saponins, flavonoids and terpenoids are present and it also has a rich micronutrient, mineral and antioxidant profile. The quantitative analysis of PRP revealed that the protein, carbohydrate, crude fiber, energy and vitamin C content of the root powder (g/100g) was 11, 73, 8, 337 kcal and 34.75 mg respectively. Whereas the calcium, sodium, potassium, phosphorous and magnesium (mg/100g) were found to be 1504, 58.86, 1275, 2000 and 360 respectively. It points to the fact that PRP has a greater amount of crude fiber, carbohydrates and has an appreciable amount of vitamin C along with other minerals.

The content of heavy metal was found to be less than 0.1 mg/kg. The low concentrations of such heavy metals suggest its utility in consumption (Gandhi et al., 2024). The FSSAI Nutraceuticals Regulations have suggested that the permitted range for usage of different parts of Punarnava root which are safe for consumption by adults is 10-15 g in the form of decoction and 1-3 g in powder form.

Owing to its documented health benefits, easy availability, ability to blend in all the recipes without significant alteration of the flavour profile and low cost, it can be considered suitable for routine consumption at moderate levels. It was easily available in local stores and was found to be cost effective. Moreover, all the recipes were prepared using locally available ingredients with simple cooking methods and no need for any specialized equipment with less preparation time (mean preparation time ranged between 10-20 minutes). The use of its dried form ensured its year-round feasibility and acceptability.

Besides this, a clinical trial to study the impact of supplementation of PRP (1g) on Type 2 Diabetic subjects is underway and we are waiting for the results.

CONCLUSION

- Plants have always been a source of drugs for humans since the beginning of time. The above study was designed with the main objective to conduct sensory evaluation and to understand the acceptability of PRP at 3 different levels (1g, 2g and 3g).
- With the presence of potential modulators like glycosides, alkaloids, proteins, tannins, saponins, flavonoids and terpenoids, an improvement in the metabolic profile of patients having diabetes, liver or kidney disorders or their associated complications can be expected.
- Results from sensory evaluation revealed that as the level of PRP incorporation increased, the overall acceptability of the all samples decreased. A significant difference observed in terms of colour and appearance, texture, after taste, mouthfeel and overall acceptability.
- PRP was found to be acceptable at 1g and 2g levels of incorporation and it can be used effectively by incorporating it into the recipes at household level.
- Therefore, the results of the present study clearly prove that there is a great scope of developing various value-added recipes with PRP and based on our study observations, we feel that PRP can be used at 1g level in various traditional recipes to optimize the health of the individuals.
- Besides owing to its safety and easy availability, clinical trials can be conducted to understand the efficacy of Punarnava in particular conditions like diabetes, liver and kidney disorders and their associated complications.
- As Punarnava root powder is used for curbing anti-inflammatory conditions in Ayurveda, utilization of such herbs in routine diet may help to reduce inflammation and help to improve the health of the population.

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REFERENCES

- Chaudhary, G., & Dantu, P. K. (2011). Morphological, phytochemical and pharmacological, studies on *Boerhaavia diffusa* L. *J Med Plants Res*, 5(11), 2125-2130. Available from: <https://academicjournals.org/journal/JMPR/article-abstract/7D47D661459>.
- Gandhi D, Iyer U. Nutrient composition of *Boerhavia diffusa* (Punarnava) root. (2024). In: Sheth M, Dhruv S, Chauhan K, eds. *Embracing the Magic of Millets: Towards a Sustainable Future, 21st December 2023: Proceedings of the International Conference on Millets, The M.S. University of Baroda*. Baroda, India: The M.S. University of Baroda:101-110. ISBN: 978-93-6128-037-5.
- Kabilan, S. J., Baskar, R., & Poorani, G. (2019). Herbal Tea Formulation for Health Rejuvenation: Nutritional, Physicochemical and Sensory Analysis. *International Journal of Engineering and Advanced Technology*, 9(1S4), 783-788. doi:10.35940/ijeat.A1202.1091S419.
- Kumar, R., Gautam, S., Singh, K. D., Kumar, P., Haque, N., Yadav, V., ... & Rishikant Kumar, S. B. (2018). Pharmacological properties of *Boerhavia diffusa*: A review. *International journal of chemical studies*, 6(4), 72-80. doi:10.22271/chemi.2018.v6.i4b.90.

- Patil, R., Patil, R., Ahirwar, B., & Ahirwar, D. (2011). Current status of Indian medicinal plants with antidiabetic potential: a review. *Asian Pacific Journal of Tropical Biomedicine*, 1(2), S291-S298. doi:10.1016/S2221-1691(11)60174-2.
- Rosy, K., & Alka, G. (2016). Preparation of Value Added Food Products from Dehydrated Underutilized Hogweed (*Boerhaavia Diffusa*) Root Powder. *International Journal of Health Sciences and Research*. doi:10.52403/ijhsr.20160333.
- Ujowundu, C. O., Igwe, C. U., Enemor, V. H. A., Nwaogu, L. A., & Okafor, O. E. (2008). Nutritive and anti-nutritive properties of *Boerhavia diffusa* and *Commelina nudiflora* leaves. *Pakistan Journal of Nutrition*, 7(1), 90-92. *Pak J Nutr.* 2008;7(1):90-92. doi:10.3923/pjn.2008.90.92.
- Yadav, S. S., & Bhamare, P. B. (1989). Ethnomedico-botanical studies of Dhule forests in Maharashtra state. *J Econ Taxon Bot*, 13(2), 455-460. doi:10.1080/00927678.1989.10669973.

THERAPEUTIC USE OF HERBS AND SPICES: KNOWLEDGE AND PRACTICE AMONG ADOLESCENT GIRLS

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ABSTRACT

Herbs and spices have been traditionally used for centuries to prevent, manage, or treat common ailments due to their natural therapeutic properties. A cross-sectional study was carried out to assess the current knowledge and practices of adolescent girls regarding the use of herbs and spices for treating common ailments. The study focused on girls aged 16–19 years, with participants selected from colleges in Chennai city and rural areas of Kancheepuram district. A stratified random sampling method was employed, grouping participants based on demographic factors such as geographic location and stream of education. A survey questionnaire was used to evaluate participants' knowledge of specific herbs and spices, their medicinal uses, and their practices in treating common ailments. Descriptive statistics were used to summarize knowledge and practice levels, while inferential statistics analyzed relationships between variables such as geographic location and stream of education. Results indicated a high level of knowledge about herbal remedies among participants, with no significant differences between urban and rural areas. Similarly, no significant differences in knowledge were found between students from the Arts and Science streams. However, a moderate level of practice was observed, with rural participants demonstrating a higher mean score. A significant correlation between knowledge and practice was found only among rural participants. The study emphasizes the need to consider cultural, geographical, and healthcare access factors in promoting safe and effective health practices.

Keywords: Adolescent girls, Arts stream, Herbs, Knowledge, Practice, Rural, Science stream. Spices, Therapeutic properties, Urban

INTRODUCTION

For centuries, herbs and spices have been valued for their natural therapeutic properties and have been widely used to treat various ailments. In recent years, there has been a resurgence of interest in these natural remedies within modern healthcare, particularly for their potential in boosting immunity, alleviating respiratory issues, calming the mind, aiding digestion, soothing skin problems, reducing inflammation, and even maintaining oral hygiene (Gasmi, et al., 2023). Among the demographic groups that may benefit from this knowledge, adolescent girls represent a unique population with specific health needs, including menstrual cramps, acne, and digestive concerns (Ekor, 2014).

As adolescence is a critical period of physical, emotional, and cognitive development, adolescent girls are more susceptible to common health challenges (Povey, et al., 2022). While conventional medicine offers solutions, many young women are turning to alternative remedies like herbs and spices due to their natural and holistic appeal (Backes & Bonnie, 2019). This trend has been further fueled by the COVID-19 pandemic, which heightened public interest in traditional medicine and natural treatments (Alotiby & Al-Harbi, 2021). A significant contribution is made by online communities in advocating the use of herbs and spices for health, making these remedies more accessible and appealing to adolescents (Ng, Verhoeff & Steen, 2023).

SIGNIFICANCE OF THE STUDY

With growing popularity comes the potential for misuse or misunderstanding of herbal treatments. Adolescents may adopt health practices based on peer influence, media trends, or cultural beliefs without fully understanding the safety or effectiveness of these remedies. This makes it crucial to assess their level of knowledge, and practices (KAP) related to the therapeutic use of herbs and spices.

Understanding these factors will not only highlight gaps in awareness but also help develop interventions that promote safe and informed use of natural remedies.

OBJECTIVES

To analyse the basic understanding and usage of herbs and spices by adolescent girls for treating common ailments, the study was focused on the following specific objectives:

1. To assess the knowledge level of adolescent girls about the therapeutic properties of herbs and spices in treating common ailments.
2. To evaluate the practical use of herbs and spices by adolescent girls, including the frequency, sources of information, and decision-making processes involved in using these remedies for health purposes.
3. To identify factors influencing knowledge, and practice, such as geographical location and stream of education, and how these factors affect the use of herbs and spices for therapeutic purposes.

METHODOLOGY

To investigate the knowledge and practice of adolescent girls regarding the therapeutic effects of herbs and spices in treating common ailments, a cross-sectional study design was employed. This approach is well-suited for assessing the current knowledge, and practices of adolescent girls in relation to the use of herbs and spices. The study focused on adolescent girls aged 16–19 years,

with participants selected from colleges of Chennai city and rural areas of Kancheepuram district. A stratified random sampling method was utilized, where participants were grouped based on relevant demographic factors such as geographic location and stream of education. Random sampling within these strata ensured that different subgroups of adolescent girls were well-represented in the study.

A survey questionnaire was designed to assess two key areas:

1. Knowledge of specific herbs and spices and their medicinal uses.
2. Practice of using herbs and spices to treat common ailments, including sources of information and decision-making processes.

A pilot study was carried out with a small sample from the target population to assess the validity and reliability of the questionnaire. Necessary adjustments were made prior to the main data collection. The final questionnaire was administered electronically. Descriptive statistics (mean, median, standard deviation) were used to summarize the knowledge and practice levels of the participants. Inferential statistics (t-tests and Pearson correlation test) were applied to analyze relationships between variables, such as geographic location, stream of education, and knowledge and practice levels.

RESULTS AND DISCUSSION

The findings of the present study are presented and discussed.

Knowledge on therapeutic use of herbs and spices among adolescent girls

The following tables represent the level of knowledge on therapeutic use of herbs and spices among adolescent girls. The results are discussed be

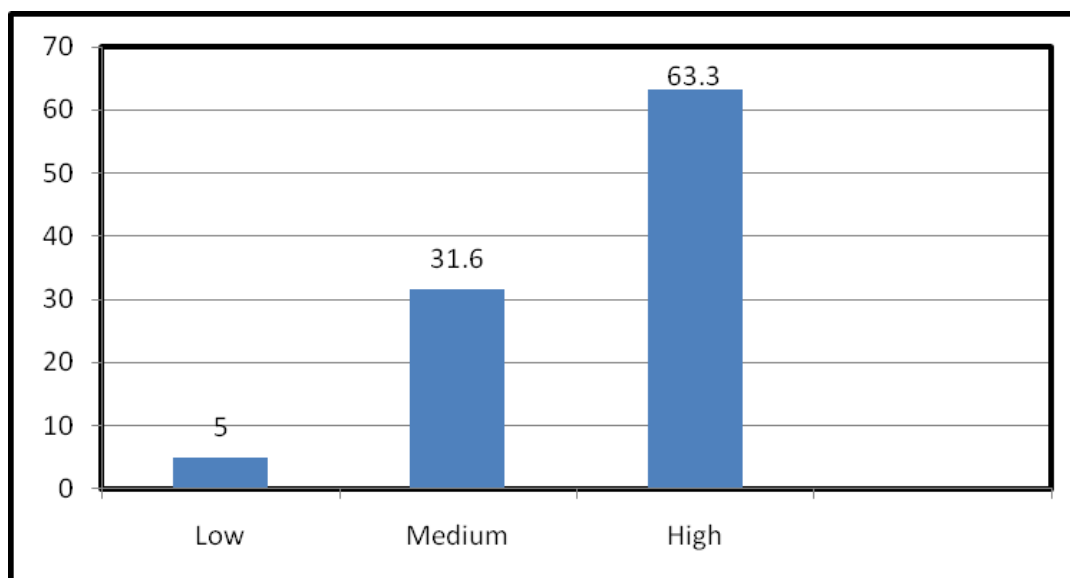


Figure - 1: Level of knowledge on therapeutic use of herbs and spices among college girls

The results of the study as demonstrated in the figure-1 shows varying levels of knowledge among adolescent girls regarding the therapeutic use of herbs and spices for treating common ailments. Of the 120 participants, only 5 per cent exhibited a low level of knowledge, indicating that very few adolescent girls possess insufficient understanding of the medicinal properties of herbs and spices. A considerable portion, 31.6 per cent, displayed a medium level of knowledge, suggesting that these girls have some foundational awareness but lack comprehensive knowledge of how herbs and spices can be used therapeutically.

Interestingly, the majority of participants, 63.3 per cent, were classified as having a high level of knowledge on the subject. This indicates that a substantial portion of the adolescent girls are well-informed about the medicinal uses of herbs and spices, reflecting either cultural familiarity, education, or access to reliable information through various sources such as family traditions, school curricula, or online platforms.

Table - 1: Comparison of knowledge on therapeutic use of herbs and spices between urban and rural adolescent girls

Variable	Geographic Location	N	Mean	Std. deviation	't' value	Level of significance
Knowledge on therapeutic use of herbs and spices	Urban	60	3.60	1.976	0.445	NS
	Rural	60	3.77	2.126		

Note: NS-Not Significant

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The above table 1 indicates the mean scores and “t” value of the knowledge on therapeutic use of herbs and spices among urban and rural adolescent girls.

The knowledge scores for urban and rural participants were similar, with urban participants averaging 3.60 (standard deviation=1.976) and rural participants averaging 3.77 (standard deviation=2.126), showing a marginal higher knowledge score among rural participants.

The resulting t-value of 0.445 suggests that the difference in knowledge levels is not statistically significant. This implies that geographic location (urban vs. rural) does not significantly influence the knowledge of adolescent girls regarding the use of herbs and spices.

These findings challenge common assumptions that rural populations might have greater knowledge of traditional or herbal remedies due to cultural practices, or that urban populations may have better access to modern health education and resources. The data suggests that both groups have relatively similar levels of knowledge, which could be attributed to the widespread availability of health information through digital platforms, media, and education, making traditional knowledge more accessible to both rural and urban populations.

This convergence could be due to the rising awareness of holistic health practices, especially following the COVID-19 pandemic, which increased interest in alternative treatments for boosting immunity and overall health.

Table - 2: Comparison of adolescent girl’s knowledge on therapeutic use of herbs and spices between arts and science stream of education

Variable	Stream of education	N	Mean	Std. deviation	‘t’ value	Level of significance
Knowledge on therapeutic use of herbs and spices	Arts	60	3.63	2.008	0.267	NS
	Science	60	3.73	2.098		

Note: NS-Not Significant

Table 2 indicates the mean scores and ‘t’ value of knowledge on therapeutic use of herbs and spices between arts and science stream of education.

The study revealed comparable levels of knowledge with respect to therapeutic uses of herbs and spices among Arts and Science students, with mean scores of 3.63 (standard deviation=2.008) and 3.73 (standard deviation=2.098), respectively. However, the difference was found to be statistically insignificant (t-value=0.267), indicating that the stream of education (Arts vs. Science) does not significantly impact knowledge levels on the therapeutic use of herbs and spices among adolescent girls.

The marginally higher mean score for science students may be expected, given that their curriculum is likely to include more exposure to scientific topics related to health, biology, and medicinal practices. However, the lack of a statistically significant difference between the two groups implies that Arts students are equally informed about the therapeutic uses of herbs and spices. This could be due to various factors, including the accessibility of information on natural remedies through non-academic sources such as social media, family traditions, and popular health trends.

These findings suggest that knowledge about herbs and spices is not confined to specific academic streams but is more likely influenced by external factors, such as cultural practices and the increased general interest in holistic and natural health treatments.

Practice of using herbs and spices to treat common ailments among adolescent girls

The following figure and tables represent the practice of using herbs and spices to treat common ailments among adolescent girls. The results are discussed below.

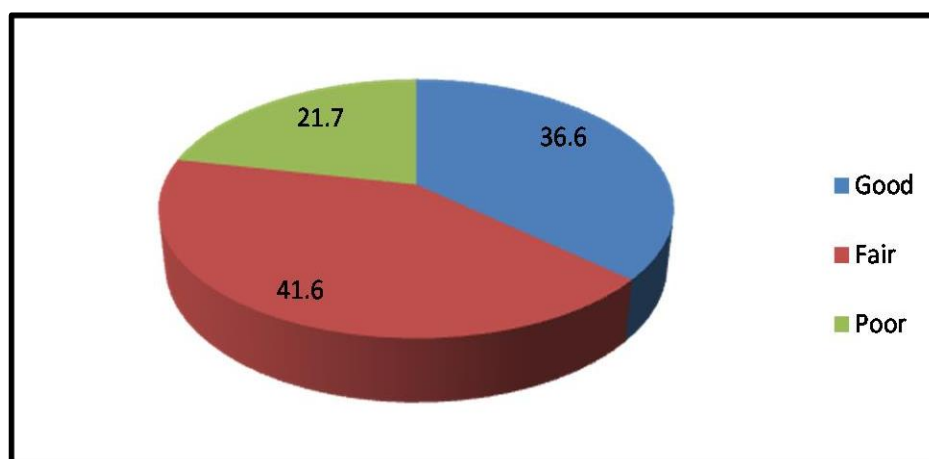


Figure -2: Practice of using herbs and spices to treat common ailments among adolescent girls

The practice of using herbs and spices to treat common ailments among adolescent girls was analyzed and the results are presented in the Figure-2. Of the 120 participants, 36.6 per cent demonstrated a good level of practice, meaning that more than one-third of the adolescent girls regularly and effectively incorporate herbs and spices into their healthcare routine.

The largest group, 41.6 per cent, exhibited a fair level of practice, indicating that they are somewhat familiar with using herbs and spices but may not do so consistently or with a full understanding of their therapeutic potential. These participants may rely on herbs and spices occasionally or as supplementary treatments but lack a more comprehensive or regular approach. Finally, 21.7 per cent of the participants demonstrated a poor level of practice, indicating minimal or no use of herbs and spices for health purposes. This group may not be familiar with the practical application of herbal remedies, or they may prefer conventional treatments over natural alternatives. The overall distribution of practices suggests that while a substantial number of

adolescent girls (36.6%) have integrated herbs and spices into their health routines, a larger portion remains in the fair or poor categories. This indicates a need for further education and encouragement to help adolescent girls understand how to safely and effectively use herbs and spices for managing common ailments.

Table – 3: Comparison of practice of using herbs and spices to treat common ailments between urban and rural adolescents

Variable	Geographical Location	N	Mean	Std. deviation	't' value	Level of significance
Practice of using herbs and spices to treat common ailments	Urban	60	27.97	4.979	2.992	0.01
	Rural	60	30.83	5.509		

Note: P<0.01-Significant at 1% level

Table 3 reveals a significant difference in the practice of using herbs and spices to treat common ailments between urban and rural adolescent girls. Rural adolescents demonstrated a higher mean practice score (30.83, SD=5.509) compared to their urban counterparts (27.97, SD=4.979). The statistically significant difference (t- value=2.992, p=0.01) indicates that rural girls are more likely to use herbs and spices for treating common ailments than urban girls.

Table – 4: Comparison of adolescent girl’s practice on therapeutic use of herbs and spices between arts and science stream of education

Variable	Stream of Education	N	Mean	Std. deviation	't' value	Level of significance
Practice on therapeutic use of herbs and spices	Arts	30	27.00	5.079	1.522	NS
	Science	30	28.93	4.756		

Note: NS-Not Significant

The data in table 4 compares the practice of adolescent girls regarding the therapeutic use of herbs and spices between those studying in the Arts and Science streams.

The mean scores indicate that, on average, girls in the Science stream scored higher (28.93) in

terms of their practice regarding the use of herbs and spices for therapeutic purposes compared to those in the Arts stream (27.00). However, the standard deviations are relatively close, indicating that the variation within both groups is comparable.

The 't' value of 1.522 suggests that there is some difference between the two groups in terms of their mean practices. However, this t-value is not large enough to reach statistical significance, so there is no strong evidence to conclude that the stream of education (Arts or Science) has a substantial impact on their practice regarding herbs and spices.

It is assumed that both Arts and Science students may have similar access to information of the therapeutic properties of herbs and spices. Factors like family background, cultural practices, or general health awareness may play a larger role than their educational stream.

Correlation between knowledge and practice of therapeutic use of herbs and spices among adolescent girls

The following tables represent the correlation between knowledge and practice of therapeutic use of herbs and spices among adolescent girls. The results are discussed below.

Table – 5: Correlation between knowledge and practice of therapeutic use of herbs and spices among adolescent girls

Variables	P value	Level of significance
knowledge and practice of therapeutic use of herbs and spices among urban adolescent girls	0.079	NS
knowledge and practice of therapeutic use of herbs and spices among rural adolescent girls	0.371	0.05
knowledge and practice of therapeutic use of herbs and spices among adolescent girls studying in Arts stream	0.082	NS
knowledge and practice of therapeutic use of herbs and spices among adolescent girls studying in science stream	0.210	NS

Note: N.S: Not Significant

Pearson correlation was used to determine whether there was a significant relationship between

knowledge and practice of therapeutic use of herbs and spices among urban and rural adolescent girls studying in Arts and Science stream.

The analysis revealed no significant correlation between knowledge and practice of using herbs and spices among urban adolescent girls (p-value=0.079, NS). This suggests that, among urban participants, there is no strong relationship between their level of knowledge and their practice of using herbs and spices for therapeutic purposes. While they may be knowledgeable about the benefits and uses of herbs, this knowledge does not necessarily translate into consistent practice, potentially due to access to modern healthcare options or lifestyle factors that limit the application of traditional remedies. In contrast, the correlation between knowledge and practice among rural adolescent girls yielded a p-value of 0.371, which is statistically significant at the 0.05 level. This indicates a positive and significant relationship between knowledge and practice in this group. For rural adolescents, greater knowledge of the therapeutic uses of herbs and spices is likely to lead to more frequent and effective use of these remedies. This could be attributed to the greater integration of herbal practices in rural communities, where knowledge is more directly applied due to cultural norms and possibly reduced access to conventional healthcare.

Among adolescent girls studying in the arts stream, the correlation between knowledge and practice showed a p-value of 0.082, which is not statistically significant (NS). Similar to the urban group, this suggests that knowledge of herbs and spices in the Arts stream does not strongly influence their practical use. This could be due to a lack of emphasis on scientific applications of natural remedies in their curriculum or other social and personal factors influencing their health behaviors. For adolescent girls in the Science stream, the correlation between knowledge and practice resulted in a p-value of 0.210, which is also not statistically significant (NS). Despite their exposure to scientific knowledge, which might include understanding the therapeutic properties of herbs, it seems that this knowledge does not significantly translate into practice. The relatively weak relationship between knowledge and practice in this group could be due to reliance on conventional medicine or skepticism about the effectiveness of natural remedies, even if they are aware of them.

SUMMARY AND CONCLUSION

The results of the study showed a high level of knowledge about herbal remedies among participants, with no significant differences between urban and rural areas. Similar levels of knowledge were observed between students from the Arts and Science streams and the stream of education does not significantly impact their awareness or understanding of these natural remedies. A moderate level of practice of using herbs and spices for common ailments was noted among rural participants. A significant correlation between knowledge and practice was found only among rural participants.

The study highlights the importance of considering cultural, geographical, and healthcare access factors in promoting safe and effective health practices. While knowledge of herbal remedies is widespread, practice varies, and interventions should focus on promoting practical application, especially in urban areas and

academic settings. Health education programs should emphasize safety, appropriate use, and integration with conventional medicine. By addressing these factors, we can promote better health

outcomes and informed usage of herbal remedies among adolescent girls.

REFERENCES

- Alotiby, A. A., & Al-Harbi, L. N. (2021). Prevalence of using herbs and natural products as a protective measure during the COVID-19 pandemic among the Saudi population: An online cross-sectional survey. *Saudi Pharmaceutical Journal*, 29(5),410-417. <https://doi.org/10.1016/j.jsps.2021.02.006>
- Backes, E. P., & Bonnie, R. J. (2019). *The promise of adolescence: Realizing opportunity for all youth*. National Academies Press. <https://doi.org/10.17226/25388>
- Ekor M. (2014). The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. *Frontiers in pharmacology*, 4, 177. <https://doi.org/10.3389/fphar.2013.00177>
- Gasmi, A., Shanaida, M., Oleshchuk, O., Semenova, Y., Mujawdiya, P. K., Ivankiv, Y., Pokryshko, O., Noor, S., Piscopo, S., Adamiv, S., & Bjorklund, G. (2023). Natural Ingredients to Improve Immunity. *Pharmaceuticals (Basel, Switzerland)*, 16(4), 528. <https://doi.org/10.3390/ph16040528>
- Ng, J. Y., Verhoeff, N., & Steen, J. (2023). What are the ways in which social media is used in the context of complementary and alternative medicine in the health and medical scholarly literature? A scoping review. *BMC Complementary Medicine and Therapies*, 23, 32. <https://doi.org/10.1186/s12906-023-03856-6>
- Povey, J., Plage, S., Huang, Y., Gramotnev, A., Cook, S., Austerberry, S., & Western, M. (2022). Adolescence a Period of Vulnerability and Risk for Adverse Outcomes across the Life Course: The Role of Parent Engagement in Learning. In: Baxter, J., Lam, J., Povey, J., Lee, R., Zubrick, S.R. (eds) *Family Dynamics over the Life Course*. Life Course Research and Social Policies, vol 15. Springer, Cham. https://doi.org/10.1007/978-3-031-12224-8_6

A STUDY ON THE ATTITUDES, KNOWLEDGE, AND EATING-PRACTICES TOWARDS MILLETS OF COLLEGE-GOING STUDENTS IN URBAN PATNA

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ABSTRACT

A major food crop grown worldwide; millet has a big economic impact on poorer nations. Millets are regarded as wholesome, low-energy foods that aid in preventing malnutrition. Foods containing millet are thought to include probiotics and prebiotics that may be beneficial to health. A research study was carried out among college-going adolescent to find out about their knowledge, attitudes, and feeding behavior toward millets. About 200 young adults between the ages of 18 and 29 who pursued their undergraduate and graduate degrees in various fields were the subjects of a mixed-methods approach to gather information. Information on their preferences and views on the objectives of Knowledge, Attitudes, and feeding Practices regarding millets were collected using the Google questionnaire through WhatsApp and Interview Schedule. According to the findings, about 70 percent of the participants were in 18–29 years of age, again about 80 percent of people had positive attitudes, toward eating millets, while 30 percent had low KAP levels.

Keyword: Attitude, eating practices, knowledge, millets, nutrition

INTRODUCTION

Amidst the diverse range of agricultural products, millets stand out as modest yet exceptional grains that have a strong cultural and historical foundation worldwide. Because of their remarkable nutritional value, durability, and flexibility, millets have supported communities across diverse environments, including the parched plains of Africa and the rich fields of Asia (Kaur et al., 2024).

People grow millets, which are grasses with tiny seeds, primarily for their grains. They belong to the Poaceae family. For thousands of years, people have cultivated them as staple foods in regions where traditional crops are difficult to grow (Tripathi & Vyas, 2023). The danger posed by climate change to traditional farming practices has brought millets back into the spotlight as essential crops for developing resilient food systems. The ability of millets to thrive in arid conditions with little water and nutrients is one of their distinguishing traits (Ndudzo et al., 2024). They are extremely valuable assets for farmers in semi-arid locations, where irregular rainfall patterns and soil degradation offer serious obstacles to food production. This is because of their resistance to drought and minimal input requirements (Begizew, 2021).

Farmers may lessen the effects of climatic variability and guarantee food security for their people by utilizing the adaptive qualities of millets. Beyond their benefits for agriculture, millets provide a wealth of nutritional advantages (Babele et al., 2022). They are rich in complex carbohydrates, dietary fiber, protein, vitamins, and minerals, making them a nutritious addition to the diet. For instance, pearl millet has a high concentration of iron and zinc, while finger millet is well recognized for having a very high calcium content (Devi et al., 2014). Particularly in places where access to a wide range of healthful meals is restricted, these nutrient-dense grains are crucial for reducing malnutrition and improving public health (Saxena et al., 2018).

Additionally, millets support the maintenance of agroecosystems and the preservation of biodiversity (Raj et al., 2024). Cultivating them increases crop diversification, lowers the chance of pest and disease outbreaks, and improves soil fertility by fixing nitrogen and building up organic matter. Farmers may build resilient agroecological landscapes that maintain biodiversity, slow down climate change, and sustainably provide for the nutritional demands of expanding people by producing millets alongside other crops (Pozza & Field, 2020).

Millets have been the subject of renewed interest in recent years from foodies, legislators, and consumers alike. Because of their gluten-free qualities and culinary adaptability, they have sparked a culinary renaissance among chefs worldwide. The globe uses millets in creative cuisines and recipes (Kheya et al., 2023). Initiatives to promote millet-based bread, pasta, and snack products have also surfaced in response to the needs of health-conscious customers looking for wholesome substitutes for traditional grains that are also sustainable (Kheya et al., 2023).

Millets provide a ray of optimism and resiliency as we negotiate the many problems of the twenty-first century, from food shortages and climate change to public health emergencies (Saxena et al., 2018). We can create more resilient, healthier societies for future generations, support biodiversity, and ensure sustainable food security by embracing these ancient grains and incorporating them into our diets and farming practices (Saxena et al., 2018). Millets are foundations of sustainability in the complex web of our food systems, feeding the body and the environment.

Some common types of millets include:

1. Pearl Millet (Bajra): Grown extensively throughout Africa and the Indian subcontinent, pearl millet is prized for its high nutritional content and resistance to drought. In many regions of Africa and India, it is a staple diet.
2. Finger Millet (Ragi): This millet is very well-liked in Africa and South India. It is a nutrient-dense addition to the diet, particularly for vegetarians and vegans, because it is high in calcium, iron, and dietary fiber.
3. Foxtail Millet: Often grown in China, India, and some regions of Southeast Asia, foxtail millet is high in dietary fiber and carbs. It is a component of many traditional cuisines, such as upma, dosa, and porridge.
4. Proso Millet: Often referred to as ordinary millet, Proso millet is cultivated throughout Asia, Europe, and North America. It is recognized for having a brief growing season and is utilized as food for both people and animals.
5. Little Millet: Grown throughout Asia and Africa, this millet is indigenous to India. It is used in many different recipes, such as porridge, snacks, and rice alternatives, and is a healthy source of protein, fiber, and minerals.

Due to its nutritional benefits, gluten-free status, and suitability for sustainable agriculture, millets are gaining popularity all over the world. They offer several health benefits, including improved digestion, weight management, and the management of some chronic conditions like diabetes and hypertension. The Health Benefits and Nutritional Value of Millets Many regions of the world have long relied on millet grains, sometimes referred to as ancient grains, as a main source of nutrition. They have a big nutritional impact and offer several health benefits:

- **Rich in Nutrients:** Millets are an excellent source of iron, calcium, magnesium, phosphorus, potassium, proteins, fiber, and carbs, as well as vitamins and minerals.
- **Gluten-Free:** Millets are naturally gluten-free, making them a fantastic choice for anyone with celiac disease or gluten intolerance.
- **Rich in Fibre:** Millets are a wonderful source of dietary fiber, which aids in digestion, prevents bloating, and promotes feelings of fullness—all of which help you control your weight. Those with diabetes or those attempting to manage their blood sugar levels can benefit from millets because they have a low glycemic index, which indicates that blood sugar levels are raised gradually.
- **Heart Health:** By lowering cholesterol levels, millets' high fiber content supports heart health. Furthermore, millet contains magnesium, which promotes heart health and lowers blood pressure.
- **Weight Management:** Millets are a fantastic choice for people trying to control their weight because they are high in fiber and relatively low in calories.
- **Rich in Antioxidants:** Millets include polyphenols and flavonoids, two forms of antioxidants that help combat oxidative stress and reduce the risk of chronic diseases, including cancer and heart disease.
- **Bone Health:** Millets are an excellent source of calcium and phosphorus, which are necessary for keeping bones healthy and preventing conditions like osteoporosis.
- **Digestive Health:** By avoiding constipation and fostering a balanced gut flora, millets' high fiber content supports digestive health.
- **Versatility:** Because millets may be produced into whole grains, flour, flakes, or even as a rice substitute, they are versatile and suitable for usage in a range of recipes, including porridges, bread, salads, and desserts.

All things considered, millets are a wholesome supplement to any diet and provide a host of health advantages. By including them in your meals, you can improve your general health and wellbeing. Given the aforementioned advantages of millets, Indians also consumed them and their derivatives. The nutritional benefits and facts of millets have been extensively studied, but less is known about people's knowledge, attitudes, and practices (KAP). Thus, examining the millet KAP in a few selected subjects was the aim of the current study.

OBJECTIVE OF THE STUDY

1. To know the knowledge, attitude and eating practices of students towards millets.
2. To assess the consumption pattern of millets of the college-going students.
3. To analyses the reasons behind usage of millets among adolescents.

METHODOLOGY

Selection of area and consumption pattern of millets

The study was conducted in urban Patna to understand the attitude, knowledge and eating practices of millets among college students. A simple random sampling method was used to select 200 respondents, with 50 students chosen from each college. Data were collected using a structured questionnaire, which was shared through Google Forms with undergraduate and postgraduate students. Participants were contacted through their respective colleges of Patna, namely College of Commerce, Arts & Science, A.N. College, Patna College, and B.N. College. They were approached through social media platforms, and personal networks. The purpose of the study was explained to the participants, and their consent was obtained before participation.

The order of significant factors impacting respondents' consumption of and purchases of millets from supermarkets is determined by the rank that the respondents awarded to the items. Garrett's ranking technique was utilized to determine the most important factor influencing the response. According to this approach, participants were asked to rank each element, and the results of this ranking were then translated into a score value using the formula below:

$$\text{Percent position} = 100 (R_{ij} - 0.5) / N_j$$

Where R_{ij} = Rank given for the i th variable by j th respondents

N_j = Number of variables ranked by j th respondents

Garrett's Table is used to translate the estimated % position into scores, which are then combined for each factor to determine the final score.

RESULT AND DISCUSSION

Descriptive statistics

Demographic information was gathered to determine the sample's distribution by gender and course of study. (n = 200)

Table 1: Distribution of respondents according to gender and course pursued

Particular	Under Graduate (n=100)		Post Graduate (n=100)	
	Frequency	Percent	Frequency	Percent
Male	60	60	65	65
Female	40	40	35	35
Total	100	100	100	100

Table no 1 shows that about 60 (60.0 percent) of under-graduation respondents and about 65 (65.0 percent) of post-graduation respondents were male. About 40 (40.0 percent) of the respondents in under graduation, and about 35 (35.0 percent) in Post- Graduation were female.

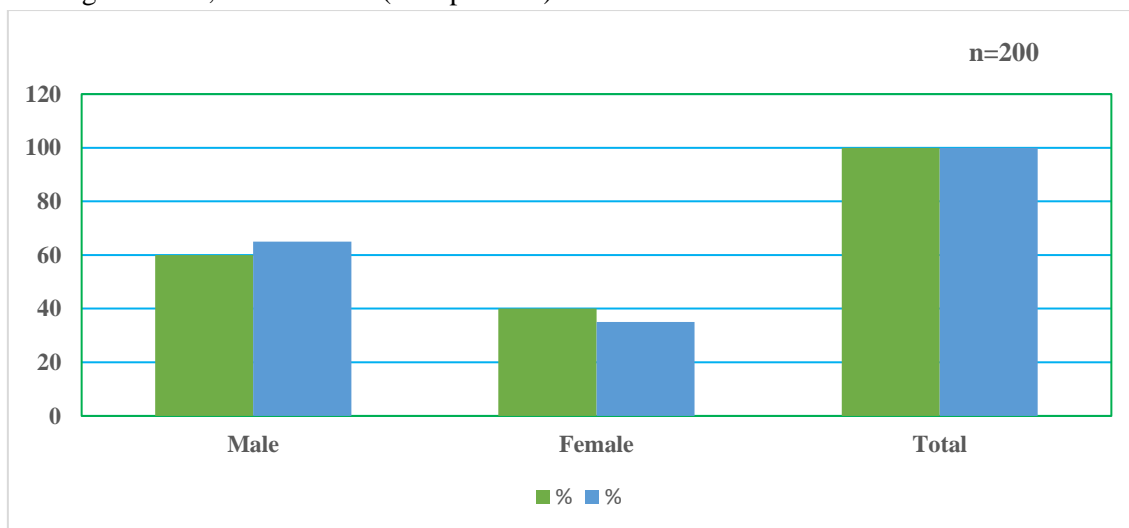


Figure 1: Distribution of respondents according to gender and course pursued

Adolescents' knowledge and awareness regarding nutritional benefits of millets

The purpose of the study was to evaluate the adolescents' knowledge, attitudes, and millet- eating practices. Information about knowledge towards millets is shown in Table 2.

Table 2: Distribution of respondents as per their knowledge and awareness regarding nutritional benefits of millets

Particulars	Answer choices n (200)			
	Yes		No	
	f	(%)	f	(%)
Have you heard of millets	175	87.5	25	12.5
Are you aware of the nutritional benefits of millets	150	75	50	25
Millets are good for health	160	80	40	20
Millets contain high fiber	125	62.5	75	37.5
Millets are rich source of zinc	110	55	90	45
Millets are rich source of magnesium	105	52.5	95	47.5
Millets have nutraceutical and antioxidant properties	115	57.5	85	42.5
Millets reduces the risk of colon and breast cancer	109	54.5	101	50.5
Millets contains highest nutrients	180	90	20	10
Millets are easily digestible food	170	85	30	15

Approximately 150 (75.0 percent) of the participants were well aware of the nutritional benefits of millets, and only 12.5 (25.0 percent) were unaware of this fact, according to the data collected for this study. This indicates that most participants had a clear understanding of the important role that millets play in our diet.

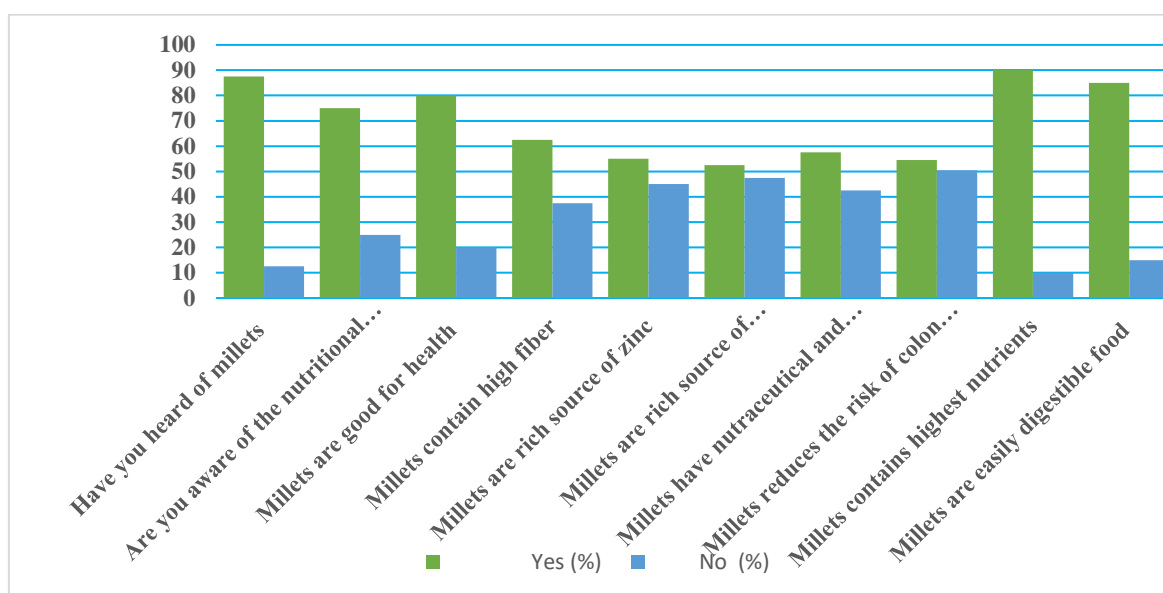


Figure 2: Distribution of respondents as per their knowledge and awareness regarding nutritional benefits of millets

Table 3: Distribution of the respondents based on their level of knowledge

Level of Knowledge (0-25)	Undergraduate (n=100)		Post graduate (n=100)	
	Male f (%)	Female f (%)	Male f (%)	Female f (%)
Low (5-10)	33(55.0)	18(45.0)	30(46.2)	20(57.2)
Medium (10-15)	10(16.6)	12(30.0)	15(23.1)	05(14.3)
Highest (15-25)	17(28.3)	10(25.0)	20(30.7)	10(28.5)
Total	60	40	65	35

Table no. 3 illustrates the percentage of respondents who fell into each of the three knowledge level categories low, medium, and high based on their scores. The data reveals that compared to 30 (46.2 percent) of the male respondents, a higher number of post-graduation female respondents 20 (57.2 percent) had a low level of understanding. Once more, around 18 (45.0 percent) of the female undergraduate respondents and 33 (55.0 percent) of the male undergraduate respondents had low knowledge scores, indicating that college students are still not well-versed in the significance and advantages of millet.

Attitude and perception of adolescent towards millets

The attitude of students was measured on the basis of three-point Likert scale (agree, disagree, and not sure).

Table 4: Distribution of respondents according to their attitude and perception towards millets

Particulars	Answer choices (n = 200)					
	Agree		Disagree		Not sure	
	No.	(%)	No.	(%)	No.	(%)
When compared to rice, millets are more expensive.	105	52.5	75	37.5	15	7.5
Every variety of millets is beneficial.	75	37.5	25	12.5	100	50.0
may only one millet be taken at a time.	45	22.5	55	27.5	100	50.0
Foods containing millets are gluten free.	70	35.0	33	16.5	97	48.5
Glycemic index is lower in millets.	60	30.0	19	9.5	121	60.5
Millets are rich in phytates, tannins and phenolic acids.	55	27.5	105	52.5	40	20.0
millets are nutritionally beneficial grains.	112	56.0	62	31.0	16	8.0
A variety of dishes can be made with millets.	77	38.2	53	26.5	70	35.0
with the additions of millets, the nutrition content of the food product gets increased	112	56.0	44	22.0	44	22.0

The findings indicate that more than half of the respondents 105 (52.5 percent) perceived millets as more expensive than rice. A considerable proportion of respondents showed uncertainty regarding various aspects of millets, such as their varieties 100 (50.0 percent), consumption practices 100 (50.0 percent), gluten-free nature 97 (48.5 percent), and low glycemic index 121 (60.5 percent), reflecting limited awareness. More than half 105 (52.5 percent) disagreed that millets contain phytates, tannins, and phenolic compounds, indicating misconceptions about their composition. However, a positive attitude was observed as the majority agreed that millets are nutritionally beneficial 112 (56.0 percent) and enhance the nutritional value of foods 112 (56.0 percent).

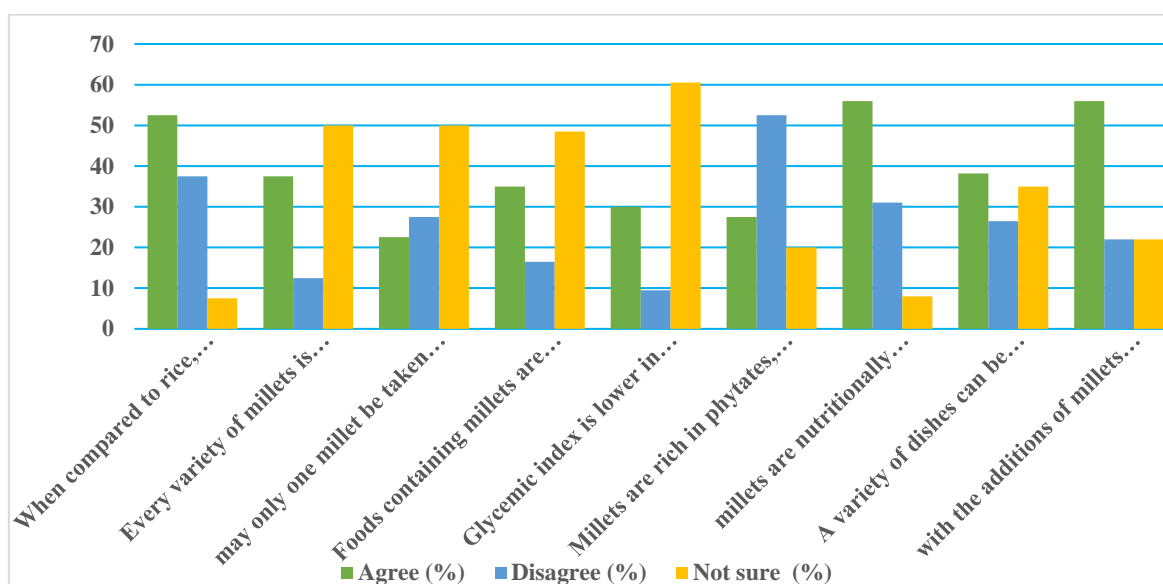


Figure 3: Distribution of respondents according to their attitude and perception towards millets

Adolescent’s eating practices regarding millets

Information regarding eating practices of millets is presented in Table 5.

Table 5: Distribution of respondents on the basis of the millets consumed by them

Types of Millets	Frequency	Percent
Any Millets	114	57.0
Finger Millets	25	12.5
Pearl Millets	21	10.5
Foxtail Millets	07	3.5
Kodo Millets	20	10.0
Little Millets	18	9.0
Barnyard Millets	8	4.0
Combination of two or three Millets	65	32.5

Table 5 showed the different types of millet that the respondents ingested; around 114 (57.0 percent) of the respondent’s used millet. Of those surveyed, 25 (12.5 percent) said they ate "finger millet" the most when asked what type of millet they most frequently consumed. Of those surveyed, 21 (10.5 percent) said they once again consumed "pearl millet" in the highest quantity. For 20 (10.0 percent) percent of them, "Kodo-Kutki" was the most eaten one. 18 (9.0 percent) of those surveyed said they ate "foxtail millet" the most. According to Barratry and Rajapushpam (2018), finger millet was the most popular millet product consumed by home customers in the Salem district of Tamil Nadu, accounting for (70.9 percent) of the total.

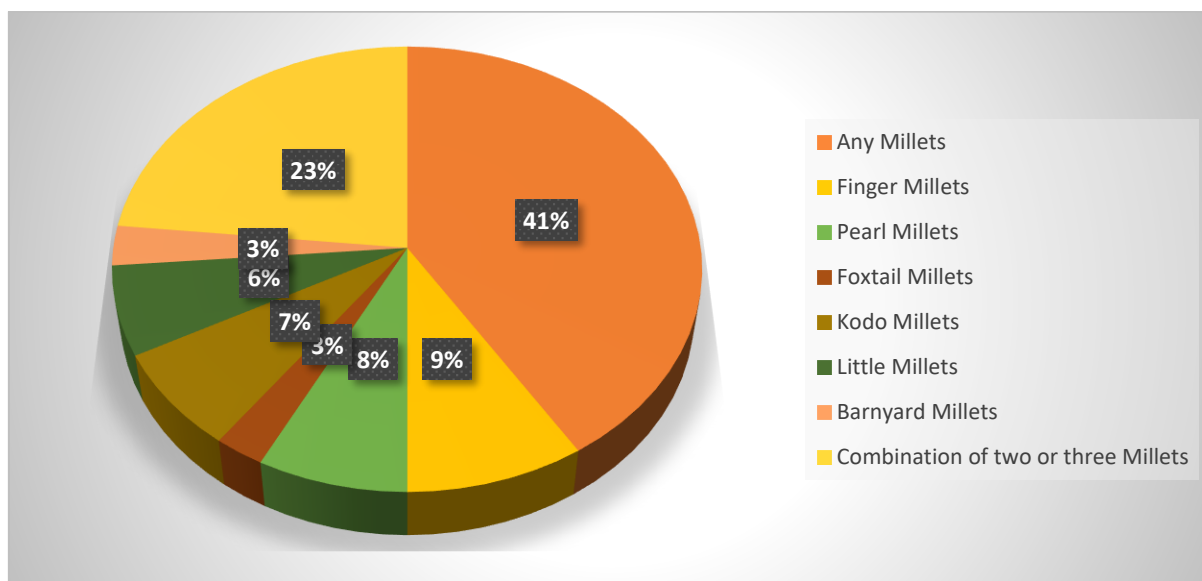


Figure 4: Distribution of respondents on the basis of the millets consumed by them

Table 6: Distribution of respondents as per their consumption pattern

Category	Undergraduate (n=100)		Post-graduate(n=100)	
	Male	Female	Male	Female
Millet's consumption				
Yes	36 (60.0)	28 (70.0)	35 (55.0)	23 (65.0)
No	24 (40.0)	12 (30.0)	30 (45.0)	12 (35.0)
Frequency of consumption				
Daily	15 (25.0)	00(00.0)	05(7.6)	04(11.4)
Weekly Twice	15(25.5)	10(25.0)	11(16.9)	05(14.3)
Weekly once	30(50.0)	24(60.0)	34(52.3)	19(54.3)
Occasionally	05(08.4)	06(15.5)	10(15.4)	07(20.0)
Period of Usage of Millets				
Since the Last One Year	25(41.6)	12(30.0)	25(38.4)	15(42.8)
Between 0-2 Years	18(30.0)	19(47.5)	25(38.4)	10(28.6)
More than 5 Years	05(8.3)	06(15.0)	10(15.5)	05(14.3)
Since Childhood	12(20.0)	03(7.5)	05(7.7)	05(14.3)

Table 6 illustrates the undergraduate and graduate students' consumption patterns. Around 28 (70.0 percent) of the female undergraduate respondents and 23 (65.0 percent) of the postgraduate respondents ate millets, whereas around 36 (60.0 percent) of the undergraduate respondents and 35 (55.0 percent) of the postgraduate male respondents ate millets. 43 (57.3 percent) of the female respondents said they ate millet frequently, once a week, compared to 64 (51.7 percent) of the male respondents. A maximum of 27 (36.0 percent) percent of female students began consuming millets within the past year, according to data analysis conducted to look at the duration of millets' usage. In contrast, almost 50 (40.0 percent) percent of male respondents also began consuming millets during that time.

Table 7: Distribution of respondents according to their millet’s eating practices

Questions	Answer choices n = 200			
	Yes		No	
	f	(%)	f	(%)
You eat items based on millet every day	120	60.0	80	40.0
You are making more dishes with millets.	110	55.0	90	45.0
Preparing several millets recipes.	175	87.5	25	12.5
Millet Processing is a simple process.	140	70.0	60	30.0
Eating millets improve your health.	170	85.0	30	15.0
Millets have a mild flavor that blends very readily with most dishes.	122	61.0	78	39.0
As probiotics, millets enhance a product’s flavor, texture and acceptance.	90	45.0	110	55.0

Information regarding respondents' millet-eating habits is included in Table 7. The majority of respondents, 175 (87.5 percent), were highly skilled at making a variety of millet-based meals. The table reveals that only 30 (15.0) percent of the participants were unaware of the advantages of eating millets, while roughly 170 (85.0) percent of the participants were aware that millets are a great source of nutrition and a food item that can be used in all its forms. They are also easy to prepare and have many health benefits.

Table 8: Rank order coefficient of reasons for purchase of millets among respondents (n = 200)

Rank	Nutritious Food	Weight Reduction	Taste	Convenience in cooking	Low Price	Likeness	To Reduce Consumption of Rice And Wheat
Rank 1	104	30	21	15	12	08	10
Rank 2	33	95	26	15	20	04	07
Rank 3	21	15	10	15	90	22	27
Rank 4	20	21	21	10	30	88	10
Rank 5	10	15	80	40	15	05	35
Rank 6	7	10	25	74	08	48	28
Rank 7	5	14	17	31	25	25	83

Table 8 clearly makes it evident that, of the 200 respondents, a maximum of 104 were taking millets for their nutritional benefits. The second-highest ranking reason for ingesting millets was weight loss. "Low price" came next, followed by "likeness" in third and fourth place. "Convenience in cooking" and "taste" rank fifth and sixth, respectively. Purchasing millets with the intention of "reducing the consumption of wheat and rice" earns the seventh and final level.

DISCUSSION

Adolescent eating habits are impacted by several variables, such as nutritional benefits, taste preferences, health consciousness, and convenience. The eating of millet is one particular component of dietary practices that has drawn attention recently. For generations, many societies have included millet—a category of extremely nutrient-dense and drought-resistant grains—in their traditional meals. Adolescents' opinions on eating millet, however, are varied and complex. A significant factor influencing adolescents' perspectives on millet intake is their level of nutritional and health consciousness. A growing number of adolescents are becoming conscious of the nutritional advantages of the foods they choose to eat in a time when fitness and health are given more importance. Millets are well known for having a high fiber content as well as antioxidants, vitamins, and minerals. Adolescents who play sports or are health-conscious are more likely to have a favorable opinion of millets. They understand that millet can support better digestion, long-term vitality, and general health. But not everyone is aware of this. Many adolescents may still prefer more recognizable, manufactured meals because they are unaware of the unique health advantages of millet.

CONCLUSION

The study concluded that adolescents had moderate knowledge and generally positive attitudes towards millets, but their eating practices were not fully aligned with their awareness. Although many recognized the nutritional benefits of millets, regular consumption was limited due to taste preferences, convenience, perceived higher cost, and lack of knowledge about preparation methods, indicating a gap between knowledge and practice. The findings supported the hypotheses. There was a significant association between knowledge, attitude, and eating practices of students towards millets. A significant difference was observed in the consumption pattern of millets among college-going students. Additionally, a significant association was found between the reasons for usage and actual consumption of millets among adolescents. The study emphasizes the need for nutrition education and practical interventions to promote regular millet consumption and improve overall nutritional status among adolescents.

SUGGESTION

- Include information about the nutritional benefits of millets in school subjects like home science, biology, and health education.
- Organize workshops and seminars led by nutritionists to provide detailed knowledge about millets and their health benefits.
- Conduct cooking classes, recipe competitions, and tasting sessions to make learning about millets interesting and practical.
- Encourage participation in community gardening and agricultural activities to provide hands-on experience with millets.
- Organize food festivals, cooking demonstrations, and awareness programs to promote traditional millet-based foods.
- Involve parents in awareness programs and encourage them to include millet-based dishes in daily meals.

- Use social media, television, and other communication platforms to spread awareness about healthy eating habits and millets.
- Promote innovative, tasty, and easy-to-prepare millet-based recipes to increase acceptance among adolescents.
- Encourage research and innovation to improve millet-based products and make them more appealing.

REFERENCES

- Babele, P. K., Kudapa, H., Singh, Y., Varshney, R. K., & Kumar, A. (2022). Mainstreaming orphan millets for advancing climate smart agriculture to secure nutrition and health. *Frontiers in Plant Science*, 13. <https://doi.org/10.3389/fpls.2022.902536>
- Begizew, G. (2021). Agricultural production system in arid and semi-arid regions. *International Journal of Agricultural Science and Food Technology*, 234–244. <https://doi.org/10.17352/2455-815X.000113>
- Devi, P. B., Vijayabharathi, R., Sathyabama, S., Malleshi, N. G., & Priyadarisini, V. B. (2014). Health benefits of finger millet (*Eleusine coracana* L.) polyphenols and dietary fiber: a review. *Journal of Food Science and Technology*, 51(6), 1021–1040. <https://doi.org/10.1007/s13197-011-0584-9>
- Kaur, N., Ray, B., & Kalyani, C. V. (2024). Millets: Ancient Grains for Modern Nutrition – A Comprehensive Review. *Indian Journal of Community Medicine*, 49(5), 665–668. https://doi.org/10.4103/ijcm.ijcm_765_23
- Kheya, S. A., Talukder, S. K., Datta, P., Yeasmin, S., Rashid, Md. H., Hasan, A. K., Anwar, Md. P., Islam, A. K. M. A., & Islam, A. K. M. M. (2023). Millets: The future crops for the tropics - Status, challenges and future prospects. *Heliyon*, 9(11), e22123. <https://doi.org/10.1016/j.heliyon.2023.e22123>
- Ndudzo, A., Sibanda Makuvishe, A., Moyo, S., & Bobo, E. D. (2024). CRISPR-Cas9 genome editing in crop breeding for climate change resilience: Implications for smallholder farmers in Africa. *Journal of Agriculture and Food Research*, 16, 101132. <https://doi.org/10.1016/j.jafr.2024.101132>
- Pozza, L. E., & Field, D. J. (2020). The science of Soil Security and Food Security. *Soil Security*, 1, 100002. <https://doi.org/10.1016/j.soisec.2020.100002>
- Raj, S., Chaudhary, S., Ghule, N. S., Baral, K., Padhan, S. R., Gawande, K. N., & Singh, V. (2024). Sustainable Farming and Soil Health Enhancement through Millet Cultivation: A Review. *International Journal of Plant & Soil Science*, 36(3), 222–233. <https://doi.org/10.9734/ijps/2024/v36i34418>
- Saxena, R., Vanga, S. K., Wang, J., Orsat, V., & Raghavan, V. (2018). Millets for Food Security in the Context of Climate Change: A Review. *Sustainability*, 10(7), 2228. <https://doi.org/10.3390/su10072228>
- Tripathi, T., & Vyas, Dr. S. (2023). From ancient grains to modern solutions: A history of millets and their significance in agriculture and food security. *International Journal of Home Science*, 9(2), 72–78. <https://doi.org/10.22271/23957476.2023.v9.i2b.1466>

DEVELOPMENT AND QUALITY EVALUATION OF VALUE-ADDED BISCUITS FORTIFIED WITH BOVINE COLOSTRUM POWDER

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ABSTRACT

Bovine colostrum (BC) is the first milk produced after birth in animals. It is a rich natural source of macro- and micro-nutrients, immunoglobulins, growth factors and peptides with anti- microbial activity. It is product of the milk industry and commercially sold as powder or liquid form to promote general health and immune support. A study was undertaken to develop biscuits using Bovine colostrum (BC) powder and to evaluate acceptability through sensory evaluation and to analyse its nutritional quality. The procedure for development of value-added biscuits using BC powder was standardized. Three variations of biscuits were prepared by substituting milk powder with BC powder at 10g, 20g and 30g. The developed variations along with the basic sample were subjected to sensory evaluation by 30 semi trained panelist using 9-point hedonic scale. The biscuits with 30 g of BC powder were highly acceptable due to the better taste and flavour. The nutritional composition of the best accepted biscuit per 100 g were crude ash content 1.87%, moisture content 4.89%, fat content 24.7%, crude protein content 15.7%, carbohydrate content 48.2%, crude fiber content 8.82%. The BC biscuit was energy dense, showed 438 Kcal content and good amount of calcium content (536 mg) per 100g. Bovine colostrum biscuits are healthier choice and can be given for children, pregnant women and lactating mothers. As a natural and potent source of bio active compounds, the incorporation of bovine colostrum into biscuit stands as an innovative approach to delivering health promoting elements, potentially benefiting individuals seeking enhanced immunity and overall, well being.

Key words – Biscuit, Bovine colostrum, Hedonic scale, Sensory evaluation, Value addition

INTRODUCTION

The first milk produced by a bovine after giving birth is termed colostrum, and it contains a wealth of natural macro and micro nutrients, immunoglobulin's, peptides with anti-microbial activity and growth factors. There is a lower lactose levels and higher protein levels in colostrum than the regular milk, Colostrum contains bioactive protein, which shows numerous health benefits, such as the potentiality to repair skeletal muscle and improve immunity (Ramani *et al.*, 2024). Additionally, bovine colostrum contains high levels of immunoglobulins, lactoferrin, and lysozyme which have well-characterized roles in providing passive immunity, antimicrobial protection, and shaping the

development of the gastrointestinal system (Kaplan *et al.*, 2022). The natural presence of nutritious and physiologically active components such as immunoglobulins, growth factors, hormones, and lactoferrins drives the increased interest in Bovine Colostrum (Mehra *et al.*, 2022). The use of bovine colostrum for human consumption has been explored thousands of years in India, but its use as a dietary supplement is recent. Regular consumption may favor benefits such as osteoporosis prevention, reducing symptoms of arthritis and intestinal permeability, improvements in the immune system, and fighting cancer cells, among others. Bovine colostrum destroys bacteria, viruses and fungi, speeds up the healing of body tissue, rebuilds immune system, helps lose weight, increase bone, lean muscle mass, and burn fat and reverses aging (Nazir *et al.*, 2018). As bovine colostrum had numerous advantages for human health, it is used in numerous interesting products, including Igazym lozenges, colostrum concentrate, spray dried colostrum powder, colostrum capsules, and powder used to prepare different products in India like Azaco cheese, Kharwas, and Phuh (Abdeen *et al.*, 2024). Bovine colostrum powder may then be sold in powder form or subsequently incorporated into dietary supplement formats such as sachets, capsules, chewable tablets, and soft chews. With this background research was conducted with an objective to develop value added biscuits fortified with bovine colostrum (BC) powder and to evaluate sensory and nutritional qualities of biscuits.

Materials and methods

The other ingredients used for the development of biscuits was procured from the local super market. The major ingredient, bovine colostrum powder Aster Veda brand was purchased online. Several experimental trials were conducted in standardizing the method of development of bovine colostrum biscuits. Three different variations of biscuits were developed along with control sample. Three variations were developed using different proportions of BC powder and milk powder.

Control sample biscuits were prepared using standardised procedure by adding 30g milk powder and rest of the ingredients. Variation I biscuits were developed by substituting 10g of milk powder with BC powder. Similarly, variation II biscuits were prepared with 20g BC powder and 10g of milk powder. The other variation III biscuits were with 30g of BC powder only.

The developed BC biscuits and basic sample were subjected to sensory evaluation to find out the best acceptability among the different variations. The sensory evaluation was carried out by 30 semi trained panelists for various quality characteristic of the products. The biscuits were evaluated by each panelist for appearance, texture, color, flavor, taste, and overall acceptability on a 9-point hedonic scale. The scores between 1 and 9, which ranged from dislike extremely to like extremely were given by the judges. Suitable statistical methods were used to analyze sensory scores.



Picture 1: Sensory evaluation of BC biscuits

The best accepted biscuits were analysed for the nutrients like moisture, crude protein, crude fats, crude ash, carbohydrate, energy content and calcium using standard AOAC procedures (Joseph et al 2023).

RESULTS AND DISCUSSION

Fig.1 and Table 1 showed the standardization of BC biscuits preparation and development of its variables. For preparing biscuits, combine flour, milk powder, baking powder and salt in a large bowl and mix well. Grind the sugar into powder and add the dry ingredients together and mix them evenly, along with the powdered sugar. Keep the butter in room temperature and mix it until gives a creamy texture. Once the creamy texture is achieved, add the dry ingredients into butter and knead. Add little amount of water to keep the dough in form. Pre heat the oven for 20 min at 180° C. Roll the dough, spread evenly and cut them into biscuit shape. Place the cut dough on the on the tray lined with baking paper and bake for 25 min at 180° C. Remove from oven and allow the biscuit to cool completely and store in airtight container.

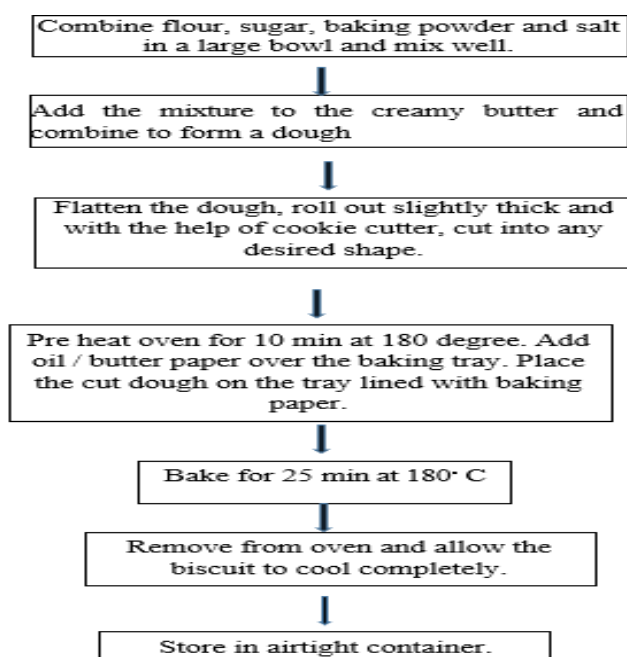


Figure 1: Standardization of BC biscuits

Table 1: Ingredients for the development of BC biscuits and its variations.

Ingredients	Basic	Variation I	Variation II	Variation III
Whole wheat	50	50g	50g	50g
Milk Powder	30g	20g	10g	-
BC powder	-	10g	20g	30g
Butter	45g	45g	45g	45g
Sugar	30g	30g	30g	30g
Baking powder	½ tsp	½ tsp	½ tsp	½ tsp
Baking soda	¼ tsp	¼ tsp	¼ tsp	¼ tsp
Vanilla essence	1 drop	1 drop	1 drop	1 drop

Mean sensory scores and standard deviation for the variations developed are presented in table 2. Among the four variations, the means sensory scores of biscuits gradually increased with the addition of BC powder increased. Variation III biscuits (added with 30g of BC powder) received mean score of 8.56 appearance, 8.4 for color, 8.33 for flavor, 8.233 for texture and 8.4 for overall acceptability was best accepted among all the variations.

Table 2: Mean sensory scores of BC biscuits

BC biscuits	Appearance	Color	Taste	Texture	Overall Acceptability
Basic	8.6±0.621	8.5 ± 0.68	8.43 ± 0.77	8.36 ± 0.80	8.46 ± 0.819
V1	8.56±0.62	8.4 ± 0.68	8.33 ± 0.56	8.23 ± 0.68	8.4 ± 0.68
V2	8.5±0.62	8.4 ± 0.68	8.36 ± 0.56	8.46 ± 0.68	8.46 ± 0.68
V3	8.63±0.55	8.5 ± 0.68	8.4 ± 0.56	8.53 ± 0.68	8.5 ± 0.68

The results of sensory attributes of Variation III biscuits were on par with results of basic sample. The incorporation of 30g of bovine colostrum powder in biscuits was found to be more preferred than the basic and other variations. The reason for the same could possibly be due to higher concentration of total solids and total protein content of colostrum which could be contributed for development of flavour and taste attributes in the biscuits. These results align with the study conducted by Barbosa et al., 2023 which showed that Colostrum supplementation in cheese favored sensory attributes and overall evaluation of all cheese formulations achieved an Acceptability Index above 70, indicating good acceptability. Numerous research studies highlighted the potential benefits of bovine colostrum in enhancing the functional and sensory qualities of different food products. Nazir et al., 2018 reported that the product samples prepared from colostrum alone showed highest mean scores for all the sensory characteristics while as least mean scores were obtained by the product prepared from equal proportions of colostrum and whole milk. Dande and Nande, 2020, demonstrated that the popular Indian paneer-based recipes like sweet rice and tikka masala can be success fully prepared using steamed bovine colostrum without affecting their sensory quality.

Table 3: Nutritional composition of BC biscuits (Per 100g, on dry weight basis)

Sl. No	Nutrients	Values per 100g
1.	Energy (kcal)	438
2.	Crude ash (g)	1.87
3.	Crude fibre (g)	8.82
4.	Crude protein (g)	15.7
5.	Carbohydrates (g)	48.2
6.	Fat (g)	24.7
7.	Calcium (mg)	536
8.	Moisture (g)	4.89

Table 3 represented that Nutritional composition of biscuits incorporated with 30g of BC powder were found to be crude ash content 1.87%, moisture content 4.89%, fat content 24.7%, crude

protein content 15.7%, carbohydrate content 48.2%, crude fiber content 8.82%. The BC biscuit was energy dense, showed 438 Kcal content per 100g. Similarly, good amount of calcium content (536 mg) was found in the biscuit which can be concluded as higher content of protein, calcium and energy value, the biscuits could be given for children, pregnant women and lactating mothers. Development of BC biscuits is an innovative and convenient method to incorporate the nutrient dense colostrum to effectively utilize the health benefits of it. The best accepted variation of BC biscuits cost was Rs. 146/- for a pack of 14 biscuits weighing 100 g. The colostrum powder was at higher price due to which the total cost of the biscuits increased compared to the other biscuits available in the market. The study by Abdeen et al., 2024, concluded that the enrichment of cottage cheese by the addition of bovine colostrum particularly, with 2% and with probiotic bacteria will increase the nutritional value and health benefits of cheese, it can be consumed as a new functional dairy food suitable for all age groups.

The presence of bio active proteins in bovine colostrum biscuits underscores its potential as a valuable supplement for supporting overall health through cardiovascular well-being, metabolic changes and enhancing body composition.

CONCLUSION

The demand for innovative foods growing every day as consumers consider nutrition to address a wide range of health conditions. Bovine colostrum is rich in protein, calcium and many bio active compounds can be incorporated in various food preparations for increased nutritional value. The incorporation of 30g of bovine colostrum powder in biscuits was found to be more preferred than the basic and other variations in terms of taste, flavour and appearance. The BC biscuit was energy, protein and calcium dense contributed 438 Kcal, 15.7g and 536 mg content respectively per 100g. The study contributed to knowledge on the use of colostrum in elaborating and enriching commonly consumed biscuits intended for human consumption, as the use of colostrum is little known.

REFERENCES

- Abdeen E M, Hamed A M and Ismail H A, 2024 Production and evaluation of novel functional cream cottage cheese fortified with bovine colostrum and probiotic bacteria. *J Food sci technology*. 61(8):1457–1469
- Barbosa I M, Anaya K, Macêdo C S, Coelho R, Gotet C C, Silva, Araújo N G, Chagas B M, Oliveira J P, Boari B, Danielle C S, Emmanuella, Neves J and Rangel A H, 2023 Characterization of Physicochemical and Sensory Properties of Cheeses Added with Bovine Colostrum., *Food science and Technology, MDPI, Foods* 12: 1-14
- Dande N D and Nande P J, 2020 Nutritional Composition of Bovine Colostrum Palatability Evaluation of Food Products Prepared Using Bovine Colostrum, *International journal of nutrition, pharmacology, neurological diseases*. Volume 10 (1): 8-13
- Joseph O, 2023 Quality evaluation of value – added nutritious biscuit with high antidiabetic properties from blends of wheat flour and oyster mushroom, *Food chemistry advances*, Vol 3, 2772-753X.
- Kaplan M, Arslan A, Duman H, Karyelioğlu M, Baydemir B, Günar B B, Alkan M, Ayşe Bayraktar, Tosun H I, Ertürk M, Eskici G, Duar M, Henrick B M, Steven A. F and Karav S, 2022 Production of bovine colostrum for human consumption to improve health, *Frontiers in Pharmacology*. Vol 12: 1-12

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- Longvah T, Bhaskarachary K and Venkaiah K, 2017 Indian Food Composition Table, India. National Institute of Nutrition
- Mehra R and Garhwal R, 2022 Insights into the Research Trends on Bovine Colostrum: Beneficial Health Perspectives with Special Reference to Manufacturing of Functional Foods and Feed Supplements. MDPI Nutrients, 14(3):1-21
- Mouton E and Aryana K J, 2015 Influence of Colostrum on the Characteristics of Ice Cream. Food and Nutrition Sciences, Vol.6 No.5, pp 480-484.
- Nazir T, Pal M A and Manzoor A, 2018 Effect of Admixing Varying Levels of Whole Milk to the Colostrum on the Sensory Quality of Fermented Colostrum Product., International journal of advance research in science and engineering, Vol.7 No.4: 156-161
- Official Methods of Analysis of AOAC International 2023, 22nd Edition.
- Ramani A, Taherabbas S and Manik S, 2024, Bovine colostrum as a promising nutraceutical: A systematic review. Sustainable food technology, 2024, 2, 531–547

THERAPEUTIC EFFECTS OF PUMPKIN SEEDS ON DIABETES

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ABSTRACT

A metabolic disease that is quickly expanding around the world is diabetes mellitus. Bioactive compounds found in seeds can be used in the treatment of diabetes mellitus. Data from human clinical trials examining the impact of supplementing with pumpkin seeds on blood glucose levels is few. The goal of the present research was to assess the three-month glycaemic effects of pumpkin seed supplementation on the elderly population of urban Vadodara. Total 60 Diabetic patients above 60 years of age were enrolled in the study and divided randomly as experimental group and control group (30 Subjects each). Data was analysed by using Microsoft excel (2017) software and appropriate tests such as mean, median and t-test was applied. Mean age of experimental group was 65.9±4.45 years and 68±4.45 years for control group. Before enrolment as per pre data collected, mean FBS levels were 159.5mg/dl and 146.7mg/dl for Experimental group and control group respectively. There is a positive association between Pumpkin seed supplementation and reduction in Fasting Blood glucose levels (Weighted Mean Difference [WMD], -11.3mg/dl; 95% CI; P=0.06*) as well as Glycosylated Haemoglobin (WMD, -0.7%; 95% CI; P=0.03*). No significant difference was noticed among control group. Thus, 10gm daily intake of Pumpkin seeds lasting 3 months has significant role to improve glycaemic parameters which indicates its hypoglycaemic properties.

Keywords: Diabetes mellitus, Pumpkin seeds, Glycaemic Control.

INTRODUCTION

There is a rapid growth of old age population around the world due to greater life expectancy and easier access to healthcare facilities. According to a recent World Health Organization report, by the year 2050, the population over 60 is anticipated to quadruple and live an additional 15 years. In numerous high-income nations as well as several of the lower- and middle-income nations in the Asia-Pacific region, the elderly will make up one-third of the entire population.

The natural process of ageing is marked by changes in the body's physiology, mental health, and metabolism. India, the second most populous country in the world, has seen a

significant demographic shift in the population of India over 60. As a result of improved health care facilities and longer life expectancies, the occurrence of non-communicable diseases among the elderly population has suddenly increased, putting the Indian elderly population at more risk of developing life style diseases in the coming decades, particularly diabetes mellitus, which can be prevented by early detection and treatment.

Diabetes mellitus is no longer a disease but now it has become a global problem, a major epidemic of the 20th century. Higher proportions of old age populations are affected due to diabetes mellitus. This tremendous rise may be due to the increased life expectancy, rapid urbanization, physical inactivity, modern lifestyle and obesity. Diabetes mellitus has affected all over the world, around 50 million people in the world are suffering from diabetes mellitus and out of that, 50% population is from developing countries. Prevalence of diabetes increases with age. In India, 20% of old age population is suffering from diabetes mellitus while 25% of old age population is suffering from impaired glucose tolerance (IGT) (Harris MI, 1987).

Diabetes mellitus is a major health concern worldwide, influencing over 463 million adults globally (International Diabetes Federation, 2020). In India, the cases of diabetes are rapidly increasing, with an estimated 72 million cases reported in 2017 (World Health Organization, 2019). The elderly population is particularly vulnerable to diabetes due to age-related physiological changes, decreased physical activity, and increased comorbidities (Kalyani et al., 2017).

Pumpkin seeds, a rich source of antioxidants, magnesium, and zinc, have been traditionally used in various cultures for their medicinal properties (Gossell-Williams et al., 2011). Recent studies have demonstrated the potential therapeutic effects of pumpkin seeds in improving glycemic control, reducing oxidative stress, and enhancing insulin sensitivity (Zhang et al., 2019; Li et al., 2020).

Given the limited availability of research on the therapeutic effects of pumpkin seeds on diabetic populations in India, this study aims to evaluate the impact of pumpkin seed supplementation on glycemic control, lipid profiles, and parameters of lifestyle among elderly diabetic individuals residing in urban Vadodara, Gujarat, India.

Frequent use of functional foods, which include physiologically active components are associated with favorable health outcomes for the management and prevention of several non-communicable diseases, including lipidemia, hypertension, and Type 2 diabetes mellitus. Functional foods used to treat non-communicable diseases contain unsaturated fatty acids, polyphenols, terpenoids, flavonoids, alkaloids, sterols and pigments. (Alkhatib A, 2017)

In nations like India, where naturopathy and Ayurveda are in treating a range of medical conditions are well established, the idea of using natural or medicinal plants for healing is becoming more and more popular. Various plant parts, including bark, leaves, seeds, roots, stems, tubers, rhizomes, fruit, flowers, bulbs, etc., are employed in the healing

process. Among them, seeds are used as medicine in a different way, including raw, roasted, boiled, extracted from oil and butter, pasted, isolated, infusions, or decoctions.

Plant seeds and nuts have received a lot of attention lately because of their many health advantages. The "Cucurbitaceae" family of seeds includes pumpkin seeds among others. Many agricultural enterprises discard pumpkin seeds as agricultural waste, despite they are a great source of protein, vitamins, and minerals. Researchers are drawn to pumpkin seeds because of its potential health benefits and high content of phenolic chemicals.

Pumpkin seeds can be utilized as valuable raw material for pharmaceutical companies' drug development processes since it contains a variety of phytochemicals (Gavril Rațu et al, 2024).

Although pumpkin seeds are typically thrown away as garbage, their nutritious value has allowed them to play a significant part in meals. Regular consumption of them won't have any negative health impacts.

Pumpkin seeds have the potential to be used to create new foods and can be used into a variety of goods to cut down on waste.

There is still plenty of room to uncover qualities of pumpkin seeds, particularly in human trials, despite the substantial amount of knowledge currently accessible regarding their therapeutic effects. Making use of such underutilised agricultural products will contribute to the optimisation of available resources.

Hence, present study was conducted specifically to assess hypoglycaemic properties of pumpkin seeds on old age (Above 60 years) population of urban Vadodara.

OBJECTIVES

- To evaluate the Nutritional Status of the enrolled Type 2 Diabetic Subjects (>60 years of age).
- To assess the Fasting Blood Sugar (FBS) and Glycosylated Haemoglobin (HbA1C).
- To supplement pumpkin seeds for the period of 3 months as an intervention
- To collect post data on same parameters after completion of 3 months.

HYPOTHESIS

- Pumpkin seed supplementation will reduce Blood glucose levels of Type 2 Diabetic Subjects.

METHODOLOGY

Description of Study Population

The study was conducted in urban Vadodara, city of Gujarat state. 60 Old age Subjects above 60 years were contacted and subjects who shown interest to participate and eligible (as per the inclusion and exclusion criteria) were enrolled in the study. Subjects were randomly distributed in two groups, Experimental Group and Control Group. (30 subjects each)

Inclusion criteria

- Subjects \geq 60 years of age of urban Vadodara
- Subjects who were willing to participate
- Subjects whose FBS levels were between 125-250mg/dl.
- Subjects who were on hypoglycaemic drugs or medications.

Exclusion criteria

- Subjects suffering from any chronic illness.
- Subjects above 80 years of age.
- Subjects whose FBS levels were more than 250mg/dl. (Further referred to doctors) and whose HbA1c was more than 9%.
- Subjects consuming other functional foods to control diabetes.

Tools and techniques used:

Procurement of pumpkin seeds:

For the study pumpkin seeds were purchased from local market of Vadodara after confirming with botanist.

Non-invasive Parameters

Height, Weight and Body Mass Index

Invasive Parameters

Fasting Blood Sugar (FBS), Glycosylated Haemoglobin

Intervention plan

After an enrolment of 60 subjects, they were randomly distributed in two groups, Experimental Group & Control Group (Untreated)

Dosage of the pumpkin seeds

Subjects enrolled in Experimental group 1 were asked to consume 10gm of pumpkin seeds on a daily basis for 90 days whereas in experimental group 2 subjects were asked to consume 15gm of pumpkin seeds on a daily basis for 90 days. Control group was not given any type of treatment.

Protocol for the consumption of pumpkin seeds

Both experimental groups were asked to consume pumpkin seeds at any time of the day in the raw form. If any subject was found to be difficult to consume full dosage of seeds to consume at a time, were allowed to divide in 2-3 dosage in a day. Subjects were also instructed to chew the seeds properly.

Distribution protocol of the pumpkin seeds

Sachet of 10gm and 15gm were prepared manually, seeds were packed in air tight small zip lock bag. Dosage was distributed to the subjects at the start of every month. Empty sachets were collected back before distributing new samples.

Experimental group given 10gm of untreated and unsalted pumpkin seeds for the period of 3 months whereas control group without any intervention. After the completion of 90 days, data was collected again on same parameters (Mentioned above).

Statistical methods used

Mean and SD

t-test (paired)

Statistical software used

MS excel, 2017

FINDINGS AND DISCUSSION

Total 60 Type 2 diabetic subjects, enrolled for study were randomly divided into Experimental group and Control group. Data was collected on gender, religion, marital status, education, occupation, and family type by using pre tested questionnaire.

The data generated of this parameter are summarized in below table.

Table 1: Baseline information (N, %)

Variable	Intervention group (10gm intervention)		Control Group	
Gender				
Male	15	50.0	16	53.3
Female	15	50.0	14	46.7
Religion				
Hindu	27	90	27	90.0
Muslim	1	3.3	3	10.0
Jain	2	6.7	0	0.0
Sikh	0	0	0	0.0
Marital status				
Married	23	76.7	21	66.7
Widow	6	20	8	23.3

Single	1	3.3	0	0.0
Divorced	0	0	1	3.3
Education				
SSC	3	10	7	23.3
HSC	9	30	10	33.3
Graduate	13	43.3	10	33.3
Post- Graduate	5	16.7	3	10.0
Occupation				
Housewife	11	36.7	10	33.3
Retired	13	43.3	12	40.0
Service	2	6.7	0	0.0
Business	4	13.3	8	26.7
Type of family				
Nuclear	22	73.3	23	76.7
Joint	8	26.7	7	23.3

The mean age, height, weight, and BMI of the recruited subjects in both groups are given in Table 2. As per the data obtained, control group's mean age is 68 ± 3.83 years, while the intervention group's is 65.9 ± 4.45 . The two groups' mean height and BMI are thus quite comparable. The majority of the participants were judged to be overweight based on the mean BMI given for both groups.

Table 2: Mean Height and weight of the enrolled subjects

	Intervention Group (10 gm intervention)	Control Group
Age (Years)		
Mean	65.9	68.0
Standard Deviation	4.45	3.83
Weight(kg)		
Mean	65.7	68.2
Standard Deviation	10	9.61
Height(cms)		
Mean	163.7	165.5
Standard Deviation	8.69	9.77
BMI(Kg/m²)		
Mean	24.5	24.8
Standard Deviation	2.97	1.07

The 10gm of pumpkin seed supplementation was given for the period of 3 months. Control group subjects were not given any supplementation. Subjects consuming other functional foods to control diabetes were excluded from study to ensure validity of intervention.

Sachets of pumpkin seeds were provided on a monthly basis and total 30/31 sachets were distributed to the subjects per week. Empty sachets were collected back before distributing new samples. WhatsApp/SMS reminders were sent to ensure pumpkin seed consumption. A compliance card was prepared for each subject in which subject was asked to mark “√” in the card after consuming daily dose. Investigator also checked the compliance at every week before giving new samples. After 3 months, all ticks (√) were counted and compliance was calculated.

Figure 1: Compliance card sample

<u>Compliance Card</u>						
Name: _____						
Month: _____						
Subject Code: _____						
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				
* Please make √ on each day when you consume the given sachet of Pumpkin Seeds.						
* Please return the empty / unconsumed sachet.						

Post intervention data was collected on the various parameters before and after intervention which are described below.

Table 3 reveals Impact of Pumpkin seed supplementation on Glycaemic parameters such as Fasting Blood Sugar (FBS) and Glycosylated Haemoglobin (HbA1C). Data shows significant reduction in all the parameters of Experimental group after pumpkin seed supplementation for the period of 90 days. Slight Hike can be observed among control group for all the parameters without any significant difference.

Before enrolment as per pre data collected, mean FBS levels were 159.5mg/dl and 146.7mg/dl for Intervention group and Control group respectively. After 90 days of 10gm pumpkin seeds intervention, there was a significant reduction in FBS level among Intervention group. Fasting blood glucose levels (Weighted Mean Difference [WMD], -11.3mg/dl; 95% CI; P=0.06*) as well as Glycosylated Haemoglobin (WMD, -0.7%; 95% CI; P=0.03*)

Table 3: Impact of pumpkin seed supplementation on the Glycaemic parameters

	Intervention Group (10gm intervention)		Control Group	
	Mean	SD	Mean	SD
Fasting Blood Sugar (FBS) (mg/dl)	159.5	34.33	146.7	9.31
Fasting Blood Sugar (FBS) (post) (mg/dl)	148.2	30.2	148.9	9.14
p-value	0.880*		0.658	
HbA1c (%)	7.4	0.48	6.9	0.72
HbA1c (post) (%)	6.7	0.43	7.1	0.62
p-value	4.842*		0.594	

*Significant from the baseline value at p<0.05, ** at p<0.01, *** at p<0.001, NS- Non- significant

SUMMARY AND CONCLUSION

Type 2 diabetes mellitus is one of the most common non-communicable diseases impacting population of entire glob, particularly old age population whose age is more than 60 years. The majority of people with diabetes are either overweight or obese, which can lead to a different type of problems.

Pumpkin seeds have been the topic of numerous studies and investigations to date, which confirm their medicinal qualities, particularly their anti-lipemic and anti-glycemic effects in the management of hypercholesterolaemia and diabetes. To control and treat diabetes mellitus in Type 2 diabetic people, a comprehensive strategy involving medications, insulin, diet, exercise, nutrition education, and the use of functional foods is necessary. The current study was designed to know the impact of pumpkin seeds in managing blood glucose levels.

Baseline information

Both the groups were having equal numbers of men and women enrolled. Hindus made up the majority of the study's participants, followed by Muslims and Sikhs. Most of the participants were married and completed their HSC and graduation. Approximately 70% of the individuals were from nuclear families.

Nutritional Status

The intervention group's mean age is 65.9 ± 4.45 , while the control group's is 68 ± 3.83 . The majority of the participants were overweight. Therefore, it may be said that high weight population type 2 diabetes are related. In addition to medication, a healthy distribution of calories is necessary to either lose weight or maintain a healthy body weight.

Impact of pumpkin seed supplementation on the glycaemic parameters

There was a significant correlation between taking pumpkin seeds and lower levels of glycosylated haemoglobin and fasting blood glucose after 3 months of pumpkin seed supplementation.

Pumpkin seeds are healthy as they contain proteins, fatty acids, vitamins, and minerals. The presence of fatty acids in pumpkin seeds suggests that high-quality oil can be produced from them for a number of health advantages.

Pumpkin seeds are better for lowering blood sugar levels and preventing cardiovascular illnesses because they include a variety of fatty acids, including octanoic acid and linoleic acid. The finding of this research supports the hypoglycemic role of pumpkin seeds. The alternative hypothesis and major objectives of the study were achieved successfully.

Future scope of the study:

- The study should be carried out on different age groups especially among adults to test the efficacy of pumpkin seeds in management of Diabetes.
- There is a need to promote use of pumpkin seeds at household levels or in the different institutions such as schools, canteens, old age homes, hospitals as a prevention aspect.
- Other indigenous foods or seeds can be tried in combination with pumpkin seeds for longer durations to study its health benefits in NCD's.

REFERENCES

- Alkhatib A, T. C. (2017). Life style approaches for diabetes prevention and management. *Journal of Functional food*, 12(9), 1310.
- Ardabili, A. G. (2011). Chemical Composition and Physicochemical Properties of Pumpkin Seeds (*Cucurbitapepo* Subsp. *pepo* Var. *Styriaka*) Grown in Iran. *J. Agr. Sci. Tech.*, 13, 1053-1063.
- Bayat A, J. Z. (2014). Effects of *Cucurbita ficifolia* Intake on Type 2 Diabetes: Review of Current Evidences. *SHIRAZ E-MEDICAL JOURNAL*, 15(2).
- Gavril Rațu, R. N., Stoica, F., Lipșa, F. D., Constantin, O. E., Stănciuc, N., Aprodu, I., & Râpeanu, G. (2024). Pumpkin and Pumpkin By-Products: A Comprehensive Overview of Phytochemicals, Extraction, Health Benefits, and Food

Applications. *Foods* (Basel, Switzerland), 13(17), 2694.
<https://doi.org/10.3390/foods13172694>

- Harris MI, H. W. (1987). Prevalence of diabetes and impaired glucose tolerance and plasma glucose levels in the US population aged 20 to 74 years. *Diabetes*, 36, 523-534.
- J. Plat, S. B. (2019). Plant-based sterols and stanols in health & disease: “Consequences of human development in a plant-based environment?”. *Progress in Lipid Research*, 74, 87-102.
- K, K. (2009). *History of medicine*. New York: Facts on file, 29-50.
- N Marbun, P. S. (2018). Antidiabetic effects of pumpkin (*Cucurbita moschata* durch) flesh and seeds extracts in streptozotocin induced mice. *Asian J Pharm Clin Res*, 12(2).

IMPACT OF FEEDING PATTERNS ON THE HEALTH OF INFANTS AGED 6 MONTHS IN MUZAFFARPUR DISTRICT

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ABSTRACT

Infancy is the most crucial period in an infant's life, especially during the first six months. Infant health, nutritional status, and survival fundamentally depend on feeding practices. Inadequate breastfeeding and improper feeding methods negatively affect an infant's health. This study aims to assess the impact of feeding patterns on the health status of infants aged 0-6 months in Muzaffarpur District, Bihar. Total 30 infants were randomly selected for the study. Infant feeding patterns were categorised as exclusive breastfeeding, partial breastfeeding, and formula feeding. The nutritional status of the infants was assessed through anthropometric measurements of weight, length, and weight-for-age. Data on the morbidity status of infants were collected using a pre-developed questionnaire. Statistical analysis was conducted with SPSS. A total of 40% of infants were exclusively breastfed, followed by formula feeding at 36.7% and partial breastfeeding at 23.3%. The mean weight of exclusively breastfed infants was 6.58 kg, followed by formula-fed infants at 5.8 kg and partially breastfed infants at 5.51 kg. A significant difference was found between the mean weight values and feeding practices of six-month-old infants at the 0.01 level. All formula-fed and partially breastfed infants experienced common morbidities such as diarrhoea and acute respiratory infections, while only 25% of exclusively breastfed infants faced these common morbidities. A significant association was found between common morbidities and feeding practices of six-month-old infants at the 0.01 level. Breastfeeding provides optimal nutrition for infants, helping to reduce malnutrition and morbidity.

Keywords: Feeding Practices, Formula feed, Infant Morbidity and Malnutrition

INTRODUCTION

The first six months of an infant's life are not just crucial, but they are the foundation of their future health. Severe infections, such as diarrhea, tetanus, pneumonia, jaundice, fever, and colds, lead to high morbidity rates. In India, the Infant mortality rate is 26.619 deaths per 1000 live births in 2023, and it declined 3.89% in 2022. Breastfeeding is essential for the health of both mothers and infants. It lowers the risk of child infections and malocclusion, boosts mental capacity, and presents a reduced likelihood of overweight and diabetes. Inadequate breastfeeding and practices of faulty feeding affect the infant's health. Breastfeeding is supreme food for infants. "Colostrum" is most beneficial for infants because it is a rich source of protein and immunoglobulins, containing antimicrobial factors that protect infants against various diseases and infections. Studies by Ware et al. (2019) and Arifeen et al. (2001) show that infants aged 0 to 5 months who are not breastfed have

a higher mortality rate than those who are breastfed. Exclusive breastfeeding helps to reduce the infant's malnutrition and morbidity.

Globally, diarrheal diseases and acute respiratory infections are significant causes of illness and death in children under five. Exclusive breastfeeding is known to reduce the risk of these infections and could save about 800,000 children in low-income areas. Despite its benefits, only 37% of infants worldwide are exclusively breastfed for the first six months of life. Studies from 2010 to 2022 found that 60 out of 70 studies confirmed the protective effects of exclusive breastfeeding against various infections in both low- and high-income country settings. Longer durations of exclusive breastfeeding were especially beneficial (Hossain *et al.*, 2022). Exclusive breastfeeding helps protect children from becoming overweight or obese. It also supports healthy growth in infants and prevents growth retardation (Osman *et al.*, 2024 and Ortega-Garcia *et al.*, 2018).

Infants should exclusively be breastfed for the first six months to ensure optimal growth, development, and health. After six months, they should begin receiving safe and nutritious complementary foods, while breastfeeding continues for up to two years or longer. (Akter *et al.*, 2012; Perez-Escamilla *et al.*, 2019). About 30% of infants are born underweight, making them more prone to infections and diseases. In India, among children aged 6-9 months, only half of those with illiterate mothers and 70% of those with literate mothers get the recommended solid or semi-solid foods along with breast milk. This leads many children in developing countries to grow up with poor health (Joseph *et al.*, 2013; Jana *et al.*, 2023). Breast milk is the healthiest option for infants. It supports health, prevents illnesses, and lowers healthcare and feeding costs. In Madhya Pradesh, many babies die soon after birth, and only 21.6% of infants are exclusively breastfed. Among infants under six months, 13.2% suffer from diarrhoea, and 4.4% experience severe respiratory infections (Kumar *et al.*, 2018; Gavine *et al.*, 2022). Each year, 2.7 million child deaths are linked to undernutrition, which is around 45% of all child deaths. Proper nutrition for infants and children under the age of five is vital for their survival and healthy development. The first two years of life are particularly critical, as good nutrition at this stage can significantly reduce the risk of lifelong health problems, lower the likelihood of illness and death, and support overall development (WHO, 2023). A present study was undertaken to evaluate the effect of feeding practices on the health status of infants (0-6 months).

OBJECTIVE OF THE STUDY

To evaluate the effect of feeding practices on the health status of infants (0-6 months).

METHODS

A present study was conducted on a 6-month-old infant in the Muzaffarpur district of Bihar. The study was conducted in different health clinics and hospitals near Muzaffarpur. A total of 30 infants who visited the clinic for treatment were randomly selected for the study to assess the impact of feeding practices on health status. The feeding patterns of the infants were classified into three groups: exclusive breastfeeding, partial breastfeeding, and formula feeding. Exclusive breastfeeding infants were those who were only breastfed for six months. Partial-breastfeeding infants were those who received both breast milk and formula, and formula-feeding infants were those who received only formula. The child's age was computed from the birth date on the immunization card.

Anthropometric measurements of weight and length were used to assess the impact of feeding practices on the health status of infants. Body weight was recorded to the nearest 0.1kg using a digital weighing scale. The body length was measured to the nearest 0.5 cm using a standard recumbent technique with the infant in a meter position. The health status of the infant is typically expressed in terms of weight for age. Weight-for-age and length-for-age classifications of the Indian Academy of Paediatrics (IAP) and GOMEZ were also calculated.

Gomez Classification

Weight for age	Grade
≤ 60%	Grade III Malnutrition
61-75%	Grade II Malnutrition
76-90%	Grade I Malnutrition
>90%	Normal

Indian Academy of Paediatrics (IAP) Classification

Weight for Age	Grade
≤50%	Grade IV Malnutrition
51-60%	Grade III Malnutrition
61-70%	Grade II Malnutrition
71-80%	Grade I Malnutrition
>80%	Normal

Data related to the morbidity status of infants were collected using a pre-developed questionnaire that included questions such as the type of illness, history of disease, frequency of illness, and frequency of illness-related hospitalizations. Statistical analysis was performed using SPSS version 20. A Chi-square test was used to compare feeding practices, and the health status of infants across different feeding practices was analyzed using a t-test or analysis of variance at a 0.05 significance level.

RESULT AND DISCUSSION

Table -1 Distribution of Infants by Sex

S. No.	Sex of Infant	Total Number	Percentage
1.	Male	13	43.3
2.	Female	17	56.7
Total		30	100

Table 1 indicates the sex distribution of infants. The data depict that 56.7% of infants were female, while 43.3% were male.

Table-2 Distribution of Infants by Mode of Delivery

S. No	Mode of Delivery	Total Number	Percentage
1	Normal Delivery	11	36.6
2	Caesarean Delivery	19	63.4
Total		30	100

Table 2 shows the delivery mode of infants. Of these, 11 (36.6%) were born by standard delivery, and the other 19 (63.4%) were born through cesarean section.

Table-3 Distribution of Infants by Feeding Practices

Feeding Practices	Number	Percentage
Exclusive Breastfeed	12	40
Partially Breastfeed	7	23.3
Formula Feed	11	36.7
Total	30	100

Table 3 depicts infant feeding practices. Twelve (40%) infants are exclusively breastfed, seven (23.3%) are partially breastfed, and eleven (36.7%) are formula-fed. Findings might be due to inadequate breastfeeding knowledge, lack of familial and societal support, lack of guidance and encouragement from health care professionals, some other factors that affect exclusivity, early use of breast milk substitutes, and duration of breastfeeding, including breast problems such as sore nipples or mother's perceptions that she is producing inadequate milk; societal barriers such as employment and length of maternity leave (Motee *et al.*, 2013; Balogun *et al.*, 2015).

Table-4 Distribution of Nutrition Status Infants according to Gomez Classification

S. No.	Malnutrition Status	Number	Percentage	Prevalence of Malnutrition
1	Normal	8	26.7	N=22 (73.3)
2	Grade I	10	33.3	
3	Grade II	7	23.3	
4	Grade III	5	16.7	
Total		30	100	

Table 4 presents the nutritional status of infants according to the Gomez classification. Table 4.4 shows the nutritional status of infants using the Gomez classification. Findings revealed that 8 (26.7%) infants had a normal nutritional status, while 10 (33.3%) infants had mild malnutrition (grade I), 7 (23.3%) infants had moderate malnutrition (grade II), and 5 (16.7%) infants had severe malnutrition (grade III), respectively. Overall, 73.3% of infants were found to be malnourished. This may be due to mothers needing more knowledge about breastfeeding and weaning practices. A mother's educational level has a significant impact on her child's nutritional outcomes (AI-Gashnin & Ghazwani, 2021; Manisha & Khan, 2022).

Table -5 Distribution of Nutrition Status Infants according to the Indian Academy of Paediatrics

S. No.	Malnutrition Status	Number	Percentage	Prevalence of Malnutrition
1	Normal	10	33.3	66.7%
2	Grade I	17	56.7	
3	Grade II	3	10	
4	Grade III	0	0	
5	Grade IV	0	0	
Total		30	100	

According to the Indian Academy of Paediatrics, a study shows that out of 30 infants, 10 (33.3%) are well-nourished. A total of 17 infants (56.7%) have mild malnutrition, classified as Grade I. Only 3 (10%) infants have moderate malnutrition, Grade II. No infants are in the more severe Grade III or Grade IV categories. Overall, 66.7% of the infants have some form of malnutrition. It might be due to poor feeding practices during infancy. According to a survey by Sahu *et al.* (2015), 60% of caregivers were unaware of tracking a child's growth. The level of malnutrition in children is influenced by factors linked to growth monitoring and nutrition. In infancy, inadequate feeding practices were standard, as 56.7% of children aged 6 to 9 months received supplemental foods, while 46.4% of infants under six months were exclusively breastfed. Mothers who had more prenatal visits and less television watching had excellent rates of exclusive breastfeeding and supplementary feeding.

Table – 6 Mean Difference between the Weight and Feeding Practices of 6-Month Infants

Feeding practices	Mean weight (kg)	Standard deviation	df	F- Value
Exclusive Breastfeed	6.58	0.51	2,27	15.61
Partial Breastfeed	5.51	0.32		
Formula Feed	5.8	0.44		
*Significant at 0.01 level (p<0.01)				

Table 6 displays the average difference in weight and feeding practices among infants aged 6 months. The mean weight of exclusively breastfed infants was 6.58 kg, followed by formula feed (5.8kg) and partial breastfeeding (5.51kg). At the 0.01 level, a statistically significant difference was observed between the mean weights and feeding practices of 6-month-old infants. Newborns should be exclusively breastfed for the first six months of life to ensure optimal growth and development of their health. To address their changing nutritional needs, newborns should be fed nutritionally adequate and safe supplemental foods while continuing to breastfeed or bottle-feed for at least two years (WHO, 2023).

Exclusive breastfeeding during the first six months of life typically supports healthy weight gain and lowers the risk of childhood obesity. It also lessens the possibility of rapid weight gain and

a higher BMI in later childhood. Therefore, encouraging exclusive breastfeeding through successful public health initiatives might be a crucial first step in the fight against childhood obesity. Infants fed formula, mainly those weaned early on, typically grow more quickly during infancy. Formula and solid foods may contain higher calories, fats, and sugars, which can contribute to excessive weight gain; however, this can increase the risk of a higher BMI in children. Exclusive breastfeeding reduces the incidence of childhood obesity and supports long-term weight management by regulating the infant's calorie intake and metabolism in a more natural manner. Bioactive elements present in breast milk, including growth factors, hormones, and enzymes, support a healthier metabolism by regulating hunger and fat storage. Breastfed newborns are more likely to eat in response to hunger cues than formula-fed infants, who may overfeed due to set feeding schedules or more significant quantities. This suggests that breastfeeding itself encourages better self-regulation of hunger.

Figure 1 Percentage of Common Morbidities among the 6-Month Age Infants

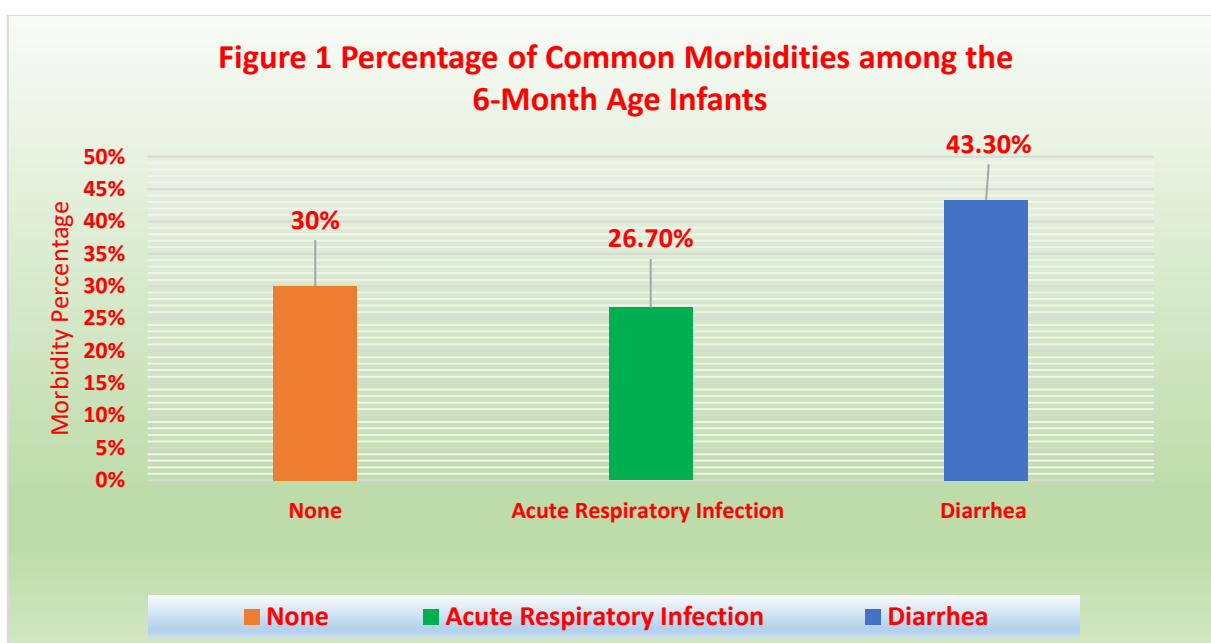


Figure 1 revealed that a maximum of 6-month-old infants suffered from Diarrhea (43.30%), while 26.70% of infants had acute respiratory infections. In contrast, 30% of infants had no morbidity complaints. These results are consistent with the studies done by Walker *et al.*, 2013 and Mehrin *et al.*, 2022.

Table-7 Association between Common Morbidities and Feeding Practices of 6-Month Infants

Common Morbidities	Feeding Pattern			Total	χ^2
	Exclusive Breast Feed	Partial Breastfeed	Formula Feed		
None	9 (30%)	0(0%)	0(0%)	9(30%)	20.98 (df-4)
Diarrhoea	2(6.67%)	6 (20%)	5(16.67%)	13(43.34%)	
Acute Respiratory Infection	1(3.33%)	2(6.67%)	5 (16.67%)	8(26.66%)	

*Significant at 0.01 Level (p<0.01)

Table 7 reveals the association between common morbidities and feeding Practices of 6-month Infants. It was observed that 100% of formula-feed and partially-fed infants were suffering from common morbidities like diarrhoea and acute respiratory infection. In comparison, only 25% of exclusively breastfed infants experienced common morbidities, and 30% of them showed no morbidity in infants. The highest morbidity was found in formula-fed infants (33.3%), followed by partial breastfeeding (26.6%) and exclusively breastfeeding (10%), respectively. A significant association was found between common morbidities and feeding practices of 6-month infants at the 0.01 level. It might be due to poor breastfeeding and weaning techniques. The incidence of morbidity was nearly twice as high in infants who breastfed for less than six months compared to those who breastfed for more than six months. However, there was a higher incidence of diarrhea and respiratory tract infections in infants exclusively breastfed for less than six months compared to those breastfed exclusively for six months or more (Joseph *et al.*,2013). The higher incidence of diarrhoea and respiratory tract infections in infants exclusively breastfed for less than 6 months, compared to those breastfed for 6 months or more, can be attributed to the protective benefits of prolonged exclusive breastfeeding. Breast milk is rich in antibodies, immune cells, and nutrients that help strengthen an infant's immune system and protect against infections. Breastfeeding for a minimum of six months provides newborns with a consistent supply of these immune-boosting substances, thereby enhancing their resistance to illnesses. Conversely, infants not nursed for more than six months may miss out on these vital immune-boosting advantages, mainly if they are introduced to solid foods or formulas that can introduce harmful infections or lack the same immune-boosting qualities. Furthermore, early weaning may be hampered by establishing a healthy gut microbiota—essential for guarding against gastrointestinal illnesses like diarrhoea. Overall, by strengthening the infant's immune system, breastfeeding exclusively for six months reduces the infant's risk of infections and other diseases.

Table- 8 Correlation between weight, morbidity status, and feeding pattern of the 6-month-old infant

Variables	Weight	Morbidity	Feeding pattern
Weight	1	-.301	-.555**
morbidity	-.301	1	.671**
Feeding pattern	-.555**	.671**	1

Table 8 depicts the correlation between weight, morbidity status, and feeding pattern of the 6-month-old infant. Results revealed that weight was negatively correlated (-0.301) with morbidity incidents among 6-month-old infants ($p < 0.05$), indicating that lower weight was associated with a higher incidence of morbidity. These results also suggested that underweight infants might be more susceptible to illness due to inadequate nutrition and poor immunity levels. Due to insufficient nutrition and low immunity levels. The current data also demonstrated a significant negative correlation (-0.555) between weight and feeding pattern ($p < 0.01$), indicating that inadequate feeding patterns may contribute to weight gain. Correlation analysis also suggested that breastfeeding promotes healthier weight gain, while formula feeding or mixed feeding may disrupt the nutrient balance, leading to weight imbalance.

Morbidity and feeding patterns exhibited a strong positive correlation ($p < 0.01$), suggesting that unhealthy feeding patterns elevate the risk of morbidity among infants. Infants who received formula or mixed feeding were more likely to experience illnesses and health complications compared to those exclusively breastfed. The correlation suggests that breastfeeding offers essential immune-boosting benefits, thereby reducing the risk of infections and diseases.

CONCLUSION

The present study found that exclusively breastfed infants have a normal weight compared with partially breastfed and formula-fed infants; therefore, implementing appropriate recommendations is essential to enhance nutritional status and promote children's development. Feeding methods during the first six months of life may affect an infant's weight gain. Exclusive breastfeeding during the first six months of life supports healthy infant weight and growth, as it is the healthiest milk for human infants. Breastfeeding reduces medical and feeding expenses while promoting health and preventing disease. Research findings indicate that infants who were exclusively breastfed until six months, compared with those who were not breastfed during that time, were more likely to experience diarrhoea and acute respiratory infections in the study. Breast milk is beneficial for an infant's health, as it is easier for their developing digestive system to digest. Antibodies found in it strengthen the immune system and guard against infections. It contains the ideal proportions of fat, sugar, water, protein, and vitamins essential for a child's development, promoting healthy weight gain. To enhance exclusive breastfeeding practices, promoting women's education, involving husbands, encouraging antenatal care, and providing exclusive breastfeeding counselling during antenatal care are recommended. In conclusion, various feeding practices significantly influence infants' growth, nutritional status, and morbidity.

REFERENCES

- Akter S.M., Roy S.K., Thakur S.K, Sultana M., Khatun W., Rahman R., Saliheen S.S., & Alam N. (2012). Effects of third trimester counseling on pregnancy weight gain, birthweight, and breastfeeding among urban poor women in Bangladesh. *Food and Nutrition Bulletin*, 33(3), 194–201. <https://doi.org/http://dx.doi.org/10.1177/156482651203300304>

- Al-Gashanin, M. A., & Ghazwani, E. Y. (2022). Knowledge, Attitude, and Practice of Weaning among Mothers in Najran Region, Saudi Arabia, 2021. *Journal of Nutrition and Metabolism*, 2022. <https://doi.org/10.1155/2022/6073878>
- Arifeen, S., Black, R. E., Antelman, G., Baqui, A., Caulfield, L., & Becker, S. (2001). Exclusive breastfeeding reduces acute respiratory infection and diarrhea deaths among infants in Dhaka slums. *Pediatrics*, 108(4). <https://doi.org/10.1542/peds.108.4.e67>
- Balogun, O. O., Dagvadorj, A., Anigo, K. M., Ota, E., & Sasaki, S. (2015). Factors influencing breastfeeding exclusivity during the first 6 months of life in developing countries: A quantitative and qualitative systematic review. In *Maternal and Child Nutrition* (Vol. 11, Issue 4, pp. 433–451). Blackwell Publishing Ltd. <https://doi.org/10.1111/mcn.12180>
- Gavine, A., Shinwell, S. C., Buchanan, P., Farre, A., Wade, A., Lynn, F., Marshall, J., Cumming, S. E., Dare, S., & McFadden, A. (2022). Support for healthy breastfeeding mothers with healthy term babies. In *Cochrane Database of Systematic Reviews* (Vol. 2022, Issue 10). John Wiley and Sons Ltd. <https://doi.org/10.1002/14651858.CD001141.pub6>
- Hossain, S., & Mirhshahi, S. (2022). Exclusive Breastfeeding and Childhood Morbidity: A Narrative Review. In *International Journal of Environmental Research and Public Health* (Vol. 19, Issue 22). MDPI. <https://doi.org/10.3390/ijerph192214804>
- Jana, A., Dey, D., & Ghosh, R. (2023). Contribution of low birth weight to childhood undernutrition in India: evidence from the national family health survey 2019–2021. *BMC Public Health*, 23(1). <https://doi.org/10.1186/s12889-023-16160-2>
- Joseph, N., Naik, V. A., Mahantshetti, N. S., Unnikrishnan, B., Mallapur, M., & Kotian, S. M. (2013). Factors associated with morbidities among infants in three sub centre areas of belgaum district of south India: A longitudinal study. *Indian Journal of Community Medicine*, 38(3), 168–174. <https://doi.org/10.4103/0970-0218.116354>
- Kumar, A., Vlasova, A. N., Deblais, L., Huang, H. C., Wijeratne, A., Kandasamy, S., Fischer, D. D., Langel, S. N., Paim, F. C., Alhamo, M. A., Shao, L., Saif, L. J., & Rajashekara, G. (2018). Impact of nutrition and rotavirus infection on the infant gut microbiota in a humanized pig model. *BMC Gastroenterology*, 18(1). <https://doi.org/10.1186/s12876-018-0810-2>
- Manisha M. & Khan, S. (2022). *KNOWLEDGE AND PRACTICE OF MOTHERS ON WEANING FOOD*. <https://www.researchgate.net/publication/363853818>
- Mehrin, S. F., Hasan, M. I., Tofail, F., Shiraji, S., Ridout, D., Grantham-McGregor, S., Hamadani, J. D., & Baker-Henningham, H. (2022). Integrating a Group-Based, Early Childhood Parenting Intervention Into Primary Health Care Services in Rural Bangladesh: A Cluster-Randomized Controlled Trial. *Frontiers in Pediatrics*, 10. <https://doi.org/10.3389/fped.2022.886542>
- Motee, A., Ramasawmy, D., Pugo-Gunsam, P., & Jeewon, R. (2013). An assessment of the breastfeeding practices and infant feeding pattern among mothers in mauritius. *Journal of Nutrition and Metabolism*, 2013. <https://doi.org/10.1155/2013/243852>
- Ortega-García, J. A., Kloosterman, N., Alvarez, L., Tobarra-Sánchez, E., Cárceles-Álvarez, A., Pastor-Valero, R., López-Hernández, F. A., Sánchez-Solis, M., & Claudio, L. (2018). Full Breastfeeding and Obesity in Children: A Prospective Study from Birth to 6 Years. *Childhood Obesity*, 14(5), 327–337. <https://doi.org/10.1089/chi.2017.0335>

- Osman, R., Katigula, I., Charles, R., Ayubu, A., Mkakilwa, P., Abdallah, Y., & Noorani, M. (2024). Improving early initiation and exclusive breastfeeding practice through PDSA framework: the experience at a private hospital in Tanzania. *BMJ Open Quality*, 13(4). <https://doi.org/10.1136/bmj-oq-2024-002893>
- Pérez-Escamilla, R., Buccini, G. S., Segura-Pérez, S., & Piwoz, E. (2019). Perspective: Should Exclusive Breastfeeding Still Be Recommended for 6 Months? In *Advances in Nutrition* (Vol. 10, Issue 6, pp. 931–943). Oxford University Press. <https://doi.org/10.1093/advances/nmz039>
- Sahu, S. K., Kumar, S. G., Bhat, B. V., Premarajan, K. C., Sarkar, S., Roy, G., & Joseph, N. (2015). Malnutrition among under-five children in India and strategies for control. In *Journal of Natural Science, Biology and Medicine* (Vol. 6, Issue 1, pp. 18–23). Medknow Publications. <https://doi.org/10.4103/0976-9668.149072>
- Walker F, C. L., Rudan, I., Liu, L., Nair, H., Theodoratou, E., Bhutta, Z. A., O'Brien, K. L., Campbell, H., & Black, R. E. (2013). Global burden of childhood pneumonia and diarrhoea. In *The Lancet* (Vol. 381, Issue 9875, pp. 1405–1416). Elsevier B.V. [https://doi.org/10.1016/S0140-6736\(13\)60222-6](https://doi.org/10.1016/S0140-6736(13)60222-6)
- Ware, J. L., Chen, A., Morrow, A. L., & Kmet, J. (2019). Associations between Breastfeeding Initiation and Infant Mortality in an Urban Population. *Breastfeeding Medicine*, 14(7), 465–474. <https://doi.org/10.1089/bfm.2019.0067>
- World Health Organization. (2023). *WHO Guideline for complementary feeding of infants and young children 6-23 months of age*. World Health Organization.

NEGOTIATING TRADITION AND MODERNITY: A KNOWLEDGE, ATTITUDE PRACTICES STUDY OF DIETARY HABITS AMONG YOUNG BENGALI AND MARWARI WOMEN RESIDING IN WEST BENGAL, INDIA

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ABSTRACT

Culture significantly influences dietary habits, with each culture having distinct languages, beliefs, and practices. In India, cultural exchange between communities has increased due to urbanisation and migration. Marwaris, originally from Rajasthan, and Bengalis from West Bengal have co-existed due to economic migration. The study assessed the impact of culture on the dietary habits of young adults.

This study recruited 100 college-going girls (50 Marwaris and 50 Bengalis) using snowball sampling. A questionnaire collected data on socio-demographic profiles, knowledge, attitudes, and practices related to cultural dietary habits to understand cultural influences on diet.

Findings revealed that all Marwari and Bengali participants were vegetarians and non-vegetarians, respectively. Bengalis identified strongly with their cultural food habits compared to Marwaris. Marwari participants' food habits did not closely align with either their own culture or Bengali culture. The higher use of traditional methods and consumption of traditional foods among Bengalis could be attributed to a positive attitude towards traditional foods, familiarity with traditional cuisine, and knowledge of traditional food preparation. Factors influencing traditional food consumption included preparation time and convenience, availability of traditional ingredients, living with grandparents/parents, attitude, and cooking skills.

Keywords: Acculturation, Cultural assimilation, Dietary habits, Indigenous foods, Traditional foods

INTRODUCTION

India is a country with a diversified culture, language, religion, caste and ethnic groups. Each region of the country (North, South, West and East) has distinct language, culture and food practices because of geographical, political, historical and economic reasons (Dhall et al. 2021, Nambiar 2021). In the Eastern region, Bengali cuisine has a strong cultural identity, while

Marwaris also have a very distinct cuisine (Sammadar et al. 2020). The uniqueness of both cultures is reflected in their cuisines. Marwaris originated from Rajasthan and moved to Kolkata 100 to 300 years ago for economic benefits (Das and Bose 2006). Kolkata is one of the important cities of the country and is sometimes regarded as the cultural centre of India (Barui 2019). The twin cities of Kolkata and Howrah are situated on the eastern and western banks of the Hooghly River, respectively (Sarkar, Das, and Mukhopadhyay 2020). Kolkata has always been known for adopting and adapting from other cultures, especially in its cuisine, because of its cosmopolitan nature (Sammadar et al. 2020). Due to urbanisation and migration, there is a possibility of exchange of cultures among people residing in close regional proximity. The combined effect of culture and ethnicity influenced by modernisation could be reflected in food habits (Som, Mishra, and Mukhopadhyay 2016). Nutritional outcomes and health behaviours are influenced by dietary patterns, which are firmly anchored in cultural traditions, beliefs, and social conventions. By examining these cultural influences, we can better address nutritional challenges, develop culturally sensitive dietary guidelines, and promote healthier eating habits within diverse communities. Despite their uniqueness, all the ethnic communities try to make an interactive space between them by adopting each other's culture (Barui 2019) and food habits (Tripathi and Srivastava 2011). However, there is a scarcity of literature assessing the effect of cross-cultural interaction on food habits, and there is less evidence on how attitudes vary across cultures. In addition, the practice of consumption of cultural foods has been impacted by access to ultra-processed foods, convenience/time required for food preparation, availability of ingredients.

Thus, the present cross-cultural study examined the knowledge, attitude and practices regarding the cultural food habits of Marwari and Bengali college-going girls residing in Kolkata and Howrah.

OBJECTIVES

1. To assess the knowledge, attitude and practice of traditional dietary habits and beliefs of 18-25 years old girls of Howrah and Kolkata.
2. To assess the factors influencing the cultural dietary habits of Bengali and Marwari college girls.

MATERIALS AND METHODS

The present cross-sectional study was conducted on 50 Marwari and 50 Bengali college-going girls aged 18-25 years old residing in Kolkata and Howrah, West Bengal, India. The sample of college-going girls was selected using snowball sampling. The questionnaire was pre-tested on 10 per cent of the sample size, and necessary modifications were made before using the tool for data collection. A self-administered questionnaire was shared with the participants to elicit information regarding socio-demographic profile, knowledge, attitude and practice (KAP) towards cultural dietary habits, food habits and factors affecting cultural dietary habits of Bengali and Marwari college-going girls.

Ethical clearance from the Institutional Ethics Committee of Lady Irwin College, University of Delhi, New Delhi, India, was obtained before data collection. Written informed consent was obtained from the participants, and a participant information sheet was provided to them.

Statistical analysis

Data entry and analysis were conducted using Microsoft Excel 2019. Descriptive analysis included calculation of mean and standard deviation (SD) for quantitative variables and calculation of frequency and percentages for categorical variables. Chi-square test and Fisher’s exact test were applied on categorical variables to assess the difference in knowledge, attitude and practices regarding cultural habits between both the groups. Results were considered significant at 5% level of significance.

Results and Discussion

The mean age was found to be 22±1 years and 21±2 years, respectively, for Bengali and Marwari participants. All the participants (n=100) were unmarried. The mean length of residence in West Bengal was found to be similar for both the groups of participants (21±5 years and 20±4 years for Bengali and Marwari college-going girls, respectively). The results on socio-demographic characteristics are presented in Table 1.

The majority of the participants (82% Bengali participants and 66% Marwari participants) lived in a nuclear family. All the Bengali participants were non-vegetarians.

Table 1. Socio-demographic profile of the participants

Socio-demographic Characteristic	Bengali participants (n=50)	Marwari participants (n=50)	p-value
Age (in years) (Mean ±S.D.)	22.36 ± 1.35	21.04 ± 1.89	
Marital status, n (%)			
Single	50 (100)	50 (100)	
Married	0 (100)	0 (100)	
Type of family ,n (%)			
Nuclear	41 (82)	33 (66)	0.068
Joint	9 (18)	17 (34)	
Length of residence in West Bengal (in years) (mean ± S.D.)	20.78 ± 5.29	19.97 ± 4.14	
Total Monthly Family Income (INR), n (%)			

Less than 50,000	21 (42)	7 (14)	0.002*
50,001-1,00,000	12 (24)	10 (20)	
1,00,001-2,00,000	8 (16)	9 (18)	
>2 lakhs	9 (18)	24 (48)	
Living arrangement, n (%)			
Living with own family	38 (76)	44 (88)	0.095*
Living in a hostel or PG	12 (24)	6 (12)	
Food Habit^bn (%)			
Non-vegetarian	50 (100)	0 (0)	0.000*
Vegetarian	0 (0)	43 (86)	
Ovo-vegetarian	0 (0)	7 (14)	

Percentages are given in parentheses. In a joint family, members of a unilineal descent group (a group in which descent through either the female or the male line is emphasised) live together with their spouses and offspring in one homestead, under the authority of one of the members. The nuclear family consists of a pair of adults and their socially recognised children. A vegetarian diet includes foods of plant origin such as whole grains, legumes, nuts and oil seeds, fruits, vegetables, as well as dairy products. Non-vegetarians are defined as those who consume some meat (red meat, poultry, at least once per month), and the total of meat and fish is >1 time/week. An ovo-vegetarian diet includes eggs alongside a vegetarian diet. Fisher's exact / Chi-square test, with the p value considered significant at 5%.

Knowledge related to cultural dietary habits

Most participants (98% of Marwari and 98% of Bengali) were aware that grilling, steaming, and boiling are healthy cooking methods. The majority reported that 'Traditional foods should be eaten in moderation' (68% of Bengali and 70% of Marwari participants). Most Bengali (98%) and Marwari (88%) participants believed that culture influences food choices. A large proportion of them (94% Bengali and 82% Marwari) indicated that traditional ingredients are used in preparing traditional dishes. Significantly more Bengali participants knew how to prepare traditional foods compared to Marwari participants (90% vs. 60%, $p < 0.001$). To evaluate their knowledge of traditional cuisine, participants were asked to identify their traditional ingredients and dishes. As shown in **Fig. 2**, dal-baati-churma (dal, an Indian pulse-based dish; baati, hard bread made from whole wheat flour; churma, a sweet made from coarsely ground wheat flour), bajre ki roti (flatbread made with bajra or pearl millet flour), gatte-ki-sabji (gram flour roundels cooked in a spicy curd-based gravy), and khichda (a porridge made from sorghum (jowar), pearl

millet, or whole wheat) were the most frequently reported traditional dishes among Marwari participants.

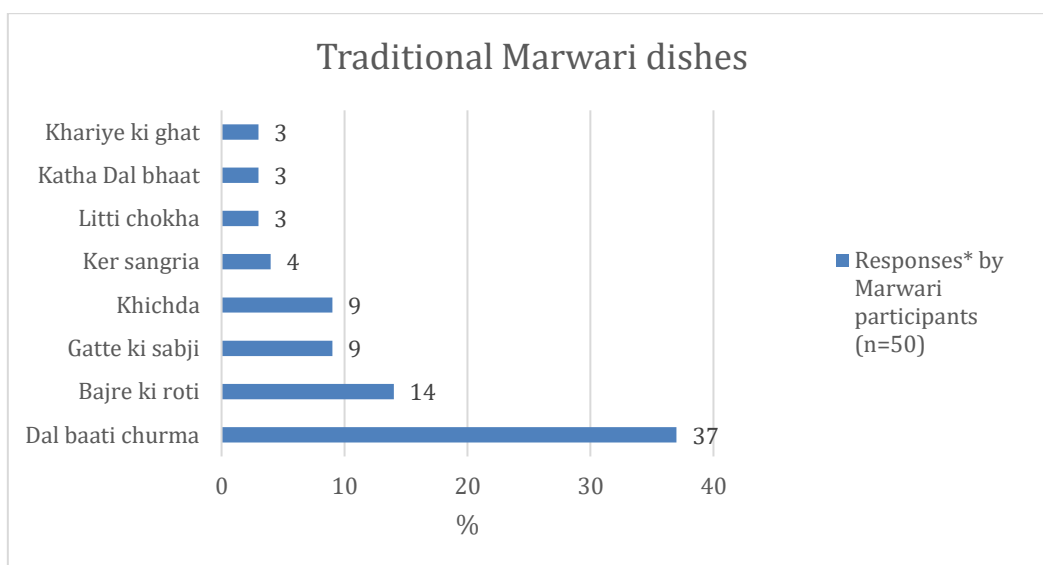


Fig. 2: Popular traditional Marwari dishes (multiple responses)(A bar chart displaying the proportion of young Marwari women consuming Marwari dishes)

Traditional Bengali dishes as presented in **Fig. 3** that were commonly mentioned by Bengali participants were *aloo posto*(potatoes in a lightly spiced poppy seeds paste), *shukto*(mixed vegetable curry), *chingri macher malaikari*(prawn curry made with mustard, coconut milk and chilli), *murighonto*(fish head cooked with rice), *bhetkipaturi*(bhetki fish pieces marinated in spiced mustard pasted and cooked by wrapping in banana leaf), *shorsheilish* (Hilsa fish cooked in mustard gravy), *luchi*(fried bread)-*aloordum*(lightly spiced and slightly sweet potato curry), *mutton kosha*(sautéed meat), *kosha mangsho*(Bengali mutton curry), *ilishbhapa*(steamed hilsa), *mocharghonto*(banana blossom curry), etc.

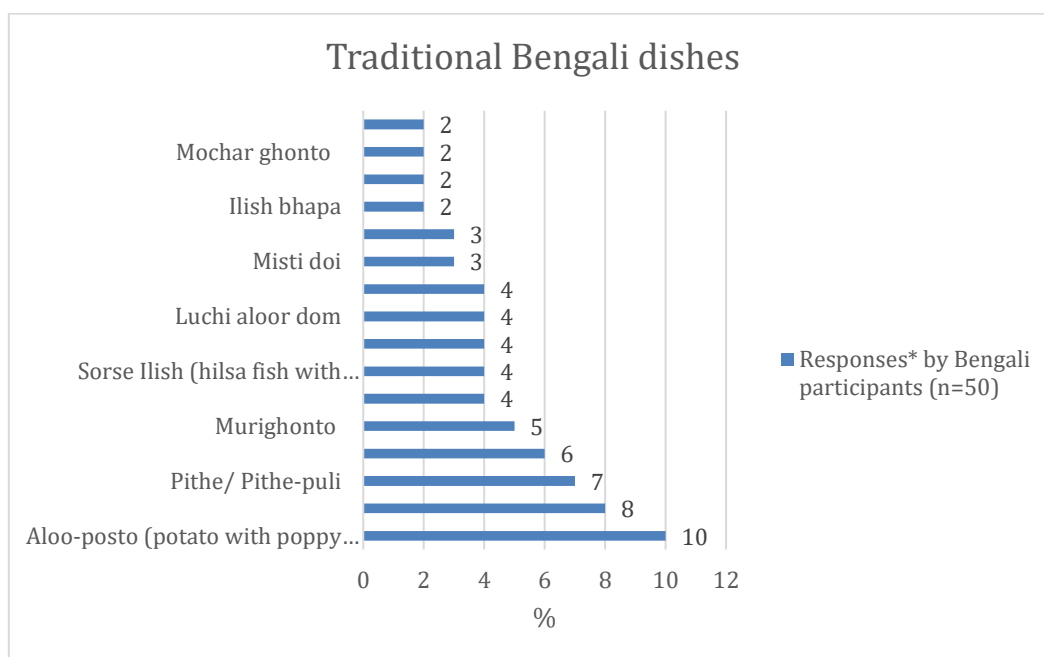


Fig. 3: Popular traditional Bengali dishes (multiple responses)(A bar chart displaying the proportion of young Bengali women consuming Bengali dishes)

Based on the responses of Marwari and Bengali participants, it was found that Bengalis have a wide variety of traditional dishes compared to Marwari participants. Varieties in sweets were also more in Bengali cuisine. Some of the popular Bengali sweets were *payesh*(rice-based pudding), *rosogulla*(syrupy, ball-shaped dumplings of chhena and semolina), *mishit doi*(fermented caramelised yoghurt), *patishapta/pithe*(rice flour crepes stuffed with coconut, *khoa* or dried evaporated milk solids and jaggery), *gurersondesh*(cottage cheese fudge with date palm jaggery), etc. The traditional dishes of both cultures are unique in terms of preparation and use of ingredients.

The condiments and spices used by the participants also varied. Some of the commonly used traditional Bengali ingredients were *posto*(poppy seeds), mustard (seeds, oil, powder), *panchphoron*(whole spice blend of fenugreek seeds, nigella seeds, cumin seeds, black mustard seeds and fennel seeds), *kalojeere*(black cumin seeds), *garam masala*(blend of ground spices), turmeric and dried red chillies. Popular traditional Marwari food items that were responded to by Marwari participants were *ghee*, bajra, ground spices, turmeric and *atta* (whole wheat flour). Spices used in Bengali cuisine are mostly whole spices e.g., *panchphoron*, whereas ground spices are more commonly used in Marwari cuisine.

Attitude of the participants related to cultural dietary habits

As shown in Table 2, familiarity with Bengali cuisine was significantly higher among Bengali participants than Marwari participants ($p < 0.001$). Similarly, familiarity with Marwari cuisine was significantly higher in Marwari participants than in Bengali participants ($p < 0.001$). On the other hand, familiarity with their own traditional cuisine was significantly higher among Bengali participants than Marwari participants (90% vs. 70%; $p < 0.05$). Bengali participants had a more

positive attitude toward the consumption of traditional foods as compared to Marwari participants ($p < 0.05$).

Table 2: Attitude related to cultural dietary habits among Marwari and Bengali participants

Attitude towards cultural food	Bengali participants (n=50), n(%)	Marwari participants (n=50), n(%)	P value
Importance of eating food similar to what they ate when they were a child			
Strongly agree	3 (6)	2 (4)	0.979
Moderately agree	7 (14)	6 (12)	
Neutral	19 (38)	19 (38)	
Moderately disagree	12 (24)	14 (28)	
Strongly disagree	9 (18)	9 (18)	
Comfortable in eating unfamiliar food			
Strongly agree	6 (12)	8 (16)	0.566
Moderately agree	8 (16)	9 (18)	
Neutral	12 (24)	9 (18)	
Moderately disagree	12 (24)	17 (34)	
Strongly disagree	12 (24)	7 (14)	
Traditional diet has negative impact on health			
Strongly agree	4 (8)	2 (4)	0.576
Moderately agree	5 (10)	4 (8)	
Neutral	12 (24)	19 (38)	
Moderately disagree	12 (24)	12 (24)	
Strongly disagree	17 (34)	13 (26)	
Those who eat traditional foods are likely to live longer			
Strongly agree	0 (0)	4 (8)	
Moderately agree	11 (22)	9 (18)	
Neutral	27 (54)	22 (44)	
Moderately disagree	6 (12)	8 (16)	0.279
Strongly disagree	6 (12)	7 (14)	

The nutritional quality of the cultural diet should be changed			0.268
Strongly agree	5 (10)	3 (6)	
Moderately agree	16 (32)	8 (16)	
Neutral	16 (32)	18 (36)	
Moderately disagree	9 (18)	15 (30)	
Strongly disagree	4 (8)	6 (12)	
Extent of consumption of traditional foods			0.008*
Very much	18 (36)	7 (14)	
Somewhat	32 (64)	40 (80)	
Not at all	0 (0)	3 (6)	
Familiarity with Bengali cuisine			0.000*
Very much	45 (90)	2 (4)	
Somewhat	5 (10)	25 (50)	
Not at all	0 (0)	23 (46)	
Familiarity with Marwari cuisine			0.000*
Very much	3 (6)	35 (70)	
Somewhat	29 (58)	15 (30)	
Not at all	18 (36)	0 (0)	
Influenced by other cultures' food choices			0.577
Never	1 (2)	3 (6)	
Rarely	4 (8)	8 (16)	

Sometimes	30 (60)	27 (54)
Frequently	13 (26)	10 (20)
Always	2 (4)	2(4)

Percentages are given in parentheses. **p*-value from Fisher's exact test

Practice related to cultural dietary habits followed among Marwari and Bengali college-going girls

The frequency of consumption of traditional Bengali foods was significantly higher among Bengali participants than Marwari participants ($p < 0.001$). Similarly, traditional Marwari foods were consumed more frequently by Marwari participants than by Bengali participants ($p < 0.001$). The frequency of consumption of traditional foods was significantly higher among Bengali participants than Marwari participants ($p < 0.001$). Bengali participants followed traditional methods of food preparation significantly more than Marwari participants ($p < 0.01$).

Bengali participants (53%) reported taste, easy availability and traditional use as reasons for preferring the mustard oil as cooking oil. One of the participants responded that “mustard oil enhances the taste of food”, while the other remarked that “Bengali traditional foods are incomplete without mustard oil”. Marwari participants mostly used sunflower oil (46%), followed by mustard oil (21%). Health benefits and taste have been found as the major determinants behind the choice of cooking oil.

Bengali participants typically accompanied their cereals with dal, vegetable curry, fish preparations, chicken curry, meat, egg, leafy vegetables, and a sweet dish, whereas Marwari participants mostly accompanied their cereals with dal and *sabji* (a vegetable dish).

Cultural food habits followed among Bengali college-going girls

A few of the Bengali participants reported that the food they usually consume has a similar taste (16%) and spiciness (16%) to that of traditional Bengali foods. Bengali participants have continued to consume fish and rice, which is an important constituents of Bengali cultural food. One of the Bengali respondents stated that “eating fish regularly” is what she has adopted from her culture. Others mentioned that use of mustard oil, consuming foods like *dal* (Indian dish made of pulse), *khichdi* (porridge made of rice and pulses) and sweets are a few of the things that they have adopted from their own Bengali dietary culture. Some of the Bengali participants mentioned that the traditional methods of food preparation, like steaming and frying, are still in practice (12%). Regarding the traditional method of food preparation, one of them stated that “in most of the Bengali traditional dishes, the frying and steaming method is used.” Bengali participants reported that they follow a specific method of food preparation that their mothers use (8%). A few of their responses were as follows:

“I use the same methods as my mother used to cut vegetables and use spices, followed by frying or steaming, or any other process as required.”

“Using traditional spices, boiling or steaming certain things; applying turmeric and salt before frying, etc.”

“While preparing *dal*, usually we add bay leaf and dried red chillies to heated oil, then when the spice becomes a bit off-colour, the boiled dal is added. This is one of the traditional methods used since time immemorial.”

Cultural food habits followed among Marwari college-going girls

Use of ghee and wheat (*chapati*, *paratha*) was adopted by 10 per cent and 8 per cent of Marwari participants, respectively. Others mentioned that the use of spices and consuming *bajra* (pearl millet), *mulisabji* (radish dish), *papad* (thin, crisp, disc-shaped food made out of seasoned dough of pulse flour), *bhujia* (crispy snack made of gram flour and spices) and rice are being followed traditionally among them. A few of the participants mentioned that the use of traditional equipment or utensils is still used to prepare traditional foods. One of them stated that they use “*sigri* (stove fuelled by fired wood or coal) for making *bajra ka rotla* (flatbread made with *bajra* or pearl millet flour) and *baati* (hard bread made of whole wheat flour) and *silbaata* (grind stone) for making *dhaniya ki chutney* (coriander sauce)” while others mentioned that “we cook in an iron *kadhahi* (wok), we use a *sil lora* (grinding stone) for preparing *chutneys* (sauces).”

Factors affecting cultural dietary habits in both groups

Time and convenience: According to 38% of the participants, preparation of traditional foods is a time-consuming process, and they prefer foods that can be prepared faster. They also stated that the lack of convenience leads to non-consumption of traditional foods. It was perceived that it takes a lot of effort and a lot of ingredients to prepare traditional foods. One of the respondents stated that “traditional dishes have elaborate chopping and cooking techniques that I am not very comfortable with”.

Availability: The Majority of the Bengali (98%) and Marwari (88%) participants did not have a problem in availing traditional ingredients. The majority of respondents (96% Bengali participants; 86% Marwari participants) were familiar with local foods available in the city. Although availability and accessibility were neither different nor difficult for both groups, consumption of local/traditional foods was significantly higher among Bengali participants ($p < 0.05$).

Living arrangement: Significantly higher proportion of Bengali participants agreed that living with their grandparents/parents facilitates consumption of traditional foods as compared to Marwari participants ($p < 0.05$). Still, most of the Bengali participants (72%) prepared traditional food when they were on their own as compared to Marwari participants ($p < 0.001$).

One of the Bengali respondents reported that it takes too much time and effort to prepare such meals just for herself, which is why she doesn't cook traditional foods when she is on her own. One of the Marwari respondents mentioned that she eats packaged foods when she is living alone and traditional food when with family.

“Because of our lifestyle, we try to find easier options for everything to save time, so here as well we find packaged foods when we are alone, while we would eat traditional foods when with family.”

Positive attitude: Significantly higher proportion of Bengali participants responded that consuming cultural foods cheered them up or made them feel good ($p < 0.05$). Most of the respondents (Bengali participants=62%, Marwari participants=52%) ‘strongly agreed’ that traditional foods are tasty.

Lack of cooking skills: Only Marwari participants reported that they don't prepare traditional foods on their own because they don't know how to cook. None of the Bengali participants responded to this as a reason not to prepare traditional foods. Bengali participants know cooking, but they mentioned they lack the expertise and experience to prepare traditional foods well. They responded the follows:

“It requires years of experience to master such food.”

“I can never get the taste correct. I miss the steps while cooking.”

Lack of traditional equipment/utensil to prepare traditional foods: Some of the Marwari participants specified a lack of availability and access to traditional equipment like *sigri* (stove fuelled by firewood or coal) and mud oven as the reason. On the contrary, none of the Bengali participants mentioned 'lack of traditional equipment/utensils' as a reason for not following traditional methods of food preparation.

DISCUSSION

This study indicated that familiarity with their own traditional cuisine as well as consumption of traditional foods was significantly higher among Bengali participants compared to Marwari participants ($p < 0.05$). A study on European participants reported a similar finding, with participants giving importance to food being familiar with what they eat, they are more likely to consume traditional foods (Pieniak et al. 2009). One of the key factors in determining food choices among the participants was peer influence. Peers play an important role in influencing food habits (Bailey et al. 2018). The food choices of peers influenced the food habits of the participants in the study. It was perceived by participants that it takes a lot of effort and a lot of ingredients to prepare traditional foods. Moreover, selection, buying and preparation of traditional foods take more time and are less convenient than their daily diet. It was observed that both the skills to prepare traditional foods and the consumption of traditional foods were significantly higher among Bengali participants compared to Marwari participants.

CONCLUSION

Food habits of Bengali participants were more influenced by culture compared to Marwari participants. Bengali participants were found to be more attached to their cultural roots. Marwari participants neither identified much with their own culture nor did they adopt much from Bengali culture. Use of traditional methods of food preparation and Increased consumption of traditional foods among Bengali participants may be linked to their positive attitude towards traditional foods, familiarity with traditional cuisine, and knowledge about the preparation of traditional foods. Factors affecting the consumption of traditional foods include the time required for preparation, convenience, availability of traditional ingredients and foods, living with grandparents or parents, attitudes, and cooking skills. Time consumption, inconvenience, and lack of cooking skills act as barriers to consuming traditional foods. Most studies on changing food consumption trends and nutrition transition are viewed from the perspectives of 'westernisation' and 'urbanisation', but this study focuses on the shifting trends in traditional dietary habits. Generally, food habits are summarised for a cultural region or state, yet few

studies examine the spatial variation in food habits. A limitation of this study is its small sample size, which prevents broad generalisation of the results. Culture plays a crucial role in food consumption, and this study highlights the impact of culture on the food habits of migrants. Therefore, nutritionist must be trained on paying attention to cultural practices of individuals while doing the dietary counselling of individuals. In addition, analysing regional variations in food preferences and habits is essential for understanding malnutrition issues related to unique local dietary patterns of people.

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REFERENCES

- Bailey C, Garg V, Kapoor D, Wasser H, Prabhakaran D, and Jaacks L M. 2018. "Food choice drivers in the context of the nutrition transition in Delhi, India." *Journal of Nutrition Education and Behavior*. 50 (7): 675-686. [10.1016/j.jneb.2018.03.013](https://doi.org/10.1016/j.jneb.2018.03.013).
- Barui J. 2019 "A journey through Bengali culture: avenues of Kolkata". *International Journal of Research in Engineering, Science and Management* 2(8):39-42.
- Das M and Bose K. 2006. "Presence of high rates of overweight and obesity among adult Marwaris of Howrah, West Bengal, India." *Coll Antropol*. 30(1): 81-86.
- Dhall M, Nilupher, Devi KS, and Gupta, U. 2021. "Health and Nutrition among various populations of India: An anthropological perspective". In *Indian Food Anthropology and the Eat Right Movement (Vol. 1)*, edited by Vanisha Nambiar, 29-41, New Delhi India: Selective and Scientific Books.
- Nambiar, V. 2021. "Understanding Indian food anthropology for the Eat Right Movement". In *Indian Food Anthropology and the Eat Right Movement (Vol. 1)* edited by Vanisha Nambiar, 1-8, New Delhi: Selective and Scientific Books.
- Pieniak, Z, Verbeke W, Vanhonacker F, Guerrero L, and Hersleth, M. 2009 "Association between traditional food consumption and motives for food choice in six European countries." *Appetite*. 53(1):101-108. [10.1016/j.appet.2009.05.019](https://doi.org/10.1016/j.appet.2009.05.019).
- Samaddar A, Cuevas RP, Custodio MC, Ynion, J, Ray A, Mohanty SK, and Demont M. 2020. "Capturing diversity and cultural drivers of food choice in eastern India." *International Journal of Gastronomy and Food Science*. <https://doi.org/10.1016/j.ijgfs.2020.100249>.
- Sarkar M, Das A, and Mukhopadhyay S. 2020. "Assessing the immediate impact of COVID-19 lockdown on the air quality of Kolkata and Howrah, West Bengal, India." *Environ Dev Sustain*. <https://doi.org/10.1007/s10668-020-00985-7>.
- Som N, Mishra SK, and Mukhopadhyay S. 2016. "Weight concerns and food habits of adolescent girls in two contrasting ecological regions: A comparative study in India." *Eating Behaviors*. 20:21-26. [10.1016/j.eatbeh.2015.11.006](https://doi.org/10.1016/j.eatbeh.2015.11.006).
- Tripathi A, and Srivastava S. 2011 "Interstate migration and changing food preferences in India." *Ecology of Food and Nutrition* 50:410-428. <https://doi.org/10.1080/03670244.2011.604586>.

**A STUDY ON THE EFFICACY OF DIFFERENT COOKING TECHNIQUES ON
REDUCING THE ANTI-NUTRIENT CONTENT OF *CARICA PAPAYA* SEEDS
AND ITS INCORPORATION IN A FOOD PRODUCT**

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ABSTRACT

Seeds are the part of the fruits and vegetables which are commonly discarded in spite of them being a storehouse of various nutrients and bioactive compounds having numerous health benefits. *Carica papaya* seeds have been underutilized from the very ancient time due to different taboos. Consumers also lack awareness regarding the health benefits of papaya seeds. In spite of having endless functional and nutritional properties, the bioavailability will be reduced unless anti-nutrients are minimized in seeds. The present study thus aims to serve the effects of different cooking techniques like boiling, blanching, steaming, pressure cooking, soaking, roasting and baking to reduce the anti-nutrient content of papaya seeds. Results obtained show that although boiling reduced the anti-nutrient content significantly, using the technique of steaming (20 minutes) maximum retention was observed with respect to the nutrient profile. Consequently, a vegan cheese was developed using chickpeas enriched with papaya seed (flour) post steaming for 20 minutes. Thereafter, sensory evaluation was carried out with maximum score obtained by V2 (4% papaya seed flour). The enriched vegan cheese (V2) so developed was rich in essential fats, PUFA, MUFA, polyphenol and flavonoid, low in cost as compared to the several commercially available vegan cheeses. Thus, this can be an innovative way to incorporate papaya seeds in the regular diet.

Keywords: Anti-nutrient, cheese, cooking techniques, nutrient, papaya seeds, vegan

INTRODUCTION

Seeds are the primary reproductive units of higher plants, formed through sexual reproduction, and essential to global agriculture. Nutritionally, seeds are rich in proteins, fats, vitamins, and minerals, offering significant health benefits, yet many nutrient-dense seeds are underutilized. Growing scientific consensus promotes their inclusion as functional foods due to their phytochemical profile and adaptability in processing.

Although seeds of fruits and vegetables are rich sources of proteins, essential fatty acids, and bioactive compounds, Anti-nutritional factors (ANFs) such as phytates, tannins, oxalates, and enzyme inhibitors present in seeds reduce nutrient bioavailability by impairing mineral absorption

and protein digestibility (Soetan & Oyewole, 2009). Processing strategies such as fermentation, soaking, roasting, boiling, and germination have effectively reduced ANF levels, thereby enhancing nutritional quality and presents as a sustainable approach for valorization of underutilized seeds in food and nutraceutical industries.

Vegan cheese and functional food innovation

Veganism, originally conceptualized in 1944 as a lifestyle avoiding animal exploitation, now extends to exclude animal-derived ingredients. Vegan cheese, a dairy-free analogue, is formulated from plant-based substrates such as soy protein, nuts and microbial cultures. Several commercial vegan cheeses are rich in saturated fats due to ingredients like nuts, there is growing interest in alternatives with improved lipid profiles.

Nutritional rationale and ingredient innovation

For the present study, chickpeas were chosen as the vegan cheese base owing to the presence of unsaturated fats and bioactive phytochemicals, including polyphenols and flavonoids. Papaya seeds, recognized for their nutritional potential, were incorporated in limited amounts due to reported toxicity in aquatic models, necessitating precise quantification and safety assessment prior to human food application.

AIM AND OBJECTIVES

Although seeds contain several anti-nutrients as well as various effective bioactive components, several studies have shown that seeds are discarded by majority of the population.

Aim

The present study aimed to evaluate the effectiveness of selected traditional cooking techniques in reducing anti-nutritional factors in papaya seeds and to assess their incorporation into a food product for improved utilization and potential health benefits.

Objectives

1. To quantify the levels of various anti-nutrients in papaya seeds before and after applying different thermal and non-thermal processing methods.
2. To identify the most effective cooking technique that significantly reduces anti-nutrients while retaining essential macro- and micronutrients.
3. To develop a value-added food product using optimally processed papaya seeds and evaluate its physicochemical, nutritional, and phytochemical properties, including shelf life.

METHODOLOGY

To valorize papaya seeds and mitigate their anti-nutritional content, this study evaluated various thermal and non-thermal processing techniques aimed at enhancing nutritional bioavailability and suitability for functional food applications. Anti-nutritional compounds many of which are heat-labile and proteinaceous can inhibit nutrient absorption and must be effectively neutralized for safe consumption. A series of standardized household processing methods were applied, including boiling, blanching, soaking, pressure cooking, steaming, baking, and roasting, each for durations informed by prior literature (Ray, 2014). These treatments facilitated anti-nutrient degradation

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through heat-induced denaturation and leaching while maintaining nutrient integrity. The processing method offering the best balance between anti-nutrient reduction and nutrient retention was selected for functional food development.

The food product developed was a vegan cheese since cheese is widely consumed and a vegan version would be a nutritionally healthier one. A standard vegan chickpea cheese recipe was taken and papaya seeds treated with best cooking technique were incorporated into the product.

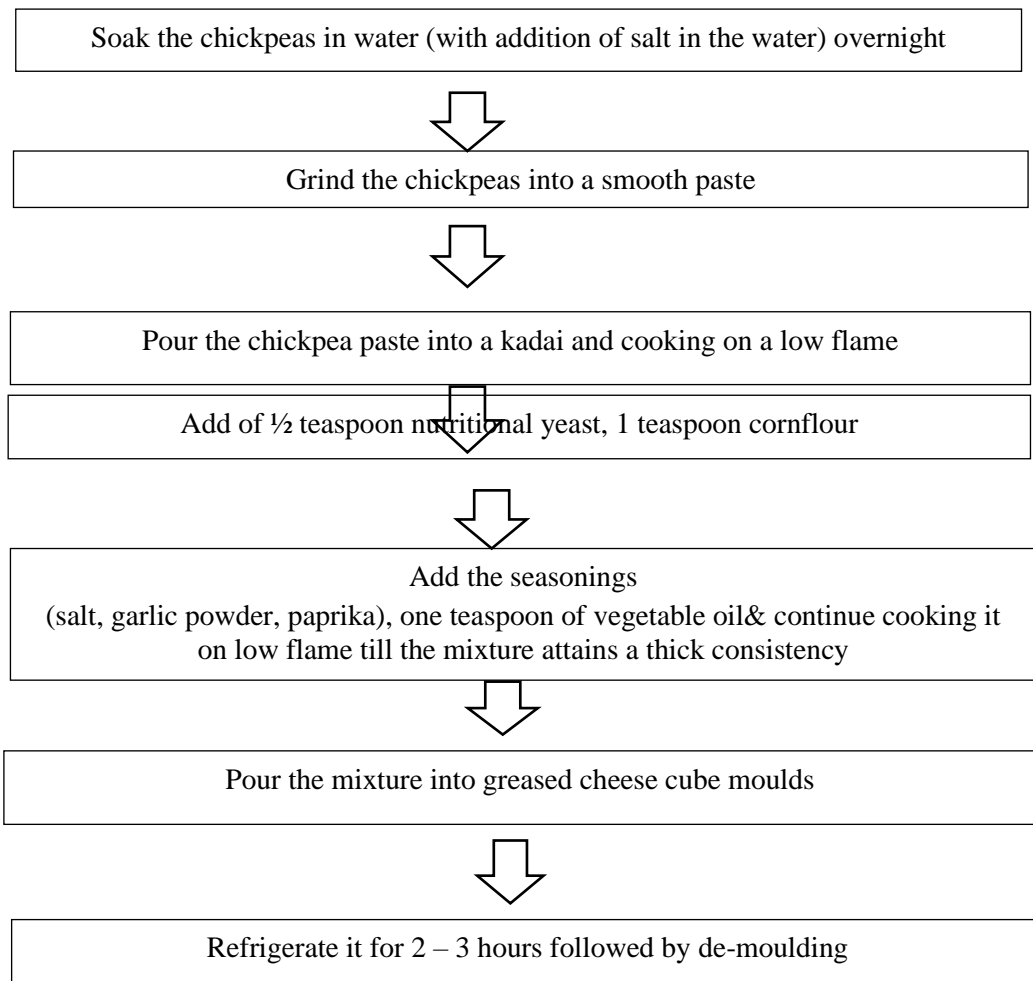


Fig 1: Preparation of Vegan Cheese with Chickpeas



Fig 2: Most Approved Product – V2

Sensory evaluation of vegan cheese formulations was conducted using a 9-point hedonic scale to assess colour, appearance, odour, texture, and taste. A panel of 50 semi-trained individuals, were selected based on consumer preference patterns for cheese among young adults (Cartwrighta, 2007), and independently evaluated the samples to avoid bias (Singh et al., 2020). The formulation with the highest mean hedonic score was chosen for subsequent analysis of nutritional composition, functional properties, melting behavior, shelf-life, anti-nutrients, and phytochemical content (AOAC, 2016).

Table 1: Composition of Basic and Variations of Vegan Cheese

Variation	Chickpeas	Cornflour	Nutritional Yeast	Salt	Paprika	Vegetable Oil	Ginger Powder	Garlic Powder	Papaya Seed
Basic (B)	60g	10g	10g	5g	2.5g	5ml	3.75g	3.75g	-
Variation 1 (V1)	60g	9.5g	9.5g	5g	2.5g	5ml	3.25g	3.25g	2g
Variation 2 (V2)	60g	8.75g	8.75g	5g	2.5g	5ml	3g	3g	4g
Variation 3 (V3)	60g	8g	8g	5g	2.5g	5ml	2.75g	2.75g	6g

Table 2: Analysis methods used for the quantitative estimation of different components

Components	Analysis Methods Used
Proximate Analysis	1. Carbohydrate – Anthrone Method 2. Protein – Folin Lowry Method 3. Fat – Soxhlet Method, MUFA, PUFA, Essential Fatty Acids – AOAC Method 4. Crude Fiber – Acid and Base digestion with dry ashing (AOAC International Methods)
Physico-chemical Properties	1. Moisture – Thermogravimetric Analysis (AOAC International Methods) 2. Ash – Ashing Method (AOAC International Methods) 3. Melting Point
Vitamins	1. Vitamin C – 2,6 Dichlorophenol Indophenol Dye (DCIP Method)
Minerals	1. Calcium – O – CresolphthaleinComplexone (OCPC Method) 2. Phosphorus – Spectrophotometric Estimation – Molybdate Method 3. Iron – Spectrophotometric Estimation – Ferrozine Method 4. Magnesium - Spectrophotometric Estimation – Calmagite Method
Phyto-Chemicals	1. Anti – Oxidant Activity –Spectrophotometric DPPH (1,1-diphenyl-2-picrylhydrazyl) Method 2. Flavonoid – Aluminium-Chloride Colorimetric Method 3. Polyphenols – Spectrophotometric Estimation - Folin-Ciocalteau Method 4. β Carotene - Solvent Extraction Spectrophotometric Method
Anti-Nutrients	1. Phytic Acid – Complexometric Titration 2. Tannic Acid – Titration Method 3. Oxalic Acid – Redox Titration 4. Saponin – Spectrophotometric Assay using Liebermann – Burchard Reagent 5. Trypsin Inhibitor - Spectrophotometric Assay using Bromocresole Purple
Shelf Life	1. Total Plate Count (TPC) Method

FINDINGS AND DISCUSSION

Despite their potential, papaya seeds remain largely underutilized due to lack of awareness regarding their applications. The pre- and post-processing analysis revealed significant reductions ($p < 0.05$) in ANF content across all methods. Among the cooking methods evaluated, water-based techniques were found to be significantly more effective in reducing anti-nutrient levels compared to dry-heat methods such as baking and roasting. This enhanced efficacy is attributed to the water solubility of most anti-nutrients, allowing them to leach into the cooking medium. Additionally, moist heat promotes thermal degradation and enzymatic inactivation of anti-nutrients. Conversely, dry-heat treatments exhibited limited reduction, as they maintain the food's native pH and lack a leaching medium, rendering anti-nutrient breakdown less efficient.

Analysis of Anti-nutrients of seeds

Table 3: Anti-nutrient content of papaya seeds pre- and post-application of cooking techniques

Cooking Technique	Tannic Acid (%)	Oxalic Acid (mg/100g)	Phytic Acid (mg/100g)	Saponin (mg/100g)	Trypsin Inhibitor (mg/100g)
Uncooked Ripe Papaya Seeds	0.33 (±1.2)	9.12 (±1.7)	8.14 (±1.8)	7.26 (±1.7)	5.16 (±1.5)
Boiling 20 minutes	0.14 (±1.4)	4.43 (±2.1)	4.49 (±1.9)	4.13 (±1.4)	3.85 (±1.7)
Boiling 40 minutes	0.13 (±1.3)	4.12 (±2.3)	4.06 (±1.8)	3.39 (±1.5)	3.21 (±1.4)
Blanching 10 minutes	0.24 (±1.2)	5.66 (±1.8)	6.14 (±1.6)	5.38 (±1.3)	4.92 (±1.6)
Blanching 20 minutes	0.16 (±1.5)	6.32 (±2.2)	5.77 (±1.7)	5.16 (±1.6)	4.54 (±1.3)
Soaking 8 hours	0.19 (±1.6)	6.14 (±1.9)	3.76 (±1.5)	3.51 (±1.3)	3.91 (±1.8)
Soaking 12 hours	0.14 (±1.1)	5.83 (±1.8)	3.15 (±1.6)	3.45 (±1.4)	3.87 (±1.7)
Steaming 20 minutes	0.11 (±1.4)	4.21 (±1.7)	4.48 (±1.5)	3.53 (±1.2)	3.22 (±1.4)
Steaming 40 minutes	0.07 (±1.5)	4.16 (±1.6)	4.33 (±1.4)	3.44 (±1.5)	3.16 (±1.5)
Pressure Cooking 10 minutes	0.19 (±1.3)	6.21 (±2.1)	6.82 (±1.5)	4.72 (±1.6)	3.16 (±1.7)
Pressure Cooking 15 minutes	0.14 (±1.1)	5.84 (±1.8)	6.61 (±1.8)	4.58 (±1.3)	2.93 (±1.6)
Baking 20 minutes	0.15 (±1.2)	7.23 (±1.6)	5.54 (±1.7)	5.37 (±1.2)	4.22 (±1.5)
Baking 30 minutes	0.14 (±1.3)	7.17 (±1.9)	5.23 (±1.5)	5.22 (±1.5)	4.21 (±1.7)
Roasting 20 minutes	0.13 (±1.4)	7.41 (±2.4)	6.18 (±1.8)	5.16 (±1.1)	4.62 (±1.4)
Roasting 30 minutes	0.21 (±1.5)	7.02 (±2.2)	6.04 (±1.7)	5.07 (±1.5)	4.49 (±1.7)

Boiling for 40 minutes achieved the highest reductions in phytic acid and tannins; however, it also led to substantial nutrient loss, particularly in vitamin C, β - Carotene, proteins and minerals like calcium and phosphorus.

Analysis of Macronutrients of seeds

Table 4: Macro-nutrient content of papaya seeds pre and post the application of cooking techniques

Cooking Technique	Carbohydrate (g/100g)	Protein (g/100g)	Fat (g/100g)	Crude Fiber (%)	Energy (Kcal/100g)
Uncooked Ripe Papaya Seeds	35.27 (±2.5)	2.07 (±1.6)	2.57 (±1.8)	22.13	172.44
Boiling 20 minutes	29.45 (±2.2)	1.001(±1.3)	2.51 (±1.4)	18.29	144.39
Boiling 40 minutes	29.45 (±1.9)	0.36 (±1.2)	2.46 (±1.2)	17.06	141.38
Blanching 10 minutes	30.86 (±1.8)	0.85 (±1.4)	2.51 (±1.3)	19.85	149.43
Blanching 20 minutes	30.86 (±2.3)	0.36 (±1.5)	2.46 (±1.7)	18.43	147.02
Soaking 8 hours	32.68 (±2.5)	2.02 (±1.2)	2.53 (±1.9)	20.43	161.498
Soaking 12 hours	31.49 (±2.3)	1.87 (±1.3)	2.5 (±1.4)	20.32	155.94
Steaming 20 minutes	33.46 (±2.4)	2.03 (±1.6)	2.52(±1.3)	20.54	164.64
Steaming 40 minutes	32.44 (±2.7)	1.6 (±1.4)	2.49 (±1.8)	19.11	158.57
Pressure Cooking 10 minutes	18.34 (±2.5)	0.76 (±1.3)	2.44 (±1.3)	18.14	98.36
Pressure Cooking 15 minutes	16.92 (±1.8)	0.51(±1.2)	2.42 (±1.6)	18.03	91.5
Baking 20 minutes	26.74 (±1.9)	1.77 (±1.5)	2.42 (±1.8)	18.72	135.82
Baking 30 minutes	25.39 (±2.3)	1.26 (±1.7)	2.39 (±1.5)	18.05	128.11
Roasting 20 minutes	30.76 (±2.5)	2.02 (±1.6)	2.46 (±1.3)	19.21	153.26
Roasting 30 minutes	29.4 (±1.8)	1.17 (±1.4)	2.43 (±1.7)	18.41	144.15

Table 5: Mineral Content of papaya seeds pre and post the application of cooking techniques

Cooking Technique	Calcium (mg/100g)	Phosphorus (mg/100g)	Magnesium (mg/100g)	Iron (mg/100g)
Uncooked Ripe Papaya Seeds	53.13 (±2.7)	238.8 (±3.4)	10.4 (±1.5)	48.6 (±1.6)
Boiling 20 minutes	49.53 (±2.3)	234.1(±3.5)	7.36 (±1.4)	45.03 (±1.8)
Boiling 40 minutes	46.91 (±2.5)	232.1 (±3.3)	6.54 (±1.2)	44.87 (±1.7)
Blanching 10 minutes	50.16 (±2.2)	235.1 (±3.6)	7.38 (±1.3)	46.07 (±1.6)
Blanching 20 minutes	49.45 (±2.4)	233.4 (±3.5)	7.04 (±1.2)	44.88 (±1.4)
Soaking 8 hours	51.17 (±2.5)	234.4 (±3.2)	7.42 (±1.4)	47.12 (±1.5)
Soaking 12 hours	50.37 (±2.6)	233.1 (±3.3)	7.13 (±1.5)	47.05 (±1.8)
Steaming 20 minutes	51.09 (±2.3)	235.2 (±3.2)	9.14 (±1.3)	47.13 (±1.5)
Steaming 40 minutes	50.03 (±2.4)	234.7 (±3.4)	8.64 (±1.2)	46.81(±1.2)
Pressure Cooking 10 minutes	49.22 (±2.7)	232.6 (±3.5)	7.57 (±1.5)	45.32 (±1.4)
Pressure Cooking 15 minutes	47.16 (±2.9)	231.1 (±3.7)	7.32 (±1.6)	44.38 (±1.6)

minutes				
Baking 20 minutes	48.31 (\pm 2.5)	233.8 (\pm 3.2)	7.66 (\pm 1.3)	44.65 (\pm 1.9)
Baking 30 minutes	48.13 (\pm 2.3)	232.4 (\pm 3.3)	7.54 (\pm 1.6)	43.33 (\pm 1.6)
Roasting 20 minutes	48.32 (\pm 2.4)	231.9 (\pm 3.2)	7.44 (\pm 1.5)	44.43 (\pm 1.3)
Roasting 30 minutes	47.65 (\pm 2.6)	231.1 (\pm 3.1)	7.24 (\pm 1.4)	43.14 (\pm 1.5)

Table 6: Vitamin Content of papaya seeds pre and post the application of cooking techniques

Cooking Technique	Vitamin A (mg/100g)	Vitamin C (mg/100g)
Uncooked Ripe Papaya Seeds	3.81 (\pm 1.5)	10.76 (\pm 1.6)
Boiling 20 minutes	2.9 (\pm 1.3)	5.93 (\pm 1.4)
Boiling 40 minutes	1.1 (\pm 1.2)	3.34 (\pm 1.2)
Blanching 10 minutes	2.6 (\pm 1.3)	5.04 (\pm 1.5)
Blanching 20 minutes	2.3 (\pm 1.5)	4.27 (\pm 1.4)
Soaking 8 hours	3.1 (\pm 1.2)	6.82 (\pm 1.2)
Soaking 12 hours	2.9 (\pm 1.3)	5.44 (\pm 1.4)
Steaming 20 minutes	3.3 (\pm 1.2)	7.83 (\pm 1.7)
Steaming 40 minutes	2.87 (\pm 1.5)	6.05 (\pm 1.6)
Pressure Cooking 10 minutes	2.7 (\pm 1.5)	5.62 (\pm 1.4)
Pressure Cooking 15 minutes	2.5 (\pm 1.4)	4.08 (\pm 1.5)
Baking 20 minutes	1.15 (\pm 1.1)	5.4 (\pm 1.2)
Baking 30 minutes	0.9 (\pm 1.2)	4.23 (\pm 1.4)
Roasting 20 minutes	1.2 (\pm 1.4)	5.72 (\pm 1.2)
Roasting 30 minutes	0.8 (\pm 1.5)	4.42 (\pm 1.3)

Table 7: Phytochemical properties of papaya seeds pre and post the application of cooking techniques

Cooking Technique	Alkaloid (mg/100g)	Polyphenol (mg/100g)	Anti-oxidant Activity (%)	Flavonoid (mg/100g)
Uncooked Ripe Papaya Seeds	8.5 (\pm 1.7)	32.1 (\pm 2.4)	10.2 (\pm 1.7)	16.6 (\pm 1.5)
Boiling 20 minutes	7.6 (\pm 1.4)	27.3 (\pm 2.3)	6.7 (\pm 1.8)	10.3 (\pm 1.7)
Boiling 40 minutes	6.88 (\pm 1.5)	25.4 (\pm 2.5)	4.2 (\pm 1.5)	9.2 (\pm 1.6)
Blanching 10 minutes	8.4 (\pm 1.3)	30.2 (\pm 2.6)	7.6 (\pm 1.4)	12.1 (\pm 1.5)
Blanching 20 minutes	8.4 (\pm 1.2)	29.1 (\pm 2.5)	6.2 (\pm 1.3)	11.5 (\pm 1.4)
Soaking 8 hours	8.1 (\pm 1.5)	31.1 (\pm 2.2)	7.1 (\pm 1.2)	14.1 (\pm 1.3)
Soaking 12 hours	7.7 (\pm 1.6)	30.2 (\pm 2.3)	5.1 (\pm 1.5)	14 (\pm 1.4)
Steaming 20 minutes	8.3 (\pm 1.3)	30.1 (\pm 2.2)	8.9 (\pm 1.4)	14.1 (\pm 1.3)
Steaming 40 minutes	8.2 (\pm 1.4)	29.4 (\pm 2.4)	6.5 (\pm 1.3)	13.7 (\pm 1.5)

Pressure Cooking 10 minutes	8.5 (± 1.5)	29.8 (± 2.5)	5.6 (± 1.5)	11.6 (± 1.4)
Pressure Cooking 15 minutes	8.1 (± 1.2)	28.2 (± 2.6)	4 (± 1.6)	11.1 (± 1.6)
Baking 20 minutes	8.5 (± 1.1)	24.2 (± 2.5)	5.1 (± 1.3)	11.7 (± 1.2)
Baking 30 minutes	8.4 (± 1.2)	22.9 (± 2.4)	3.5 (± 1.2)	10.2 (± 1.3)
Roasting 20 minutes	8.1 (± 1.7)	26.1 (± 2.2)	5.9 (± 1.3)	12.1 (± 1.4)
Roasting 30 minutes	7.4 (± 1.5)	24.9 (± 2.1)	4.7 (± 1.1)	11.4 (± 1.5)

Analysis of Physicochemical Properties of seeds

Table 8: Physicochemical properties of papaya seeds pre and post application of cooking techniques

Cooking Technique	Moisture (%)	Ash (%)	Titration Acidity (%)
Uncooked Ripe Papaya Seeds	2.7	7.29	0.05
Boiling 20 minutes	6.75	5.23	0.02
Boiling 40 minutes	7.13	5.14	0.03
Blanching 10 minutes	4.12	6.23	0.03
Blanching 20 minutes	4.83	5.88	0.03
Soaking 8 hours	7.15	6.53	0.03
Soaking 12 hours	7.46	6.47	0.03
Steaming 20 minutes	3.68	6.84	0.03
Steaming 40 minutes	4.43	6.42	0.02
Pressure Cooking 10 minutes	6.83	6.16	0.03
Pressure Cooking 15 minutes	7.28	5.72	0.03
Baking 20 minutes	1.72	5.82	0.02
Baking 30 minutes	1.38	5.51	0.02
Roasting 20 minutes	1.18	6.15	0.03
Roasting 30 minutes	1.05	5.71	0.03

Steaming for 20 minutes was found to be the most efficient and balanced method, significantly lowering anti-nutrients, as per Table 3, while retaining a higher proportion of proteins and minerals. The gentler heat and absence of direct water contact likely minimized leaching and degradation of heat-sensitive nutrients.

Although water-based techniques are effective in reducing anti-nutritional factors, prolonged methods like boiling, pressure cooking, and blanching led to significant leaching of water-soluble vitamins (B and C), and degradation of proteins, carbohydrates, β -carotene, polyphenols, flavonoids, antioxidants and mineral content, including partially heat-stable elements like phosphorus and iron. Therefore, applying cooking methods at moderate temperatures and for shorter durations is recommended to optimize nutrient retention while minimizing anti-nutrient content.

Development of Vegan Cheese with the incorporation of steamed ripe papaya seeds

Consequently, 2g, 4g, 6g of steamed ripe papaya seeds (20 minutes) were thereafter incorporated into a functional vegan cheese prototype, using chickpeas as the base. Variation 2 with 4g of the treated seeds scored highest and was selected as the final formulation for subsequent nutritional profile analysis.

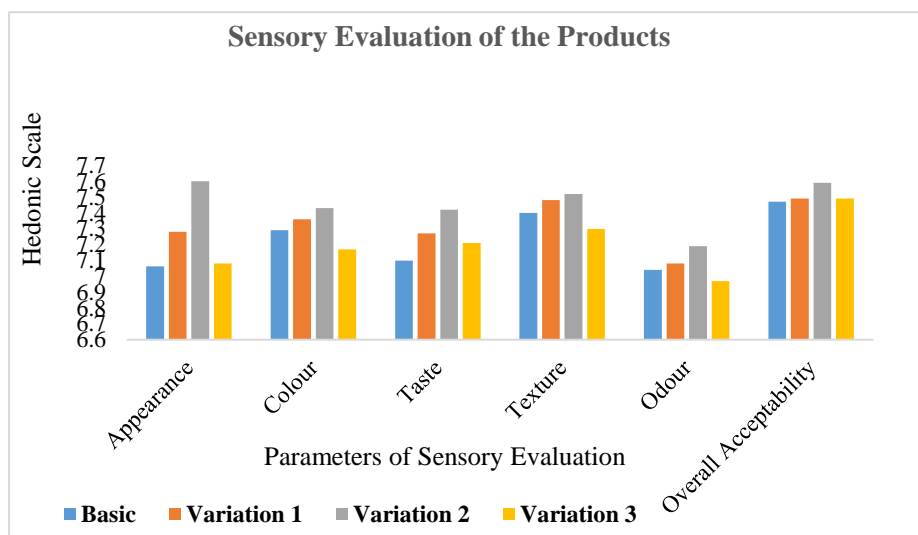


Fig 3: Sensory Evaluation of all the developed products

Anti-nutrients in vegan cheese

Table 9: Anti-nutrient content of the basic product and the final product

Product	Tannic Acid (%)	Oxalic Acid (mg/100g)	Phytic Acid (mg/100g)	Saponin (mg/100g)	Trypsin Inhibitor (mg/100g)
Basic	0.11 (±1.4)	0.3 (±1.8)	1.34 (±1.5)	3.82 (±1.3)	1.12 (±1.5)
Variation 2	0.10 (±1.3)	0.259 (±1.7)	1.18 (±1.4)	2.71 (±1.2)	0.94 (±1.3)

Chickpeas were pre-soaked to reduce native ANFs by over 50%. Variation 2 (V2), which included an additional 2–3 minutes of post-integration heating, showed the lowest total ANF content compared to the control.

Nutritional Content of Vegan Cheese

Table 10: Macro-nutrient and Micronutrient content of the developed products

Nutrient	Basic	Variation 2
Carbohydrate (g/100g)	15.34 (±2.4)	16.12 (±2.3)
Protein (g/100g)	7.12 (±1.5)	7.27 (±1.3)
Fat (g/100g)	13.7 (±1.5)	14 (±1.4)
Essential Fatty Acid (EFA) (g/100g)	-	6.8
PUFA (g/100g)	-	6.8
MUFA (g/100g)	-	2.83

Crude Fiber (%)	1.86	3.85
Energy (Kcal/100g)	189.23	192.64
Calcium (mg/100g)	14.2 (± 1.6)	16.37 (± 1.4)
Phosphorus (mg/100g)	98.06 (± 3.1)	107.3 (± 3.2)
Magnesium (mg/100g)	41.9 (± 1.7)	42.36 (± 1.5)
Iron (mg/100g)	1.23 (± 1.8)	1.37 (± 1.5)
β Carotene (mg/100g)	4.2 (± 1.4)	5.07 (± 1.5)
Vitamin C (mg/100g)	0.26 (± 1.2)	0.31 (± 1.1)

Table 11: Phytochemical properties of developed products

Product	Alkaloid (mg/100g)	Polyphenol (mg/100g)	Anti-oxidant Activity (%)	Flavonoid (mg/100g)
Basic	7.3 (± 1.2)	4.24 (± 1.8)	61.77 (± 2.3)	32.36 (± 1.5)
Variation 2	7.3 (± 1.3)	5.27 (± 1.6)	70.63 (± 1.9)	35.12 (± 1.4)

The product demonstrated a favourable lipid profile including PUFA, MUFA due to the presence of papaya seeds as seen in Table 10. Formulation V2, containing 4 g of steamed papaya seed flour, demonstrated an enhanced phytochemical profile including elevated levels of polyphenols, antioxidants, flavonoids, and alkaloids as well as increased concentrations of β -carotene, vitamin C, and essential minerals compared to the basic formulation. This enrichment underscores the functional potential of V2 as a nutritionally superior product.

Physicochemical Properties of vegan cheese

Table 12: Physicochemical properties of the developed products

Product	Moisture (%)	Ash (%)	Titration Acidity (%)
Basic	38.56	2.12	0.01
Variation 2	34.31	2.7	0.02

The initial moisture content of ripe papaya seeds was 2.7%. Water-based cooking methods significantly increased moisture levels, with soaking and boiling showing the highest amount. Steaming caused minimal moisture increase due to the absence of direct contact with water. Variation 2 had lower moisture content, attributed to the moisture-absorbing properties of protein- and fiber-rich papaya seed flour and mucilages (Arnold et al., 2004).

Ash content indicates total mineral concentration, which was 7.29% (Table 8) in raw papaya seeds, containing minerals like calcium, magnesium, phosphorus, and iron (Kumar et al., 2020). Water-based cooking, particularly boiling, resulted in the greatest reduction (5.23–5.14%), while steaming preserved mineral content more effectively (6.84–6.42%). Dry-heat methods showed an average ash reduction of 20–24%. The ash content in Variation 2 compared to the basic product was higher indicating nutritional enhancement due to inclusion of papaya seed flour.

Initial titrable acidity (TA) of papaya seeds was 0.05%. Post-processing, TA declined to 0.02–0.04%, with the lowest values observed in boiling, steaming, and baking (0.02%). Soaking retained slightly more acidity (0.04%). Reduction in acidity is likely due to thermal degradation and oxidation of organic acids. The basic cheese showed a TA of 0.01%, while Variation 2 registered 0.02%, likely due to higher tannic acid content from chickpeas and papaya seeds. TA influences microbial stability and textural quality of cheese products (Paul et al., 2010).

Melting Point

The melting point of the selected vegan cheese variation was studied using a melting point apparatus based on thermal analysis principles described by Muthukumarappan et al. (1999). The formulation exhibited a melting point of 40°C, consistent with a semi-soft texture. This property suggests favourable applicability for culinary uses such as slicing, grating, and heating, with a desirable flavour release and light surface browning, enhancing sensory appeal.

Shelf Life

Shelf-life analysis of the developed vegan cheese under ambient ($25 \pm 2^\circ\text{C}$) and refrigerated ($4 \pm 1^\circ\text{C}$) conditions showed a time-dependent increase in microbial load, with higher total plate counts observed in variants lacking fat droplets. By day 7, microbial counts reached 100 CFU/ml in former, compared to 25 CFU/ml in latter, suggesting reduced microbial inhibition due to higher water activity (Verheyen et al., 2019).

Table 12: Total plate count of Product

Parameter	Product	0 Day	15 days	30 days
Total Plate Counting (CFU/ml)	Variation 2 (4 °C)	25	81	100

CONCLUSION

This study evaluated the effectiveness of seven household cooking methods in reducing anti-nutrients and enhancing the nutritional value of ripe papaya seeds for use in functional food development. While processing is essential to improve the nutritional bioavailability of plant-based foods, excessive thermal exposure may compromise nutrient retention. Therefore, optimal cooking should involve moderate temperatures and shorter durations to balance anti-nutrient reduction with nutrient preservation. Steaming for 20 minutes emerged as the most effective, achieving 70–80% nutrient retention and 50–60% anti-nutrient reduction, outperforming techniques involving direct water or extended heat exposure. Steamed papaya seed flour incorporated into a chickpea-based vegan cheese (Variation 2, V2), leveraged the lipid and phytochemical profile of chickpeas. V2 underwent further mild heat treatment, resulting in lowered anti-nutrient content and a nutrient-dense composition, including 2.83 g MUFA, 6.8 g PUFA, 6.8 g essential fatty acids, 35.12 g/100 g flavonoids, and 5.47 g/100 g polyphenols, with 70.63% antioxidant activity. With a high sensory acceptability, and the product demonstrated 30-day shelf life at 4°C. The study supports papaya seed valorisation as a sustainable, health-promoting component in plant-based diets.

Future Recommendations

- Anti-amylase inhibition activity of the vegan cheese can be carried out.
- Rheological testing of the developed vegan cheese can be conducted.
- Effect of thermal treatment on toxins like benzyl isothiocyanate (BITC), cyanogenic compounds, and glucosinolates present in papaya seeds can be assessed to establish their safety thresholds for humans.

REFERENCES

- Adamu, D., Akande, K., & Doma U. (2010). Major anti-nutrients found in plant protein sources: their effect on nutrition. *Pakistan Journal of Nutrition* 9(8): 827-832.
- Arnold, M., Raj, S., & Reith, M. (2004). Mucilage and protein contents in papaya (*Carica papaya* L.) seeds and their functional properties. *Journal of Food Science and Technology*, 41(3), 341–345.
- Association of Official Analytical Chemists (AOAC). (2016). *Official Methods of Analysis of AOAC International* (20th ed.). AOAC International.
- Bari, L., P. Hassan, N. Absar, & Haque, M. (2006). Nutritional analysis of two varieties of papaya (*Carica papaya*) at different maturation stages. *Pakistan Journal of Biological Science*, 9, 137-140.
- Cartwright, A. (2007). *Consumer preference trends for dairy and non-dairy cheese products*. *Journal of Dairy Research*, 74(2), 125–132.
- Clarke E. J., & Wiseman J. (2000). Developments in Plant Breeding for Improved Nutritional Quality of Soya Beans II. Anti-nutritional Factors. *Journal of Agricultural Science* 134 (2), 125–136.
- Esenwah, C., & Ikenebomeh, M. (2008). Processing effects on the nutritional and anti-nutritional contents of African locust bean (*Parkia biglobosa*) seed. *Pakistan Journal of Nutrition* 7(2): 214-217.
- Jurado, J. F., Pollier, J., Moses, T., Arendt, P., Medina, N. B., Morilla, E., Arahana, V., Torres, M.L., Goossens, A., & Reyes, A.L. (2016). Saponin determination, expression analysis and functional characterization of saponin biosynthetic genes in *Chenopodium quinoa* leaves. *Plant Science*, 250. 188-197.
- Muthukumarappan, K., Wang, Y. C., & Gunasekaran, S. (1999). Modified meltability test for cheese: A melting test for cheese with improved accuracy and reliability. *Journal of Dairy Science*, 82(5), 1068–1071. [https://doi.org/10.3168/jds.S0022-0302\(99\)75327-1](https://doi.org/10.3168/jds.S0022-0302(99)75327-1).
- Paul, L., Thomas, S., & Joseph, M. (2010). Influence of titratable acidity on microbial stability and texture of soft cheese. *International Journal of Dairy Technology*, 63(4), 567–573. <https://doi.org/10.1111/j.1471-0307.2010.00589.x>
- Singh, P., Sharma, R., & Kaur, A. (2020). *Sensory evaluation techniques in food product development: A review*. *Journal of Food Quality*, 43, 1–9. <https://doi.org/10.1155/2020/8891234>.
- Soetan, K. O., & Oyewole, O. E. (2009). The need for adequate processing to reduce the anti-nutritional factors in plants used as human foods and animal feeds: A review. *African Journal of Food Science*, 3(9), <https://doi.org/10.5897/AJFS.9000281>.
- Verheyen, C., Albrecht, A., Jörissen, J., Hinrichs, J., & Grein, T. A. (2019). Effect of fat content and homogenization on the microbial quality and shelf life of recombined dairy cream. *International Dairy Journal*, 92, 1–7. <https://doi.org/10.1016/j.idairyj.2018.12.007>.

Nutritional Status of Adolescents (15-18 years) with Autism Spectrum Disorder in Delhi

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ABSTRACT

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by persistent challenges in social and communication skills and restricted and repetitive behaviors. Its exact etiology is still unknown. The study aimed to determine the nutritional status of adolescents (15-18 years) with Autism Spectrum Disorder. A hundred adolescents with ASD, 15-18 years, were selected from different NGOs and special schools in Delhi via purposive sampling. Findings indicated that twenty-eight percent of the subjects were overweight due to faulty eating habits, and forty-seven percent were found to be underweight. A 24-hour recall revealed that their diets were repetitive and restricted, with limited variety and evidence of nutrient inadequacy. None of the subjects were consuming even the basic four food groups in their daily diets, indicating that the diets were unbalanced due to limited variety. Nutrition-based intervention programs need to be organized frequently for the parents of individuals with autism spectrum disorder as soon as possible after diagnosis to improve the quality of life.

Keywords: Autism, Dietary intake, Nutritional status.

INTRODUCTION

Autism spectrum disorder (ASD) is a developmental disability that can cause significant social, communication, and behavioral challenges (Centre for Disease Control and Prevention, [CDC] 2022). Although there is no single cause of autism spectrum disorder, it might be caused by abnormalities in brain structure. Nutritional status is the current state of a person or population group, concerned with their state of nourishment (the consumption and utilization of nutrients). The prevalence of risk for overweight and obesity was found to be at its peak in the 12.0–17.9 year age group. The study further implicated that this area needs to be focused on as associated problems with obesity make life difficult for children and their families to live independently (Curtin et al., 2005). Another study conducted by Bandini et al. (2010) in the United States on “Food Selectivity in Children with Autism Spectrum Disorder and Typically Developing Children” and their findings indicated that children with autism spectrum disorder demonstrated more food refusal than their typically developing peers (41.9% vs. 18.9%). Food selectivity is found to be more common among children with autism spectrum disorder, and a limited food repertoire may be coupled with nutrient deficiencies (vitamin B6, vitamin B12, fiber, vitamin D, vitamin E, and calcium) among children with autism spectrum disorder.

In the introduction, an attempt was made to explain how improbably complex autism spectrum disorder is. Another goal is to highlight that adolescents (15-18 years) with autism spectrum disorder tend to show diet-related behavioral problems that interfere with adequate nutrient intake due to several associated factors, and thus, nutritional status is also compromised. To the best of the

researcher's knowledge, no research is available on the aspects of diet-related problems among adolescents with autism spectrum disorder in Delhi. That is why research is needed to get some effective outcome regarding the nutritional status of adolescents with autism spectrum disorder, as adolescents with autism spectrum disorder are more prone to nutritional deficiencies. Looking towards the increasing prevalence of autism and complexity of the disorder, the present study was planned to determine the nutritional status of adolescents with autism spectrum disorder.

METHODOLOGY

The cross-sectional descriptive research design has been used in the present study. The current study has used purposive sampling. A total of 100 adolescents with autism spectrum disorder, 90 boys (including 43 of 15 years and 47 of 16-17 years) and 10 girls (out of which 3 girls of 15 years and the remaining 7 girls of 16-17 years) aged between 15- 18 years were selected from different NGOs and special schools of Delhi city. The sample that had to have coexistence of chronic disorders like Type I Diabetes, as it could affect the dietary intake and anthropometric measures of the sample, was excluded from the study.

Ethical considerations:

Data collection commenced after receiving approval from the Institutional Ethics Committee, Lady Irwin College, the University of Delhi, on 25th May 2019. Written informed consent was taken from the parents before the selection of the participants in the current study, and parental consent was also obtained.

TOOLS OF THE STUDY

Anthropometric Indices of Adolescents with Autism Spectrum Disorder:

The anthropometric measurements included weight and height to determine Body Mass Index for Age and height for age.

Checklist Supported by Interview to assess selective Micronutrient Deficiency Signs and Gastrointestinal Symptoms present in Autism Spectrum Disorder:

This self-structured pre-tested checklist was based on literature (Ranjan & Nasser, 2015 & Liu et al., 2016) to assess micronutrient deficiency signs among the subjects. It included clinical examination of eyes and nails to help in identifying the micronutrient deficiency signs of specific vitamins and minerals, especially vitamin A and Iron among the participants.

Dietary Assessment:

A dietary assessment was done to understand the dietary consumption patterns of the subjects. It was done by using two dietary survey forms, including a 24-hour recall method and a food frequency questionnaire.

Data collection:

Anthropometric measurements:

Weight: Weight was measured using an electronic weighing machine (Model: SECA 813) with a measurement accuracy of up to 100 grams. Weight was measured thrice, and its average was obtained as the final value (CDC, 2021).

Height: Standing height is an analysis of the maximum vertical size of the participant. It was measured with a portable stadiometer using Model SECA 213 with a precision of 1mm. All the readings were taken thrice, and the average was obtained as a final value (CDC, 2021).

Dietary Intake:

The mothers of participants were interviewed to recall a day’s events in temporal sequence, and the interviewer recorded the amount and type of all food and drink consumed by the sample group that day. To increase the accuracy, the mothers of the participants were asked to show a set of measuring cups and Katori sizes to estimate the amount of food eaten. The utensils that were fed in the Diet Cal included katoris of different sizes: Largest (A), Medium (B), Small (C), and Smallest (D), and a cup of 240 ml. These measures were used to estimate the dietary intake of adolescents with autism spectrum disorder.

Analysis of data:

- a. Anthropometric Measurements Analysis:

Body-Mass-Index for age and height for age were evaluated using World Health Organization growth reference data (World Health Organization, 2007).

Height for Age (HA):

Table 1: Cut-off points for classifying the adolescents (15-18 years) with autism spectrum disorder according to Height-for-Age z-scores (HAZ)

Z-score	Height-for-Age
Above +3	Very tall
Below -1 to above 2	Normal
Below -2	Stunted
Below -3	Severely stunted

Body Mass Index (BMI):

Table 2: Cut-off points for classifying adolescents (15-18 years) with autism spectrum disorder according to BMI-for-Age z scores (BMIAZ)

Z-scores	BMI-for-Age
\geq Median - 2SD to $+ < 1$ SD	Normal
Median $<- 2$ SD to $>- 3$ SD	Moderate underweight
$<$ Median -3SD	Severe underweight
Median $\geq + 1$ SD to $< + 3$ SD	Overweight
$\geq + 3$ SD	Obesity

Dietary Intake Analysis:

The analysis of nutrients of the dietary intake of the participants was computed using the validated software “DietCal” version 9.0 (Profound Tech Solutions), which was based on values from the Indian Food Composition Tables 2017, National Institute of Nutrition, ICMR (IFCT 2017). For the analysis of the dietary intake, the participants were divided into two age groups (15 years and 16-17 years) and gender-wise (boys and girls) categories, corresponding to the age groups used in ICMR, Estimated Average Expenditure (EAR, 2020). Adequate intake for each dietary nutrient was defined as between 75 to 100 or more than 100% EAR, moderately inadequate was defined as between 50 to 75% EAR, and inadequate intake was defined as less than 50% EAR. The data on consumption patterns of different food groups by adolescents with autism spectrum disorder were also collected using a qualitative food frequency questionnaire. The data collected through a qualitative food frequency questionnaire were analyzed in terms of percentage.

RESULTS AND DISCUSSION

Anthropometric Measurements of Adolescents with Autism Spectrum Disorder (n=100):

Height for Age: The data regarding height for age is depicted in Figure 1, which revealed that more than half of the adolescent boys (60 percent) and a small percentage (4 percent) of the adolescent girls were found to be stunted. On the other hand, the severely stunted growth of 10 percent of adolescent boys was identified, and 1 percent in an adolescent girl. It might be due to the selective eating habits of the adolescents, which acted as an obstacle to consuming a variety of foods and food adequacy.

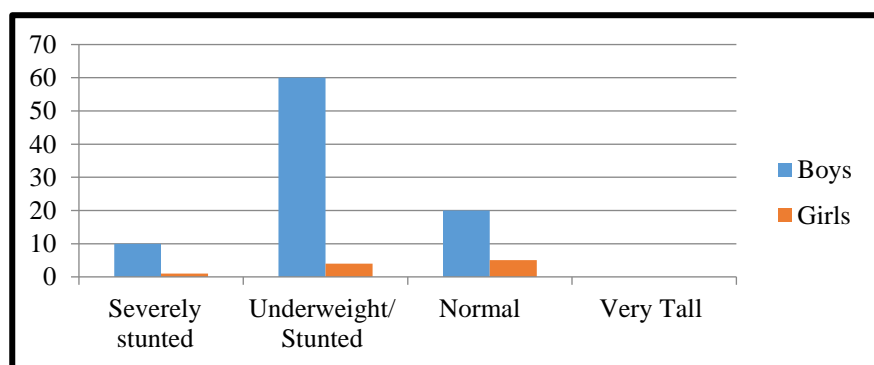


Figure 1: Height for Age of Adolescents with ASD

BMI for Age: In the present study, less than 50 percent of the adolescent boys, i.e., 34 percent, and only one girl were found to be moderately underweight, whereas nearly 12 percent of the adolescent boys were severely underweight. The unusual and faulty dietary patterns, including overconsumption of calorie-dense foods and carbohydrate-rich foods and an increasingly sedentary lifestyle, could potentially contribute to overweight and obesity among the sample group, as indicated by 12 percent of the adolescent boys being overweight and 12 percent being obese. Among adolescent girls who were on the autism spectrum, only 3 percent were overweight, whereas 4 percent were found to be obese, as presented in Figure 2. Curtin et al. (2010) reported that the prevalence of obesity among children with autism spectrum disorder (30.4 percent) was higher compared to neurotypically developing children (23.6 percent). Seventy-five percent of stunting as per height-for-age reflected

chronic undernutrition, whereas based on weight-for-height (BMI/Age), only 47 percent were underweight. This indicated the probability that some of the stunted adolescents had become overweight or obese again, possibly due to faulty eating and activity patterns while remaining stunted.

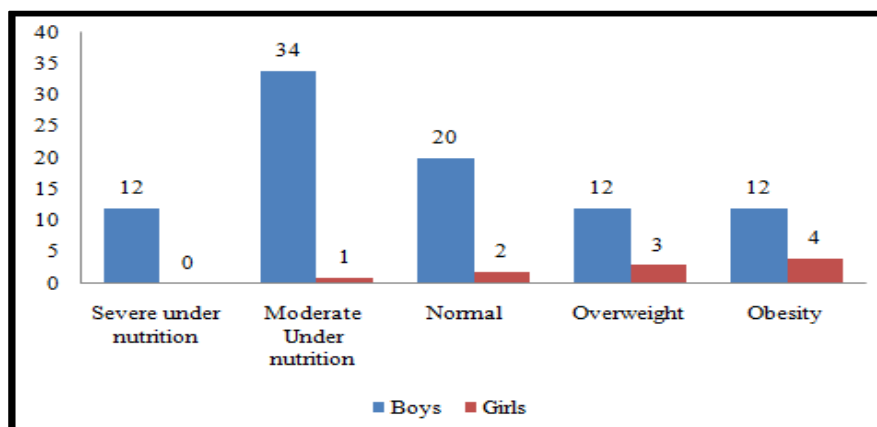


Figure 2: BMI for Age of Adolescents with ASD

Clinical assessment of Adolescents with Autism Spectrum Disorder (n=100)

Table 3: Clinical assessment based on selective micronutrient (vitamin A and Iron) deficiency signs and the gastrointestinal Symptoms present in Autism Spectrum Disorder (n=100)

Adolescents with Autism Spectrum Disorder					
Area of Examination	Signs	Yes		No	
		n	%	n	%
Eyes	Bitot spot	-	-	100	100
Nails	Brittle and spoon-shaped	-	-	100	100
	Pallor in nails	-	-	100	100
3.	Internal System				
A	Gastrointestinal Symptoms				
	Chronic constipation (defined as < 2 stools /week with difficulty in passing stools for at least 3 consecutive weeks).	98	98	2	2
	Chronic diarrhoea (defined as very loose to watery stools regardless of frequency, persisting for at least 3 consecutive weeks).	23	23	77	77
	Abdominal bloating, discomfort, or irritability	56	56	44	44
	Chronic abdominal pain or gaseousness	34	34	66	66
	Vomiting	-	-	100	100

The current study showed that none of the participants (100 percent) showed any deficiency signs of the micronutrients Vitamin A and Iron. A study conducted by Sun et al. (2013) found that only one child (4-6 years) within the autism spectrum showed signs of vitamin A deficiency, six had scarce, dry, and brittle hair, three had dry skin, and one had cheilosis. However, they found no significant difference between the typically developing children and children with autism. Due to limited literature, there appear to be no conclusive results on nutritional status based on clinical assessment. Moreover, the majority (98 percent) of the participants felt difficulty in passing stools for at least 3 consecutive weeks, whereas a very low percent (2 percent) had no difficulty. It might be associated with the lack of fiber in the diet and sedentary lifestyles. On the other hand, out of 98 percent of the participants, fewer cases (23 percent) of chronic diarrhea were also reported (Table 3).

Dietary Profile of Adolescents with Autism Spectrum Disorder (15-18) years:

Available literature indicates that children with autism spectrum disorder were found to be deficient in all the nutrients, which might be associated with their selective eating patterns and consumption of a limited variety of food (Sun et al., 2013; Bicer & Alsaffar, 2013 & Meguid et al., 2015).

Energy and Macronutrients: Energy, carbohydrate, protein, and fat (visible and invisible fat) consumption among the participants was found to be more than 50 percent of the EAR, whereas less than 50 percent adequacy of energy was found in the adolescent boys aged 16-17 years. The EAR given by ICMR (2020) is only for the visible fat intake and hence cannot be compared.

Micronutrients: The mean intake of calcium, zinc, vitamin A, and magnesium was found to be less than 50 percent of EAR among 100 percent of the participants.

Fiber: A significant finding of the study was that for dietary fiber, the mean intake of all the participants was found to be 15.33 grams. It was found that the consumption of dehusked pulses was higher compared to husked pulses among the sample group. They preferred to eat fruits without peel, or that were soft in consistency, and mostly preferred fruits were banana and orange. This might be associated with developmental delays in sensory motor, tactile sensitivity, and abnormal response to the taste of the participants. Low intake of fiber might be coupled with the prevalence of constipation among 98 percent of the participants. Consumption of rice was found to be higher by 100 percent of adolescents with autism as compared to chapati. It might be due to poor jaw movements that made it difficult for the participants to chew the chapati properly. Notably, was that the intake of vegetables, especially green leafy vegetables and fruits (except banana), was found to be only once or twice a week to never among the sample group. That might be due to color sensitivity or due to their chewy texture that demands proper chewing.

The findings were in line with the few previously conducted studies on dietary intake, which showed that children with autism had inadequate intake of several micronutrients (Xia et al., 2010; Hyman et al., 2012; Zimmer et al., 2012 & Meguid et al., 2017) (Table 4).

Table No: 4

S. No.	Boys (n=47) Age 15 years				Girls (n=3) Age 15 years		
	Energy/ Nutrient	Mean ± SD	*EAR	Percent Adequacy	Mean ± SD	EAR	Percent Adequacy
1	Energy (kcal)	1532.06± 549.02	2860	53	1735.67±206.17	2400	72
2	Protein (gm)	23.94±9.59	36.4	65	20.82±4.30	34.7	60
3	Visible fat (gm)	32.12± 3.59	50	64	27.6±5.99	35	78

4	Carbohydrates (gm)	287.06±6.02	100	287	351.66±19.22	100	352
5	Calcium (mg)	386.49±99.49	800	48	370.35±25.88	800	46
6	Iron (mg)	18.24±4.16	15	121	18.59±2.68	17	109
7	Pyridoxine (vitamin B ₆) (mg)	1.63±0.76	2.2	74	0.13±0.06	1.8	7
8	Vitamin C (Ascorbic acid)(mg)	12.98±3.02	60	21	22.29±1.06	55	40
9	Dietary folate (mg)	86.05±43.81	238	36	65.47±11.17	204	32
10	Magnesium (mg)	103.23±1.44	294	35	115.59±16.89	270	42
11	Zinc (mg)	1.84±1.19	11.9	15	2.99±0.57	10.7	27
12	Vitamin A (Retinol) (mg)	127.83±18.06	430	29	151.99±51.12	420	36
S. No.	Boys (n=43) Age 16-17 years				Girls (n=7) Age 16-17 years		
	Energy/ Nutrients	Mean ± SD	EAR	Percent Adequacy	Mean ± SD	EAR	Percent Adequacy
1	Energy (kcal)	1341.597±217.14	3320	40	1786.71±421.25	2500	71
2	Protein (gm)	25.75±18.84	45.1	57	19.35±5.91	37.3	51
3	Visible fat (gm)	20.23±8.52	40	50	23.28±8.06	35	66
4	Carbohydrates (gm)	261.74±16.29	100	262	374.42±11.76	100	374
5	Calcium (mg)	376.83±146.06	850	44	269.57±57.29	850	31
6	Iron (mg)	15.33±3.89	18	85	14.62±1.41	18	81
7	Pyridoxine (vitamin B ₆) (mg)	0.80±0.51	2.5	32	0.57±0.5	1.9	30
8	Vitamin C (Ascorbic acid) (mg)	21.58±5.95	69	31	23.69±3.89	57	41
9	Dietary folate (mg)	49.84±11.89	286	17	58.37±12.02	223	26
10	Magnesium (mg)	160.87±26.33	338	47	113.01±9.07	279	40
11	Zinc (mg)	2.08±1.19	14.7	14	2.54±1.56	11.8	21
12	Vitamin A(Retinol) (mg)	124.34±8.63	480	25	133.79±10.07	400	33

EAR – Estimated Average Requirement

Consumption pattern of various food groups by Adolescents with Autism Spectrum Disorder:

The dietary pattern and nutrient intake data revealed that 100 per cent of the subjects were consuming only cereals daily, whereas 54 per cent had consumed pulses daily. In the context of milk and animal foods, the percentage of consumption was found to be very low. Nearly 55 per cent of the subjects were drinking milk daily, and the consumption of animal foods was found to be either monthly or occasionally. Moreover, the intake of oil and fats was found to be daily by 100 per cent of the subjects. The consumption of fruits (23 per cent) and vegetables (55 per cent) was also found to be very low daily. It might be due to repetitive and restricted behaviour patterns of the children with autism spectrum disorder that might have acted as an obstacle in consuming a diverse, varied, and hence balanced diet. Only 2-3 food groups were consumed daily by the majority, these being mainly cereals, fats, and sugars. It emerged from the data gathered that the diets were lacking or inadequate in vegetables, fruits, pulses, milk, and animal foods which proved that the diet was unbalanced or nutritionally inadequate due to limited variety in the diet (Table 5).

Table 5: Frequency of various Food Groups Consumption by Adolescents with Autism Spectrum Disorder (n=100):

Table: 4.5.3 Frequency of various Food Groups Consumption by Adolescents with Autism Spectrum Disorder (n=100):

Food Groups	Adolescents with Autism Spectrum Disorder															
	Daily		5-6/week		3-4/week		1-2/week		Monthly		Occasionally		Rarely		Never	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Cereals	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pulses (Husked)	-	-	-	-	-	-	32	32	2	2	23	23	23	23	20	20
Pulses (Dehusked)	54	54	21	21	25	25	-	-	-	-	-	-	-	-	-	
Milk and Milk products	55	55	-	-	33	33	12	12	-	-	-	-	-	-	-	
Meat, Fish & Chicken	-	-	-	-	-	-	-	-	-	-	10	10	-	-	90	90
Egg	-	-	-	-	-	-	-	-	34	34	23	23	-	-	43	43
Vegetables (roots) e.g. Carrot, Raddish, Turnip, Potato.	45	45	-	-	-	-	-	-	-	-	28	28	15	15	12	12
Green Leafy Vegetables	-	-	-	-	-	-	23	23	21	21	24	24	-	-	32	32
Other Vegetables e.g. Lady Finger, Brinjal, Beans.	10	10	-	-	21	21	33	33	-	-	-	-	23	23	13	13
Fruits	23	23	-	-	-	-	37	37	-	-	-	-	34	34	6	6
Sugar and Jaggery	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fat and Oils, Ghee, Vegetable Oils or other	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nuts & Oilseeds	21	21	-	-	-	-	23	23	-	-	-	-	45	45	11	11

CONCLUSION AND RECOMMENDATIONS OF THE STUDY

It can be concluded from the present study that there are a variety of disruptive behaviors exhibited during mealtimes by adolescents with autism that may affect the food intake and duration of mealtime, and finally lead to poor nutritional status. It might be due to improper awareness among the parents about nutrition and management of disability or the characteristics of autism. It is recommended that future studies be planned with a large sample size and a placebo group to generalize the results. A biochemical assessment is needed to confirm the micronutrient deficiencies.

STRENGTHS OF THE STUDY

The current study represents a unified approach to assessing the nutritional status and mealtime behavior of the participants.

LIMITATIONS OF THE STUDY

1. The parents of the sample did not give their consent for biochemical assessments. However, these are needed to clearly assess micronutrient deficiencies, clinical and sub-clinical.
2. The findings of the study may not be representative of the entire population because the sample was selected only from Delhi and the adolescents who were attending the special schools and NGOs.

CONFLICT OF INTEREST

There is no interest in conflict.

REFERENCE

- Autism speaks. (2018). Retrieved from Autism Speaks: <https://www.autismspeaks.org/whatautism>
- Bandini, L. G., Anderson, S. E., Curtin, C., Cermak, S., Evans, E. W., Scampini, R., Maslin, M., & Must, A. (2010). Food selectivity in children with autism spectrum disorders and typically developing children. *The Journal of Pediatrics*, 157 (2), 259–264. <https://doi.org/10.1016/j.jpeds.2010.02.013>.
- Bicer, A. H., & Alsaffar, A. A. (2013). Body mass index, dietary intake, and feeding problems of Turkish children with autism spectrum disorder (ASD). *Research in Developmental Disabilities*, 34 (11), 3978–3987. <https://doi.org/10.1016/j.ridd.2013.08.024>.
- Curtin, C., Bandini, L. G., Perrin, E. C., Tybor, D. J., & Must, A. (2005). Prevalence of overweight in children and adolescents with attention deficit hyperactivity disorder and autism spectrum disorders: a chart review. *BMC Pediatrics*, 5, 48. <https://doi.org/10.1186/1471-2431-5-48>.
- Centers for Disease Control and Prevention. (2021). Retrieved from https://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/measuring_childrenhtml.
- Curtin, C., Bandini, L. G., Perrin, E. C., Tybor, D. J., & Must, A. (2005). Prevalence of overweight in children and adolescents with attention deficit hyperactivity disorder and autism spectrum disorders: a chart review. *BMC Pediatrics*, 5, 48. <https://doi.org/10.1186/1471-2431-5-48>.
- Ferguson, B. J., Dovgan, K., Takahashi, N., & Beversdorf, D. Q. (2019). The Relationship Among Gastrointestinal Symptoms, Problem Behaviors, and Internalizing Symptoms in Children and Adolescents with Autism Spectrum Disorder. *Frontiers in psychiatry*, 10, 194. <https://doi.org/10.3389/fpsy.2019.00194>.
- Gibney, M. J. (2005). *Clinical Nutrition (The Nutrition Society Textbook)*. Wiley–Blackwell.
- Gibson, R. (2005). *Principles of Nutritional Assessment*. Oxford University Press.
- Herndon, A. C., DiGuseppi, C., Johnson, S. L., Leiferman, J., & Reynolds, A. (2009). Does nutritional intake differ between children with autism spectrum disorders and children with

- typical development? *Journal of autism and developmental disorders*, 39(2), 212–222. <https://doi.org/10.1007/s10803-008-0606-2>.
- Hyman, S. L., Stewart, P. A., Schmidt, B., Cain, U., Lemcke, N., Foley, J. T., Peck, R., Clemons, T., Reynolds, A., Johnson, C., Handen, B., James, S. J., Courtney, P. M., Molloy, C., & Ng, P. K. (2012). Nutrient intake from food in children with autism. *Pediatrics*, 130 Suppl 2, 145–153. <https://doi.org/10.1542/peds.2012-0900L>.
 - Indian Council of Medical Research. (2020). Nutrient requirements and estimated average requirements for Indians. A Report of the Expert Group of the Indian Council of Medical Research.
 - Kim, J., & Wessling-Resnick, M. (2014). Iron and mechanisms of emotional behavior. *The Journal of Nutritional Biochemistry*, 25 (11), 1101–1107. <https://doi.org/10.1016/j.jnutbio.2014.07.003>.
 - Liu, X., Liu, J., Xiong, X., Yang, T., Hou, N., Liang, X., Chen, J., Cheng, Q., & Li, T. (2016). Correlation between Nutrition and Symptoms: Nutritional Survey of Children with Autism Spectrum Disorder in Chongqing, China. *Nutrients*, 8 (5), 294. <https://doi.org/10.3390/nu8050294>.
 - Malhi, P., Venkatesh, L., Bharti, B., & Singhi, P. (2017). Feeding Problems and Nutrient Intake in Children with and without Autism: A Comparative Study. *Indian Journal of Pediatrics*, 84(4), 283–288. <https://doi.org/10.1007/s12098-016-2285-x>.
 - Meguid, N., Anwar, M., Zaki, S., Kandeel, W., Ahmed, N., & Tewfik, I. (2015). Dietary Patterns of Children with Autism Spectrum Disorder: A Study Based in Egypt. *Open Access Macedonian Journal of Medical Sciences*, 3 (2), 262–267. <https://doi.org/10.3889/oamjms.2015.051>.
 - Nishikimi, M., Fukuyama, R., Minoshima, S., Shimizu, N., & Yagi, K. (1994). Cloning and chromosomal mapping of the human nonfunctional gene for L-gulonon-gamma-lactone oxidase, the enzyme for L-ascorbic acid biosynthesis, missing in man. *The Journal of Biological Chemistry*, 269 (18), 13685–13688.
 - Ranjan, S., & Nasser, J. A. (2015). Nutritional status of individuals with autism spectrum disorders: do we know enough? *Advances in Nutrition (Bethesda, Md.)*, 6 (4), 397– 407. <https://doi.org/10.3945/an.114.007914>.
 - Rosser, D.D. & Frey, G.C. (2003). Comparison of physical activity levels between children with and without autistic spectrum disorders. 35 supplements (1). <https://doi.org/10.1097/00005768-200305001-00410>.
 - Sun, C., Xia, W., Zhao, Y., Li, N., Zhao, D., & Wu, L. (2013). Nutritional status survey of children with autism and typically developing children aged 4-6 years in Heilongjiang Province, China. *Journal of Nutritional Science*, 2, e16. <https://doi.org/10.1017/jns.2013.9>.
 - S Padmanabhan, P., & Shroff, H. (2018). The relationship between sensory integration challenges and the dietary intake and nutritional status of children with Autism Spectrum Disorders in Mumbai, India. *International journal of developmental disabilities*, 66(2), 142–152. <https://doi.org/10.1080/20473869.2018.1522816>.
 - Sharp, W. G., Berry, R. C., McCracken, C., Nuhu, N. N., Marvel, E., Saulnier, C. A., Klin, A., Jones, W., & Jaquess, D. L. (2013). Feeding problems and nutrient intake in children with autism spectrum disorders: a meta-analysis and comprehensive review of the literature. *Journal of Autism and Developmental Disorders*, 43 (9), 2159–2173. <https://doi.org/10.1007/s10803-013-1771-5>.

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- Swaminathan, M. (1990). *Advanced Text Book on Food & Nutrition*. The Bangalore Press.
- Sweetman, D. U., O'Donnell, S. M., Lalor, A., Grant, T., & Greaney, H. (2019). Zinc and vitamin A deficiency in a cohort of children with autism spectrum disorder. *Child: Care, Health and Development*, 45 (3), 380–386. <https://doi.org/10.1111/cch.12655>.
- Sun, C., Zou, M., Zhao, D., Xia, W., & Wu, L. (2016). Efficacy of Folic Acid Supplementation in Autistic Children Participating in Structured Teaching: An Open-Label Trial. *Nutrients*, 8(6), 337. <https://doi.org/10.3390/nu806>.
- Thompson, A.S. & Dyers, A.D. (1994). Impact of nutrition education. *Journal of Community Health*, 23, 45-47.
- UNICEF. (2019). Over 80% of adolescents in India suffer from hidden hunger: UNICEF. Retrieved from <https://www.indiatoday.in/india/story/unicef-hunger-1614578-2019-10-31>.
- WHO. Growth Reference data for 5-19 years 2007. <http://www.who.int/growthref/en/> (Last accessed on 22nd June 2016).
- Zimmer, M. H., Hart, L. C., Manning-Courtney, P., Murray, D. S., Bing, N. M., & Summer, S. (2012). Food variety as a predictor of nutritional status among children with autism. *Journal of autism and developmental disorders*, 42(4), 549–556. <https://doi.org/10.1007/s10803-011-1268-z>.

Website visited

- <https://www.who.int/tools/child-growth-standards>.
- <https://www.cdc.gov/ncbddd/autism/facts.html>.

EXPLORING PERCEPTIONS AND AFFORDABILITY OF ICMR-NIN “MY PLATE FOR THE DAY” AMONG WOMEN IN URBAN SLUMS OF DELHI

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ABSTRACT

India's nutrition challenges persist, with the diets lacking in diversity and key nutrients. To address this, the ICMR-NIN introduced food-based dietary guidelines and the “My Plate for the Day” visual tool to promote balanced eating. However, their effectiveness depends on both public awareness and affordability, particularly in low-income communities. To explore these concerns, a mixed-methods cross-sectional study was conducted among women aged 20 to 35 years living in urban slums of Delhi. For the quantitative study, 100 participants were selected through convenience sampling. Data collection involved a structured questionnaire capturing socio-demographic details, awareness, perceived benefits and barriers as well as affordability of the recommended portions proposed in the “My Plate for the Day”. To deepen the understanding, two FGDs were conducted, with eight women each. Additionally, daily cost of following the “My Plate for the day” diet was calculated for both vegetarian and non-vegetarian diets. The results revealed that despite awareness the actual understanding of the “My Plate for the Day” guidelines was almost non-existent among participants. Nevertheless, many women expressed that such a balanced diet could improve health outcomes, enhance well-being, and reduce the risk of illness. Despite this positive perception, financial limitations were a dominant concern. The daily cost estimates confirmed this barrier: a vegetarian diet would cost approximately ₹97.50 and a non-vegetarian one ₹112.03. This translates to a monthly cost of ₹2,925 - ₹3,361 per adult, which is often more than what slum households can afford to spend on food. High-cost items such as milk, meat, eggs, nuts, and seeds were cited as the most difficult to afford, making regular adherence to the guidelines unrealistic. The study reveals a major gap between public health guidelines and real-world practice, driven by low awareness and significant financial barriers. To make the guidelines effective, programs like subsidized food schemes must include nutrient-rich foods, not just staples. Both awareness and affordability need to be addressed to benefit the communities most in need.

Key words: Food-based dietary guidelines, My Plate for the Day, Balanced Diet, Perceptions, Affordability

INTRODUCTION

Nutrition is vital for health, immunity, and overall quality of life. A well-balanced diet helps meet daily nutritional requirements, supporting long-term well-being by preventing both deficiencies and chronic diseases (WHO, 2003). In India, nutritional imbalances are particularly pronounced among women. Data from the National Family Health Survey (NFHS-5) reveals the intake of nutrient-rich foods such as fruits, animal protein, and dairy remains low among women aged 15–49 years ((IIPS, 2021) and are heavily cereal-based (Sharma et al., 2020). These dietary patterns lead to a dual burden: undernutrition and overnutrition coexisting, both contributing to long-term health risks (Winichagoon & Margetts, 2017).

Dietary recommendations as proposed in the Nutrient Requirements for Indians, 2020 are based on use two key values: the Estimated Average Requirement and the Recommended Dietary Allowance (ICMR & NIN, 2020). For easy translation of nutritional requirements into practice, it has proposed to use simple public messages encouraging habitual food choices. This can be achieved if nutritional guidance is presented in terms of food groups rather than individual nutrients, which led to the development of Food-Based Dietary Guidelines (FBDGs). It is also recommended that FBDGs should be country-specific and take into account the nation's social, cultural, economic, and environmental contexts (WHO, 1998) and should be supported by clear dietary messages and visually engaging graphics (Erve et al., 2017).

In line with the recommendation, the first set of dietary guidelines for Indians were issued by the National Institute of Nutrition (NIN) in 1998, followed by a second edition in 2011. This has been subsequently revised 2024. These dietary guidelines strongly emphasize the importance of dietary diversity by encouraging the inclusion of a wide variety of foods from each food group in our daily diets (Passi, 2024). The updated guidelines feature 17 key messages, with "My Plate for the Day" as the main educational tool. It offers practical guidance on achieving a balanced 2000 Kcal Indian diet by showing ideal proportions of various food groups needed to meet daily requirements for essential nutrients like amino acids, fatty acids, minerals, and bioactive compounds (NIN, 2024).

From a technical standpoint, establishing a single, unified set of country-specific FBDGs may be both desirable and potentially feasible. However, this approach poses significant challenges, particularly in accommodating cultural diversity and navigating the complex social, economic, and political factors (Leme et al., 2021). Several research studies conducted across countries indicate that a significant proportion of individuals do not meet the recommendations outlined in their respective national dietary guidelines. A global review of 90 FBDGs revealed that among the various food groups, starchy staples and fruits/vegetables were the most commonly consumed in alignment with the guidelines but adherence to recommendations for other food groups such as dairy, proteins, and healthy fats was notably lower across countries (Leme et al., 2021). In addition to socio-demographic factors, affordability presents a major barrier to adherence to such guidelines. Various studies conducted in India found that a nutritious diet was unaffordable, especially among poor and vulnerable population groups (Thomas, 2016; Kachwaha et al., 2020; Raghunathan et al., 2021). Growing shift toward convenience foods, driven by time constraints and evolving lifestyles has increased reliance on processed and ready-to-eat foods, which further complicates efforts to improve dietary quality (Bren d'Amour et al., 2020).

Given the central role women play in managing household nutrition, understanding their perspectives of the food based dietary guidelines is crucial for its the effective implementation. Therefore, the study focuses on assessing awareness, perceived benefits, and affordability of Indian dietary guidelines and particularly “My Plate for the Day” pictorial graphic, among women living in Delhi’s urban slums. Insights from this research will help evaluate the effectiveness of pictorial graphic in bridging the gap between nutritional knowledge and everyday dietary practices.

OBJECTIVES

- To assess the perceived benefits and affordability of following the ICMR-NIN “My Plate for the Day” recommendations among women living in urban slums of Delhi.
- To determine the cost of consuming the ICMR-NIN “My Plate for the Day” using data from the household food price survey.

HYPOTHESIS

Null Hypothesis (H1): Women in urban slums of Delhi do not perceive the "My Plate for the Day" recommendations as beneficial and affordable.

Alternate Hypothesis (H0): Women in urban slums of Delhi perceive the "My Plate for the Day" recommendations as beneficial and affordable.

METHODOLOGY

This cross-sectional study was conducted among women living in the urban slums of Delhi, employing a mixed-methods approach. Data collection took place between January-March 2025 and included quantitative surveys, focus group discussions (FGDs), and a cost estimation exercise. Quantitative data were gathered from 100 women selected through convenience sampling. The same participants were also involved in the cost estimation component.

Inclusion criteria for the study were: women aged 20–35 years, residing in urban slum areas of Delhi, and willing to participate. Additionally, two FGDs were conducted, each involving eight participants, enrolling a total of 16 women for the qualitative component of the study.

Ethical clearance was obtained from the Institutional Scientific Committee of the Institute of Home Economics, University of Delhi. Prior to data collection, the study’s purpose was explained to each participant, and written informed consent was obtained along with a participant information sheet outlining the study’s objectives, procedures, and participant rights.

The structured questionnaire included sections on socio-demographic details and awareness of the “My Plate for the Day” recommendations. Women were asked whether they had heard of the model and were familiar with the suggested portion sizes for each food group. The next section explored dietary practices, with participants reporting how often they consumed recommended quantities of specific food groups, using response options of “always,” “sometimes,” or “never.” Barriers to adherence were also identified. Perceived benefits were assessed using a 3- point Likert scale (Agree = 3, Neutral = 2, Disagree = 1) across several statements.

The study also assessed affordability by asking participants about their household food expenses relative to other costs, and whether they found the “My Plate for the Day” model financially manageable. Willingness to bear the daily cost of following the recommendations was also explored. For cost estimation, a methodology adapted from Raghunathan et al., 2021 was used, with primary data collected from local markets and government outlets in Delhi. A detailed questionnaire captured food items under each group, and participants reported recent consumption using the recall method. Prices of the 5–6 most commonly consumed items per group were collected, and average prices were calculated. These were then multiplied by the recommended portion sizes to estimate the cost for each group, and summed to determine the total daily cost of following the dietary model.

The qualitative data was collected using two FGDs, which lasted approximately 40-50 minutes each. The discussions were conducted in Hindi to facilitate clear and comfortable communication. Participants were informed about the purpose of the FGDs and assured of the confidentiality of their responses. Written informed consent was obtained from all participants. The FGDs were conducted with a separate group from those in the quantitative study.

After data collection, responses from the questionnaires were entered into Microsoft Excel and checked for missing values and correcting errors. The cleaned dataset was imported into IBM SPSS 21.0 for analysis. Descriptive statistics, including means, standard deviations, and ranges for continuous variables, and frequencies and percentages for categorical variables, were used to summarize findings. Qualitative data from focus group discussions were thematically analyzed based on participants' understanding, acceptance, and perceived feasibility of the guidelines, with selected verbatim quotes illustrating key insights.

FINDINGS

I. Findings of the quantitative survey

Quantitative data for the study was collected from 100 women living in urban slums of Delhi. As shown in Table 1, most participants were over 30 years old and had completed middle or high school. Few were graduates or diploma holders, while some had only primary education or were illiterate. Most were engaged in elementary jobs, with only a few in professional roles or unemployed. The majority belonged to the general category, followed the Hindu religion, and lived in nuclear families with 4–6 members. Most households had a monthly income between ₹10,000–20,000.

Table 1: Data on the Socioeconomic Profile of the Subjects

Parameter	Category	Frequency / % (n=100)
Age	20-25	33
	26-30	28
	Above 30	39
Educational Level	Graduate/ diploma	4
	High school	23
	Middle school	33
	Primary school	21
	Illiterate	19
Occupation	Professionals	8
	Clerks	6
	Skilled workers/shop workers	12
	Skilled agricultural/fishery workers	5
	Craft and related trade workers	4
	Plant and machine operators	13
	Elementary occupation	47
	Unemployed	5
Caste	General	54
	Scheduled Caste	21
	Scheduled Tribe	12
	Other Backward Classes	13
Religion	Hindu	83
	Muslim	10
	Others (Sikh)	7
No. of Family Members	1-3	18
	4-6	78
	Above 6	4
Family Type	Nuclear	83
	Joint	17
Monthly family Income	< ₹10,000	31
	₹10,000–₹20,000	58
	> ₹20,000	11

Data on women's awareness and perceived benefits of the "My Plate for the Day" guidelines indicate that while a majority (74%) had come across the plate through media channels such as television, internet, or newspapers, only a small fraction (2%) demonstrated an accurate understanding of its specific recommendations, including portion sizes for each food group. Awareness of the purpose and role of "My Plate for the Day" in promoting a balanced diet was generally low. When shown the visual, many women recognized its benefits for overall health, disease prevention, and mental well-being. Most felt it could reduce the need for supplements like calcium and iron. However, fewer associated it with weight management or improved digestion, and

many did not believe it enhanced community-level nutrition awareness. Figure 1 shows that many women regularly consume food groups like vegetables, pulses, cereals, and fats & oils at levels close to the "My Plate for the Day" recommendations, however, intake of milk or curd, fruits, and nuts and seeds is significantly lower, with many women reporting rare or no consumption

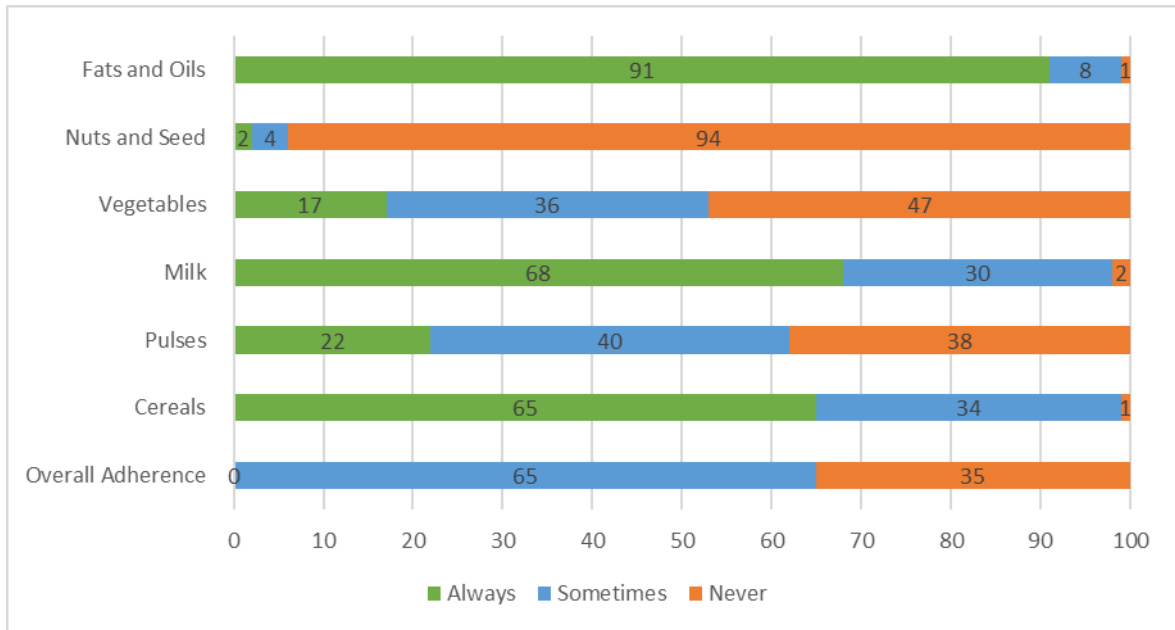


Fig 1: Comparison of Food Group Consumption with the "My Plate for the Day" Recommendations

Participants were asked to identify barriers that prevent them from consuming the recommended portions of each food group in the guidelines. As shown in Table 2, financial constraints emerged as the most significant obstacle. Nearly 46% cited the high cost of certain foods, and 45% pointed to low household income or tight budgets together accounting for over 90% of the reported challenges. Additionally, 13% mentioned the limited availability and higher cost of seasonal fruits and vegetables. Some (7%) found the recommended portion sizes unrealistic for daily cooking habits. Only a few women (4%) cited competing expenses like school fees or medical bills, and just 3% mentioned the lack of government support as a barrier.

Table 2 Challenges to Incorporating ICMR NIN's "My Plate for the Day" into Daily Routine

Barriers/factors	Frequency / % (n=100)
High cost of the food product	46
Low income /budget constraints	45
Availability of food products	13
Large recommended portion sizes	7
Other family expenses given are priority	4
No Government support	3

Most women spent 40- 60% of their income on non-food expenses, while only 20-40 % was allocated to food, highlighting a lower priority given to food-related spending. With respect to affordability, cereals (48%) and vegetables (46%) were rated as the most affordable. In contrast, nuts and seeds were perceived as the most expensive by 35% of women, followed by pulses (18%), fruits (15%), and meat products (15%). Milk (10%) and fats and oils (7%) were generally considered moderately priced (Figure 2).

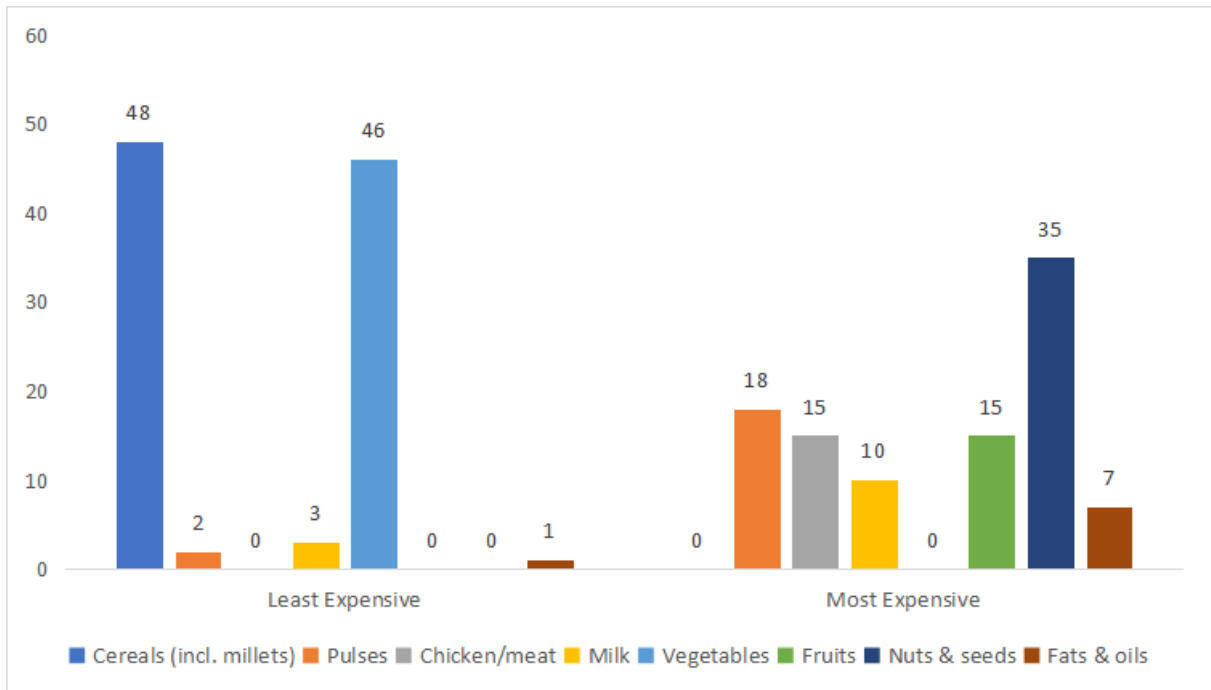


Fig 2. Affordability of Food Groups in ICMR-NIN “My Plate for the Day” Recommendations

II. Qualitative Insights into Perceptions and Challenges in Following 'My Plate for the Day' Recommendations

To explore perceptions, motivations, and challenges in adopting the ICMR-NIN "My Plate for the Day" guidelines, two Focus Group Discussions (FGDs) were conducted with 16 women from urban slums in Delhi. Each group included 8 participants aged 20–35 years, all primarily responsible for household food purchasing and meal preparation.

Theme 1: Understanding of a Balanced Diet

Women described a balanced diet as a variety of familiar, home-cooked foods that satisfy hunger and promote health. Their understanding was rooted in tradition and availability, typically including grains, pulses, vegetables, and dairy rather than focusing on calories or nutrients.

Theme 2: Adherence to Food Groups in “My Plate for the Day” and cultural acceptability

Participants showed consistent dietary patterns centered around staple grains like wheat and rice, with dals prepared daily or every other day. Vegetable intake varied by cost and season, while fruits and milk were consumed occasionally, mainly for children, due to affordability constraints. Adult milk consumption was rare.

Verbatim 1: "We always have cereals and pulses. Vegetables depend on price. Fruits, milk, and ghee are not regular."

Verbatim 2: "We don't eat fruits every day; mostly, we keep them for the children."

Most participants felt that the guidelines matched their traditional diets, featuring familiar foods like roti, dal, sabzi, and rice. This cultural alignment made the recommendations feel practical and easy to follow without altering cooking habits or taste preferences.

Theme 3: Perceived Benefits, Barriers and Affordably

Despite the daily challenges of life in urban slums, women recognized the clear health benefits of following a balanced diet recommendation linking it to increased energy, reduced fatigue, and better immunity. Many believed that eating more vegetables, fruits, and pulses could improve well-being, though financial limitations often restricted their ability to follow these practices.

Verbatim 3: “If we eat like that, especially vegetables and fruits, I think our body will feel better and we won’t fall sick easily.”

However, despite being aware of the benefits of a balanced diet, many women living in urban slums shared that fully following the ICMR-NIN recommendations was extremely challenging. The most commonly cited barrier was financial constraint. While items like cereals, pulses, and some seasonal vegetables were affordable, the daily inclusion of costlier foods such as fruits, milk, nuts, and meat were often out of reach. Participants noted that meeting all the recommended portions would significantly exceed their monthly food budgets, which typically ranged from ₹3000 to ₹6000. Beyond finances, time and workload were also key constraints. Many women reported long working hours and fatigue, leading them to rely on simple, quick meals.

Verbatim 4: “Not really. Some parts we can manage, like dal and vegetables. But fruits and milk every day is not possible.”

Verbatim 5: “After working the whole day, it’s easier to just make simple dal-roti; there’s no extra time for vegetables or milk.”

During the discussions, women clearly differentiated between affordable and expensive foods.

Items like milk, fruits, nuts, paneer, and meat were considered costly and treated as occasional purchases, reserved for festivals, illness, or guests. Fats such as oil and butter were used sparingly. In contrast, staples like cereals, pulses, potatoes, and seasonal vegetables were consumed regularly due to their affordability and availability.

III. Estimation of Daily Dietary Cost Based on “My Plate for the Day” Recommendations

For vegetarian adult females, the total daily cost for meeting the recommended dietary intake amounted to ₹97.50. Notably, nuts and seeds, followed by dairy, were the highest cost contributors within the vegetarian plate. For non-vegetarian adult females, the daily cost came to ₹112.03. In this case, animal-source foods, dairy, and nuts and seeds formed the most expensive components. When projected over a month, these costs translate to ₹2,925 for a vegetarian adult female and ₹3,361 for a non-vegetarian one. Considering an average household income of ₹15,000 per month and assuming that 30% (₹4,500) is typically spent on food, a household of five members would have approximately ₹900 per person per month for food. This creates a significant affordability gap: the cost of the recommended diet (₹2,925–₹3,361) is more than three times what is available per person.

Table 4: Recommended Intake and Cost of “My Plate for the Day” for Adult Females

Food Groups	Recommended Daily Intake for Vegetarian Diet	Recommended Daily Intake for Non-Vegetarian Diet	Cost for a Vegetarian plate (Rupees)	Cost for a non-vegetarian plate (Rupees)
Cereal and NutraCereals	250	260	15.25	15.86
Pulses	85	55	13.24	8.56
Egg / Chicken/ Meat		70	X	23.00
Milk/curd	300	300	19.65	19.65
Vegetables	400	400	16.67	14.91
Fruits	100	100	9.60	9.60
Nuts and Seeds	35	30	18.60	15.94
Fats and oils	27	27	4.50	4.50
TOTAL COST			97.50	112.03

DISCUSSION

Both quantitative and qualitative data indicate that participants’ awareness of the guidelines’ broader impact on health was limited. Earlier studies have also highlighted that effectively communicating and implementing FBDGs across diverse populations is a significant challenge (Smitasiri & Uauy, 2007). Financial constraints were the primary barrier to following the recommendations, with secondary challenges including seasonal food availability, unrealistic portion sizes, and competing household expenses. Furthermore, participants clearly distinguished between affordable staples like cereals, pulses, and vegetables, which formed the basis of their daily diet, and more expensive items such as nuts, fruits, and meat, were considered occasional luxuries. A comparison with the EAT-Lancet reference diet shows that Indian diets are generally imbalanced, with excessive cereal consumption and insufficient intake of proteins, fruits, and vegetables (Sharma

et al., 2020). The literature also identifies food prices and affordability as key factors influencing food choices (Turrell et al., 2002, Lee et al., 2013).

The estimated daily cost of following the “My Plate for the Day” recommendations was

₹97.50 for vegetarian and ₹112.03 for non-vegetarian adult females. When calculated monthly, this amounts to ₹2,925–₹3,361 per person, over three times the average per capita food budget. This highlights a significant affordability gap and economic barrier to following national dietary guidelines, consistent with findings from previous Indian studies (Gupta et al., 2021; Raghunathan et al., 2021).

CONCLUSION AND IMPLICATIONS

The findings indicate that while women in Delhi’s urban slums see the “My Plate for the Day” as beneficial for health, its cost makes it largely unaffordable, exceeding the budgets of low-income households. This underscores the need for public health recommendations to be paired with economic support. Expanding food assistance to include nutrient-rich foods like dairy, pulses, eggs, fruits, and nuts alongside staples and combining it with nutrition education is crucial to making balanced diets achievable for the urban poor.

SUGGESTIONS FOR FUTURE RESEARCH

Although the present study provides valuable insights into the awareness, perceptions, and affordability challenges related to the “My Plate for the Day” guidelines among women in urban slums, its findings are limited by the small and localized sample. Future research should include larger and more representative populations across diverse settings to improve generalizability and better understand regional and socio-cultural differences in dietary practices. Intervention studies are also needed to evaluate the effectiveness of nutrition education, low-cost meal planning, and subsidized nutrient-rich food schemes in improving adherence and long-term health outcomes.

REFERENCES

- Bren d’Amour, C., Pandey, B., Reba, M. et al. (2020). Urbanization, processed foods, and eating out in India. *Global Food Security*, 25, 100361. <https://doi.org/10.1016/j.gfs.2020.100361>
- Erve, I. van ‘t, Tulen, C. B. M., Jansen, J. et al. (2017). Overview of Elements within National Food-Based Dietary Guidelines. *European Journal of Nutrition & Food Safety*, 1–56. <https://doi.org/10.9734/EJNFS/2016/32645>
- Gupta, S., Vemireddy, V., Singh, D. K., & Pingali, P. (2021). Ground truthing the cost of achieving the EAT lancet recommended diets: Evidence from rural India. *Global Food Security*, 28, 100498. <https://doi.org/10.1016/j.gfs.2021.100498>
- ICMR, & NIN. (2020). *Nutrient Requirements for Indians*. ICMR-National Institute of Nutrition. https://www.nin.res.in/RDA_Full_Report_2024.html
- IIPS. (2021). *International Institute for Population Sciences (IIPS) and ICF. 2021. National Family Health Survey (NFHS-5), 2019-21: India: Volume II. Mumbai: IIPS.*
- Kachwaha, S., Nguyen, P. H., DeFreese, M. et al. (2020). Assessing the Economic Feasibility of Assuring Nutritionally Adequate Diets for Vulnerable Populations in Uttar

- Pradesh, India: Findings from a “Cost of the Diet” Analysis. *Current Developments in Nutrition*, 4(12), nzaa169. <https://doi.org/10.1093/cdn/nzaa169>
- Krishnaswamy, K. (2008). Developing and implementing dietary guidelines in India. *Asia Pacific Journal of Clinical Nutrition*, 17 Suppl 1, 66–69.
 - Lee, A., Mhurchu, C. N., Sacks, G. et al. (2013). Monitoring the price and affordability of foods and diets globally. *Obesity Reviews*, 14(S1), 82–95. <https://doi.org/10.1111/obr.12078>
 - Leme, A. C. B., Hou, S., Fisberg, R. M., Fisberg, M., & Haines, J. (2021). Adherence to Food- Based Dietary Guidelines: A Systemic Review of High-, Low- and Middle-Income Countries. *Nutrients*, 13(3), 1038. <https://doi.org/10.3390/nu13031038>
 - NIN, I. (2024). *Dietary Guidelines for Indians*. ICMR-National Institute of Nutrition. <https://www.nin.res.in/dietaryguidelines2024.html>
 - Passi, S. J. (2024). Dietary Guidelines for Indians-2024: A critical appraisal. *Journal of the Epidemiology Foundation of India.*, 2(4), 200–204. <https://doi.org/10.56450/JEFI.2024.v2i04.008>
 - Raghunathan, K., Headey, D., & Herforth, A. (2021). Affordability of nutritious diets in rural India. *Food Policy*, 99, 101982. <https://doi.org/10.1016/j.foodpol.2020.101982>
 - Sharma, M., Kishore, A., Roy, D., & Joshi, K. (2020). A comparison of the Indian diet with the EAT-Lancet reference diet. *BMC Public Health*, 20(1), 812. <https://doi.org/10.1186/s12889-020-08951-8>
 - Smitasiri, S., & Uauy, R. (2007). Beyond recommendations: Implementing food-based dietary guidelines for healthier populations. *Food and Nutrition Bulletin*, 28(1 Suppl International), S141-151. <https://doi.org/10.1177/15648265070281S112>
 - Thomas, E. (2016). Food for thought: Obstacles to menu labelling in restaurants and cafeterias.
 - *Public Health Nutrition*, 19(12), 2185–2189. <https://doi.org/10.1017/S1368980015002256>
 - Turrell, G., Hewitt, B., Patterson, C., Oldenburg, B., & Gould, T. (2002). Socioeconomic differences in food purchasing behaviour and suggested implications for diet-related health promotion. *Journal of Human Nutrition and Dietetics: The Official Journal of the British Dietetic Association*, 15(5), 355–364. <https://doi.org/10.1046/j.1365-277x.2002.00384.x>
 - WHO. (1998). Preparation and use of food-based dietary guidelines. Report of a joint FAO/WHO consultation. FAO/WHO. *Technical Report Series*, 880, 1–108.
 - WHO. (2003). *Diet, nutrition and the prevention of chronic diseases- Report of a Joint WHO/FAO Expert Consultation*. WHO Technical Report Series No. 916).
 - Winichagoon, P., & Margetts, B. M. (2017). The double burden of malnutrition in low- and middle- income countries. In I. Romieu, L. Dossus, & W. C. Willett (Eds.), *Energy Balance and Obesity*. International Agency for Research on Cancer.

A PROMISING INSIGHT INTO THE NEED FOR EFFECTIVE CURRICULUM IMPLEMENTATION: A STUDY IN SELECTED ANGANWADI CENTRES IN KERALA

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ABSTRACT

This research study evaluates the effectiveness of Pre-school education in Anganwadi centres (AWCs) under the Integrated Child Development Services (ICDS) scheme in Ernakulam district, Kerala. Utilising a purposive sampling approach, the study assesses the quality of pre-school education, infrastructure, social awareness and training given to Anganwadi Workers (AWWs) through a survey of 151 AWCs. In India, studies evaluating the objectives of ICDS indicate a predominant emphasis on child nutrition (Ministry of Women and Child Development, 2015). Although preschool education is among its stated goals, there is a significant gap in evaluating its effectiveness. So, the present research focuses on assessing the preschool education component delivered through AWCs in Kerala. The results reflect the Kerala government's prioritisation of preschool education in AWCs, but also expose gaps within the current curriculum that require attention, especially in the time schedule and activities which fulfil the five developmental domains. By contributing to the existing body of research on preschool education in AWCs, the research contributes significant understanding to policymakers, practitioners, and stakeholders working towards improving the lives of pre-school children in Kerala and beyond.

Keywords: AWCs, AWWs, ICDS, Curriculum, Kerala

INTRODUCTION

The ICDS is a centrally sponsored scheme administered by the Department of Women and Child Development under the Ministry of Human Resource Development, Government of India. Since its inception in 1975, it has served as the Government's flagship programme aimed at addressing the comprehensive developmental needs of children.

The primary objectives of the Integrated Child Development Services (ICDS) are To promote better nutrition and health among children under six years of age, to establish a foundation for their optimal psychological, physical, and social development, to provide informal pre-school education through a widespread network of community-based Anganwadi Centres (AWCs) and Anganwadi Workers (AWWs), to reduce child mortality, morbidity, malnutrition, and school drop-

out rates, to ensure efficient coordination among various governmental bodies involved in child development, and to empower mothers through education, which empowers them to better care for their children's health, nutrition, and overall development.

A key component of the ICDS Programme is pre-school education, which emphasises the holistic development of children between 3 to 6 years of age. This age group benefits from non-formal pre-school education provided through AWCs established in villages across the country. New Education Policy (NEP) 2020 emphasises early childhood education and holistic learning (MHRD, 2020). There has been an impressive expansion of ECCE by ICDS in India in quantitative terms, with low or inadequate attention to the content and standard of preschool education. So, it can be observed that there is a drop in the number of children enrolling on AWCs, and many parents prefer alternative schooling options. If these inadequacies are addressed appropriately, the scheme has the potential to give satisfactory pre-school education outcomes. Therefore, there is a need for understanding the problems faced by AWWs and the curriculum framework.

OBJECTIVES

- To evaluate the current status and modes of delivery of non-formal preschool education in AWCs through ICDS in Kerala.
- To investigate the social awareness of non-formal preschool education as perceived and experienced by AWWs.
- To modify the existing preschool education curriculum based on the research and to examine the impact of the implementation.

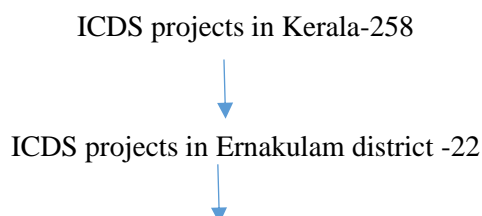
HYPOTHESIS

There is a need for modification of the current preschool curriculum in AWCs in Kerala, as perceived by the concerned authorities.

The limitation of the study was the small sample size used for implementation. It is mainly due to the need for implementation of the modified curriculum at a time, as it was prepared for one month, and requires a pre-test just after the usual curriculum implementation and a post-test just after the modified curriculum implementation.

MATERIAL AND METHODS

A community based, descriptive, quasi experimental study was conducted in 151 AWCs selected from the Ernakulam district of Kerala, with strategic focus to the coastal belt.



AWCs in Vypeen (39), Njarackal (60), Edavanakad (35) and Kuzhipily (17) panchayats,

The primary data were gathered from the AWWs in the AWCs in which lie in the coastal belt of Kochi through purposive sampling method.

Methods	Material
Evaluation of the current status and modes of delivery of non-formal preschool education in AWCs through ICDS in Kerala	Survey schedule to understand community awareness, explore the status of non-formal preschool education in AWCs, to study the problems faced by the AWWs in implementing the programme effectively-Percentage analysis and Chi-square test.
The formulation of a sustainable plan aimed at transforming AWCs as effective early learning centres.	Modified teaching curriculum for the month of June, including components of multiple intelligences based on ‘Ankanathaimav’ (Preschool Education material for Ankanwadis in Kerala by Department of Women and Child Development)
Execution of the prepared module in AWCs	Implementation and Pre-test and post-test of the same to understand the effectiveness- Wilcoxon Signed-Rank Test

RESULTS AND DISCUSSION

Discussion of the results was developed within the framework of the following areas: Adequacy of the AWC equipment and infrastructure, Social awareness, Training of AWWs, Time spent for pre-schooling by AWWs, Curriculum and Ankanathaimav, and Updation of the existing curriculum and Implementation.

Adequacy of the AWC equipment and infrastructure

The study checked the adequacy of the AWC equipment and infrastructure, in terms of enabling the AWW to perform her work effectively. Sixty-four per cent of the AWWs had the opinion that the AWC has enough equipment and infrastructure. Emperical findings by R. Abraham (2022) concerning ICDS in urban Kerala indicate high level of infrastructure satisfaction , specifically, more than 70 per cent participant mothers affirmed that AWC facilities were enough for good service delivery. In the financial year 2021–22, the government consolidated several nutrition-focused initiatives under the comprehensive framework of Saksham Anganwadi and POSHAN 2.0. This structural reorganisation was undertaken to modernise Anganwadi centres, facilitate digital data management, strengthen monitoring mechanisms, and enhance the overall quality of service delivery. The modernisation efforts encompass the upgrading of Anganwadi Centres (AWCs) with improved kitchen facilities, child-friendly learning environments, and the integration of audiovisual tools. Additionally, under the *POSHAN Abhiyaan*—initiated in 2018—technological interventions were introduced to monitor child growth and service delivery outcomes more effectively. These measures have contributed to minimising resource leakages and promoting greater transparency (MWCD, 2022).

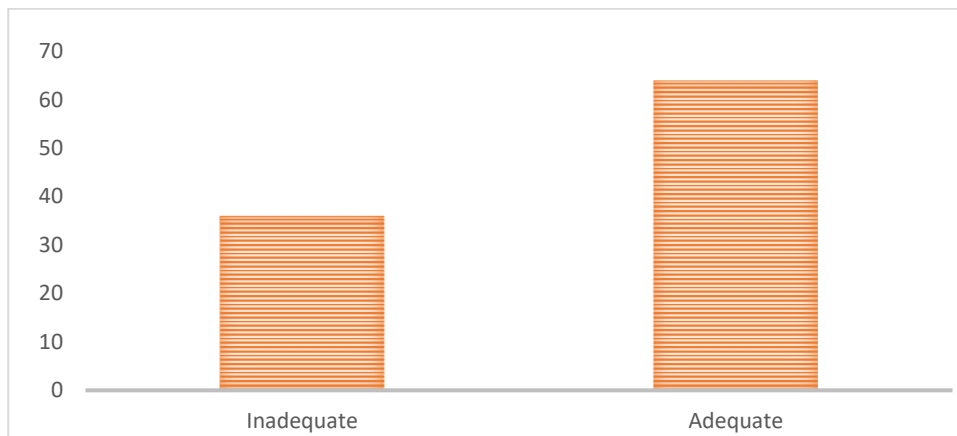


Figure 1 Adequacy of the equipment and infrastructure in AWCs

Assessment of Social Interest and Awareness: Perspectives of AWWs

The study questioned AWWs about any changes needed in social awareness about activities in AWCs. The results showed that 51 per cent did not have a need for any change in social interest and awareness. But among the 151 AWWs, 29 per cent had the opinion that there should be a change in the social interest and awareness, and 20 per cent had the opinion that they needed some changes in the social interest and awareness. R. Abraham (2022) conducted a study on awareness and perception of mothers regarding the Integrated Child Development Services Scheme for children in an urban area of Kerala, and the study concluded that although 90% were aware of the preschool non-formal education offered by AWCs, only 57.1% considered it beneficial.

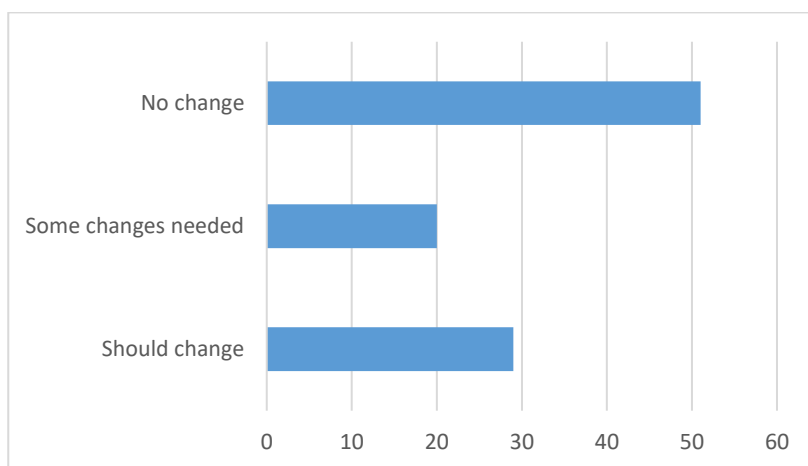


Figure 2 Assessment of Social Interest and Awareness

Training of AWWs

The Department of Women and Child Development, Government of Kerala, provides standardized training for all permanent AWWs and AWHs. Regarding the efficacy of this training, a majority (exceeding 50 per cent) expressed satisfaction with the current curriculum, advocating for no modifications. Conversely, approximately 30 per cent identified a need for incremental

adjustments, while the remaining 20 per cent asserted that a fundamental restructuring of the training framework is required. VK et al., (2024) conducted a cross cross-sectional study on challenges and needs among Anganwadi Workers under Rural Health Training Centre, Kalaburagi and found that AWWs encountered several challenges, including a complete lack of drug supplies (100%), limited access to transportation facilities (80.9%), and a critical need for consistent incentives (100%). In contrast, a relatively smaller proportion (14.9%) reported a need for technical training.

Those workers who need a change in training suggested changes such as inclusion of more practicals, ECCE-related activities, and also training of more than two weeks. The training period was 3 months, then it changed to two weeks. So many of them said that not three months, but they need training of minimum one month. A study by Musthafa, N and Navaneeth, P. (2025) critically examined the professional training given to AWWs, and it was reported that the insufficient emphasis on the preschool education component during training, challenges related to the delivery of training, and the inadequacy of both the duration and frequency of training sessions were identified. This research highlighted the critical need for policy measures to enhance training quality and proposed reasonable solutions for strengthening early childhood programs for the developmental outcomes of children.

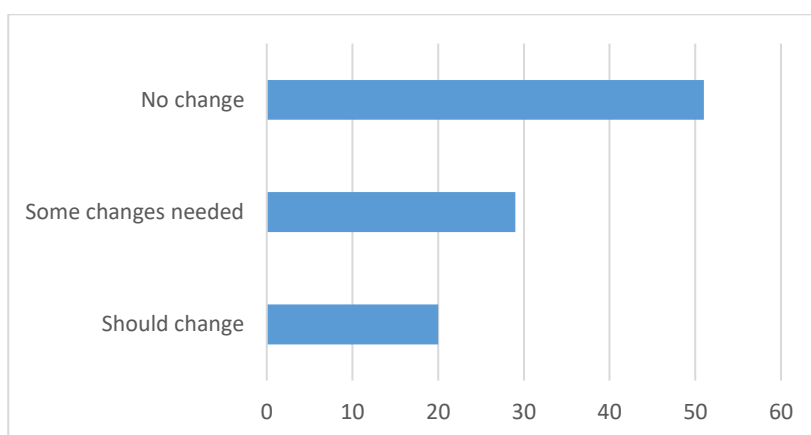


Figure 3 Training of AWWs

Time spent for pre-schooling by AWWs

The study depicted that 72 per cent of AWWs spend one and a half hours on ECCE. Only 4 per cent of AWWs were spending 2 hours on ECCE. The mean time spent on ECCE by AWWs is approximately 1.34 hours. The ‘Ankanathaimav’ has five activities per day with a half-hour duration. So, it needs two and a half hours. As a result, AWWs have lacked adequate time for ECCE as specified in Ankanathaimav. Arya and Vig (2023) conducted a study entitled Impact of Anganwadi Workers’ Soft Skills on the Developmental Milestones of Anganwadi Children to examine the influence of AWWs’ soft skills on the developmental progress of children. The study found that the time management skills of (AWWs) were positively associated with children’s gross motor, fine motor, and socio-emotional development. A positive attitude among AWWs demonstrated a significant correlation with both gross motor, cognitive development and socio-emotional development. According to Lall, Roy, Chandrika, and Divan (2024), AWWs frequently feel overwhelmed due to their demanding and tightly packed schedules. One among the core objectives

of the National Education Policy (NEP) 2020 is Aims to guarantee universal access to education at every level, from early childhood care and education (ECCE) through to higher education, with the aim of leaving no child behind. The policy places particular emphasis on the significance of the early years in a child's development, highlighting ECCE as a key foundation for lifelong learning (Ministry of Education, 2020).

Table 1 Time spent for pre-schooling by AWWs

Time spent for pre-schooling	Percentage (%) N=151
Less than One hour	11
One hour	13
One and half hour	72
Two hours	4

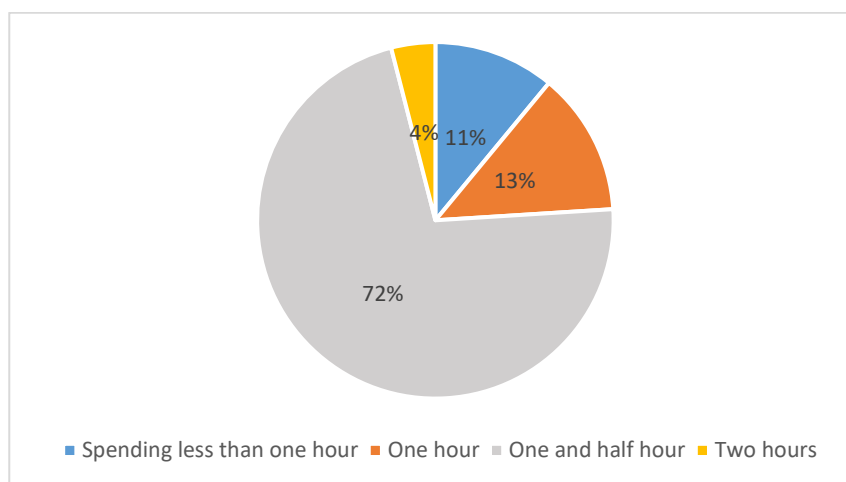


Figure 4 Time spent for pre-schooling by AWWs

Comparative Analysis of AWWs Perspectives on Curriculum Changes and Revision of Ankanathaimav

The survey analysed aspects such as the infrastructure of AWCs, social interest and awareness, and training of AWWs to make sustainable plans for beneficial pre-school education in AWCs. As the ICDS has other objectives, and AWWs also have the responsibility of doing activities to accomplish those objectives, the most effective solution lies in modifying the current preschool education curriculum, while ensuring that the goal of promoting the five developmental domains is met.

The curriculum of AWCs in Kerala includes the daily activities and general schedule for the functioning of an AWC and the pre-school education based on 'Ankanathaimav', which includes theme-based five activities in a day that accomplish five developmental domains.

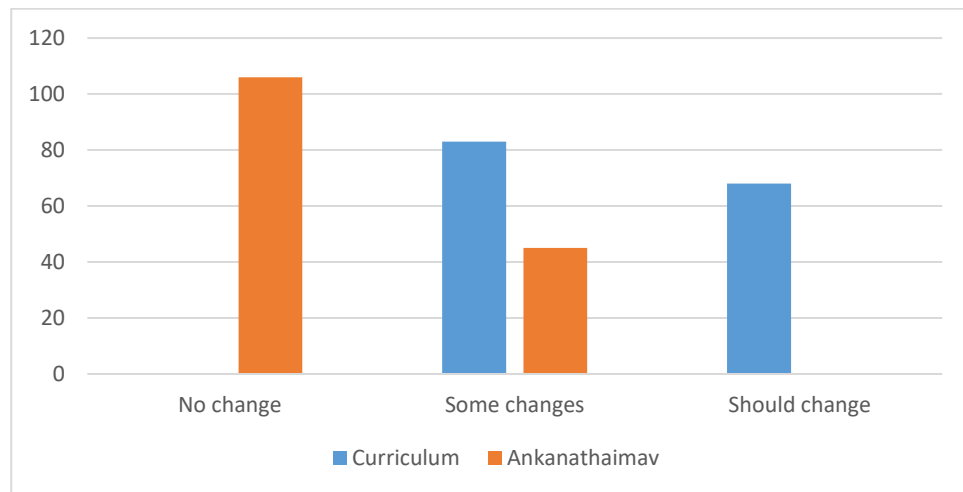


Figure 5 Comparative Analysis of AWWs Perspectives on Curriculum Changes and Revision of Ankanathaimav

A chi-square test was conducted to evaluate the response of AWWs towards Curriculum and Ankanathaimav. That means whether they need change in Curriculum or Ankanapoolmazha only. The calculated chi-square statistic was 186.34, degrees of freedom- 2, and dritical value at $\alpha=0.05$: 5.99. p-value is less than 0.05, which is highly significant. The highly significant result shows a strong link between the type of concept and the way AWWs responded. AWWs generally agree that the curriculum needs to be changed. As illustrated in Figure 5, there is a consensus among AWWs regarding the inadequacy of the current framework. Specifically, 55% of respondents advocated for incremental modifications to the AWC curriculum. 45% of respondents asserted that a comprehensive curricular overhaul is essential to ensure high-quality Early Childhood Care and Education (ECCE). While the Ministry of Women and Child Development (2015) identifies preschool education as a core pillar of Integrated Child Development Services (ICDS), empirical focus remains disproportionately skewed toward nutritional outcomes. This study addresses the critical evaluative gap regarding the pedagogical effectiveness of AWCs. Despite their foundational role in the Indian educational landscape, current evidence suggests that AWCs frequently underperform in facilitating age-appropriate developmental milestones. In the specific context of Kerala, the primary barrier identified by AWWs is not the content itself, but rather the temporal constraints associated with implementing the *Ankanathaimav* activities. The statistically significant variance in opinions highlights a nuanced distinction in how AWWs perceive the general curriculum versus the specific operational demands of the *Ankanathaimav* manual.

Analysis of the Implementation of the Transformed Curriculum

Drawing from the above results, a refined Curriculum was made, including revision in Ankanathaimav, and it was evaluated by stakeholders. In the National Education Policy (NEP) 2020, in its phased implementation approach, exemplified by early pilot projects such as the Innovative School Models in Uttar Pradesh. These pilots have proven effective in tailoring reforms through continuous feedback and alignment with local requirements (Ravi, 2024). The modified curriculum was implemented across five AWCs using a pre-test/post-test design. Data are presented as mean with standard deviation. Due to the non-normal distribution of the scores, a Wilcoxon signed-rank

test was employed to determine the statistical significance of the improvements since the score followed non-normal distribution. The test results are given in table 2.

Table 2 Analysis of the Implementation of the Transformed Curriculum

Measurements	Pre-test Mean (SD)	Post-test Mean (SD)	Mean Difference	Wilcoxon Statistic	p-value
Daily activities and general schedule for the functioning of an AWC.	1.0 (0.89)	9.4 (0.89)	8.4	0.0	0.0625
Pre-school education based on 'Ankanathaimav'	0.4 (0.55)	10.0 (0.00)	9.6	0.0	0.0625
Total	1.6 (1.34)	19.4 (0.89)	17.8	0.0	0.0625

A Wilcoxon Signed-Rank Test was carried out to evaluate the response. The Wilcoxon Signed-Rank Test compares paired pre- and post-scores. For daily activities and the general schedule for the functioning of an AWC test statistic = 0.0, p-value \approx 0.0625, where for pre-school education based on 'Ankanathaimav' test statistic = 0.0, p-value \approx 0.0625 and the total scores were test statistic = 0.0, p-value \approx 0.0625

The improvement in scores is striking across all categories. However, the p-values are just above the conventional significance threshold ($p=0.05$). While the results did not reach the threshold for formal statistical significance likely because of the limited sample size, the data reveal strong indicative trends toward improvement. Specifically, every participant demonstrated a consistent and substantial increase in performance across all evaluated domains. These indicative trends suggest that the implementation of the modified curriculum, specifically the daily activities and general schedules within the *Ankanathaimav* framework, may enhance the overall functioning of AWCs. Although the findings are not yet definitive, the uniform upward trajectory observed in the pre- and post-test scores points toward the potential efficacy of the revised preschool educational model. All measures showed excellent improvement following the implementation of the modified curriculum. The marginal statistical results ($p\approx 0.0625$) are likely a result of a limited sample size, even though not the absence of real change. Overall, the intervention led to robust, positive change in curriculum, which means both in the daily activities and general schedule for the functioning of an AWC and pre-school education based on 'Ankanathaimav'. For attainment of a 100% Gross Enrollment Ratio (GER) from preschool through secondary education by 2030, NEP 2020 proposes strategic measures focused on reducing dropout rates and improving learning outcomes (UNESCO, 2020).

CONCLUSION

There has been a notable quantitative expansion of AWCs under ICDS in Kerala, and having an excellent curriculum, there has been insufficient importance placed on the quality of preschool education. While the ICDS in Kerala has achieved significant quantitative expansion, this study identifies a critical divergence between curricular design and pedagogical quality. The findings underscore that structural growth alone is insufficient, rather, the optimization of implementation strategies is the primary catalyst required to translate the state's educational frameworks into measurable developmental outcomes. Current state initiatives, such as the 2021 Smart Anganwadi scheme and the infrastructure priorities of the Local Self-Government Department, provide a vital physical foundation for reform. However, this research posits that infrastructural advancement must be coupled with the iterative curricular refinements evidenced in this study to transform AWCs into centers of excellence for Early Childhood Care and Education. By addressing these implementation gaps, Kerala can move beyond mere enrolment toward a model of high-quality, universal preschool education. This research contributes to the existing discourse by providing evidence-based insights for policymakers and stakeholders committed to advancing early childhood outcomes in Kerala. It will ensure the primary objective of NEP 2020, which is to guarantee universal access to high-quality Early Childhood Care and Education (ECCE) throughout the country by 2030.

REFERENCES

- Abraham, R. (2022). Awareness and perception of mothers regarding Integrated child development services scheme for children in an urban area of Kerala. *International Journal of Community Medicine and Public Health*, 9(7), 2875.
- Arya, M., & Vig, D. (2023). Impact of Anganwadi workers' soft skills on Anganwadi children's developmental milestones. *Indian Journal of Extension Education*, 59(3)
- Government of India. (2020). National Education Policy 2020. Ministry of Education. Retrieved from <https://www.education.gov.in>.
- Lall, G., Roy, R., Chandrika, K. S., & Divan, G. (2024). "The early years are like a foundation for the future": Perspectives, facilitators, and challenges of Anganwadi workers in supporting early child development interventions in Hyderabad, India: Qualitative findings from a scalable program incorporating early child development interventions. *Indian Journal of Public Health*, 68(2), 214–221.
- MHRD (Ministry of Human Resource Development). (2020). National Education Policy 2020. Government of India.
- Ministry of Education. (2020). National Education Policy 2020. Government of India.
- Musthafa, N., & Navaneeth, P. (2025). Early education on fragile ground: rethinking preschool teacher training. *Education* 3-13, 1–15. <https://doi.org/10.1080/03004279.2025.2467926>.
- Rahaman, M., Roy, A., & Chouhan, P. (2025). Assessing the non-attendance of preschooling among children under ICDS scheme in India: Insights from National Family Health Survey, 2019–21. *Evaluation and Program Planning*, 111, 102589.
- Ravi, S. (2024). Phased implementation and its impact: Insights from the Innovative School Models in Uttar Pradesh. *Education Reform Quarterly*, 18(1), 12–25.

The Indian Journal of Home Science 2026: 38(1)

- UNESCO (United Nations Educational, Scientific and Cultural Organisation). (2020). Global Education Monitoring Report 2020: Inclusion and education: All means all. UNESCO Publishing.
- VK, M., Kumar, G. A., & Dhadave, M. M. (2024). A Cross Sectional Study on Challenges and Needs among Anganwadi Workers Under Rural Health Training Centre-Hiresavalagi, Kalaburagi. *Indian Journal of Public Health Research & Development*, 15(3).

NUTRITIONAL STATUS AND COGNITIVE DEVELOPMENT AMONG SCHOOL CHILDREN OF YERAVA TRIBE

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ABSTRACT

The Ravula or Yerava are a tribal community found in Kerala and Karnataka. The age of 6 to 12 years is an active and dynamic period of physical growth as well as of mental health in school children. It is well established that nutritional status is a major determinant of the health and well-being among children. The present study was conducted with objectives, to know the nutritional status and to assess the cognitive development of school children of Yerava tribe. Random sampling technique was used to select the children in the age group of 5 years to 10 years for the study. The questionnaire and assessment methods were predominantly used to collect the data. Ravens Color Progressive Matrices and self-structured questionnaire were used to elicit the information. The results showed that severe level of stunting was observed among 5 to 7 years of age group (44.16%) compared to 8 to 9 years old children (24.5%). About 21.53% of the respondents moderately underweight in 5 to 7 years whereas 32.07% in 8 to 9+ years old belonged severe underweight category. According to cognitive development of school children, 27% had definitely above the average level of cognitive abilities while 26.27% of them were intellectually average and intellectually superior level of cognitive development followed by 23% children had definitely below the average level of cognitive development. The study also reported that nutritional status of the child showed positive correlation with weight, height, MUAC and BMI. This indicates cognitive development was impacting on nutritional status of the children. Hence there is a need of awareness programme on healthy and nutritious food to maintain the optimum nutritional status of the children and educational programme regarding nutrients to improve the cognitive development.

Key words: Nutrition, cognitive development, stunting

INTRODUCTION

India is home to over 700 diverse, officially recognized Scheduled Tribes (Adivasis) representing roughly 8.6% of the population, with the largest groups being the Bhils, Gonds and Santhals. The population of Yerava tribes as per 2011 census is 30,359 in Karnataka and found mostly in Kodagu and Mysore districts. They appear to have been, from a remote period, in a servile relation to the Betta Kurumbas. Having no land of their own for cultivation, the Ravula ended up as slaves for the migrants or as plantation workers and had to scour the forests for their survival. Even the Government list of Scheduled Tribes lists them as 'Adiya', in the place of their original name – Ravula. The researchers concluded that using Malayalam or Kannada – the state languages - would not provide sufficient understanding of the deeper truths of Scripture (Iyer, 2019). Several centuries

ago, the Ravula were a thriving, agriculture and forest-based tribe, in Wayanad and Coorg districts of Kerala and Karnataka, respectively. As per the provisional Census 2011 figures, India has recorded an aggregate child population of 158,789,287 which comprises of a rural child population of 117,585,514 and an urban child population of 41,203,773.

School age is a transition period between childhood and adulthood that involves changes in both size and behavior which contributes to the developmental process of the mental and cognitive abilities of the children that is demonstrated in their intellectual and motor performance. Assessment of physical development and nutritional status of children anthropometry remains as one of the most universally acceptable, applicable, non-invasive and inexpensive techniques of choice for researchers to assess the intelligence, performance and nutritional status of the children. Anthropometric measurements such as height, weight, mid-upper arm circumference (MUAC), skin fold thicknesses (e.g., triceps and sub-scapular) have been extensively used to assess the physical growth and nutritional status of children (Kujur *et al.* 2017). Hence the study was conducted with objectives, to assess the nutritional status of school children, to assess the cognitive development and to know the influence of nutritional status on cognitive development among school children. Hence the study was conducted with following objectives,

1. To assess the anthropometric measurements of school children.
2. To assess the cognitive development of school children
3. To know the association of nutritional status on cognitive development.

METHODOLOGY

The cross-sectional study was conducted to find out the influence of nutritional status on cognitive development of school children. A total of 118 school children were selected for the study among them 61 boys and 57 girls from 1st standard to 4th standard who were residing in Ponnampet taluk. Randomization sampling technique was adopted while selecting the respondents for the study. Self-developed questionnaire on socio-demographic conditions consisting of general information of child and family history and Ravens Color Progressive Matrices (1938) was used to assess the cognitive development of the children in the age group of 5 years to 9+ years. The values of weight and height, MUAC, skin fold thickness and body mass index were recorded for every child in the study sample.

The collected data were scored and interpreted according to the norms given in the manual of the scale. Further, the data were statistically processed by using SPSS package version 16.0. Mean and standard deviation were calculated for the study variables and t-test and F-test were applied to see the significant differences between gender and age groups in nutrition status and cognitive development.

RESULTS

Table 1: Personal information of children

Information about children		No	%
Gender	Boys	57	48.3
	Girls	61	51.7
Age (Years)	5years to 7 years	65	55.1
	8 years and 9+ years	53	44.9
Education	1 st to 3 rd	86	72.9
	4 th and 5 th	32	27.1

Table 1 shows the information about the children; 51 percent of the children were girls while 48 percent were boys. Majority (55%) of the children were in the age group of 5 to 7 years old and 44 percent of them belonged to 8 to 9+ years of age group. Majority (72.9%) of the children were studying in 1st to 3rd standard followed by 27 percent were studying in 4th to 5th standard.

Table 2: Gender-wise Mean and Standard deviation of Anthropometric measurements

Variable	Gender	n	Mean	SD	t- value	sig
Height	Boys	61	14.39	3.36	0.360	0.720
	Girls	57	14.31	3.90		
Weight	Boys	61	21.92	4.36	1.697	0.096
	Girls	57	20.56	4.43		
MUAC	Boys	61	6.44	1.02	0.546	0.568
	Girls	57	6.35	0.77		
Skin fold thickness	Boys	61	5.47	0.74	1.665	0.099
	Girls	57	5.70	0.73		
BMI	Boys	61	1.83	0.91	0.448	0.405
	Girls	57	1.70	0.82		

Table 2 shows the anthropometric measurements of children. According to gender, the mean value of boys' height was 14.39±3.36 while mean value of girls was 14.31±10.90 and there was no significant difference between height and gender. Weight of the boys slightly higher than girls (21.92>20.56), however there was no significant difference between gender and weight. The mean value of MUAC, skin fold thickness and BMI were almost equal and there were no significant differences in between gender with MUAC, skin fold thickness and BMI of children.

Table 3: Age-wise Mean and Standard deviation of Anthropometric measurements

Variable	Age	n	Mean	SD	t- value	sig
Height	5 to 7 years	65	9.06	1.21	7.728*	00
	8 and 9+ years	53	12.2	1.07		
Weight	5 to 7 years	65	18.84	3.04	8.226*	00
	8 and 9+ years	53	24.23	4.06		
MUAC	5 to 7 years	65	6.23	0.76	2.147*	0.034
	8 and 9+ years	53	7.59	1.03		
Skin fold	5 to 7 years	65	5.63	0.76	0.743	0.459

thickness	8 and 9+ years	53	5.52	0.72		
BMI	5 to 7 years	65	1.64	0.79	1.741	0.084
	8 and 9+ years	53	1.92	0.93		

Table 3 shows anthropometric measurements according to age of the children. The mean value of height of 8 to 9+ years children was 12.2±1.07 followed by 5 and 7 years of children (9.06±1.21). The weight of 8 to 9+ years children was higher compare to 5 to 7 years of children (24.23±4.06 > 18.84±3.04). The mean value of MUAC of 8 to 9+ years was 7.59±1.03 followed by 5 to 7 years of children (6.23±0.76). There were significant differences between age of the children with height, weight and MUAC. No significant differences between skin fold thickness and BMI with age groups. The similar results found by Prabhakar and Gangadhar in 2009 found that height and weight were no significant differences (p>0.05) in the age and gender in school children.

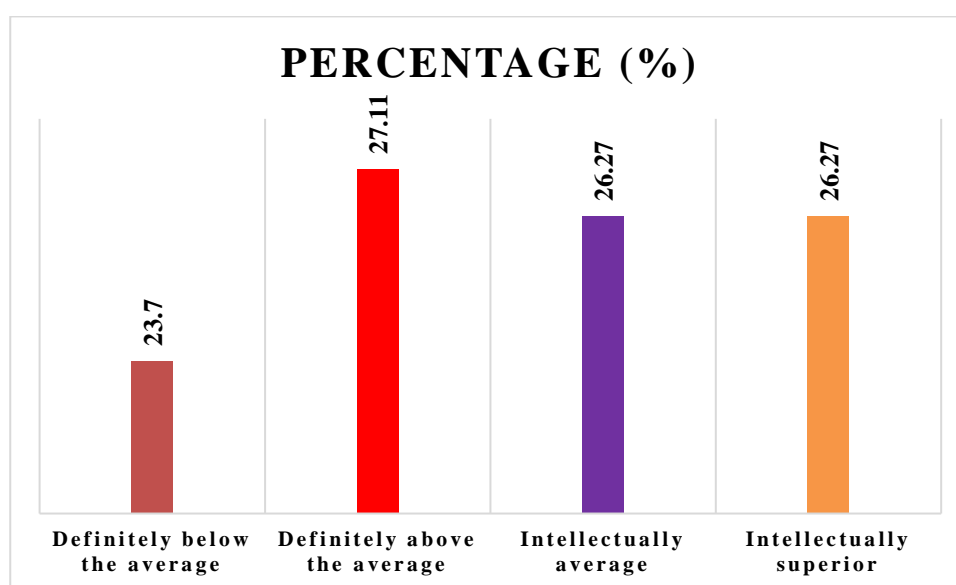


Fig. 1: Level of cognitive development of school children

Fig. 1 indicates level of cognitive development of school children; 27 percent of children had definitely above the average level of cognitive development while 26.27 percent of them had intellectually average and intellectually superior level of cognitive development followed by 23 percent of the children had definitely below the average level of cognitive development.

Table 4: Association of cognitive development with child’s information

Variables		Definitely Below the average		Definitely above the average		Intellectually average		Intellectually superior		χ ² (df) Sign.
		No	%	No	%	No	%	No	%	
Gender	Boys	1	1.6	23	37.7	35	57.3	2	3.2	0.679 (3) 0.499
	Girls	3	5.2	15	26.3	33	57.8	6	10.5	

Age	5 to 7 years	21	0.3	40	62.5	4	6.1	0	0	2.159 (3) 0.039
	8 and 9+ years	17	0.3	4	7.5	28	52.8	4	7.5	
Education	1 st to 3 rd	25	29	54	62	1	1	6	6	1.733 (3) 0.027
	4 th and 5 th	3	9	13	40	14	43	2	6	
BMI	Normal	4	6.7	2	3.3	22	37.2	31	52	3.912 (9) 0.017
	Mild	1	3.44	3	10.34	18	62.1	7	24.1	
	Moderate	17	60.7	11	32.7	1	3.57	1	3.57	

Table 4 depicts distribution of cognitive development with child's factors. According to the gender, 57 percent of both boys and girls were had intellectually average level of cognitive development where as 37.7% of boys and 26.3% of girls were had definitely above the average level of cognitive development. Majority (62.5%) of 5 to 7 years of children were had average level of cognitive development while 52.8 percent of 8 to 9+ years of children had intellectually average level of cognitive development. Majority (62%) of 1st to 3rd standard students were had definitely above average level of cognitive development while 43 percent and 40 percent of 4th to 5th standard children were had intellectually above and average level of cognitive development respectively. Among children with normal BMI, 52 percent of them had intellectually superior and 37.2 percent had intellectually average level of cognitive development. Majority (62.1%) of the children with mild BMI had intellectually average level of cognitive development followed by 24.1 percent had intellectually superior level of cognitive development. Among the children with moderate BMI, 60 percent of them had below average and 32.7 percent had definitive above the level of cognitive development. Age, education and BMI were significantly associated with cognitive development of children. The study in line with Dutton *et al.* (2018) revealed that cognitive development had significantly associated on child age. It indicated that children aged between 8-10 years had higher cognitive abilities compare to 6-7 years of children.

Table 5: Mean and SD scores of cognitive developments based on child factors

Variables		n	Mean	SD	t-value/ F-value	Sig
Gender	Boys	57	18.12	2.052	1.312	0.243
	Girls	61	19.05	3.125		
Age	5years to 7 years	65	17.85	1.263	2.283*	0.022
	8 years and 9+ years	53	20.18	2.470		
Education	1 st to 3 rd	86	18.12	1.031	3.141*	0.015
	4 th and 5 th	32	20.91	2.372		
BMI	Normal	59	19.47	1.75	12.57*	0.010
	Mild	29	18.40	1.98		
	Moderate	30	16.19	1.99		

Table 5 indicates the Mean and SD scores of cognitive developments based on child factors. The mean score for girls (19.05) were slightly higher than the boys (18.12) in cognitive development however there was no significant difference between the gender in cognitive development. In case of age 17.85 and 20.18 were the mean score for 5 to 7 year and 8 to 9+ year old children respectively, hence there was significant difference found between age of the children in cognitive development. According to education group 1st to 3rd and 4th to 5th standard students had mean score of 18.12 and 20.91 respectively. According to BMI category, the children with normal BMI had high level of cognitive abilities compare to the children with mild and moderate BMI (19.47>18.40>16.19). Teh *et al.* in 2020 found a similar results that anthropometric measurements and nutrition status of the children were significantly association with cognitive development of the children.

Table 6: Correlation values for cognitive development with child’s factors

Child’s factors		
Age	r	0.521**
	Sig	0.00
Gender	r	0.363**
	Sig	0.00
Education	r	0.491**
	Sig	0.01
BMI	r	0.521**
	Sig	0.00
Overall cognitive development	R	0.676**
	Sig	000

Table 6 indicates the correlation values for cognitive development with child’s factors. Age, gender, education, body mass index and overall cognitive development of the children were highly significantly correlated with cognitive development of children. It indicated that increase in age and education the improvement in cognitive abilities was observed and body mass index of children also positively highly significantly correlated with cognitive abilities of the children. The results in line with Kaberi (2017) found that age, education and BMI of the children were significantly correlated with cognitive skills among children.

CONCLUSION

The present study highlighted that there was significant difference between age group of children with height, weight and MUAC. Nearly 30 percent of children had definitely above the average, intellectually average and intellectually superior level of cognitive development. Gender was non-significant difference in cognitive development, hence there was significant difference found between age of the children in cognitive development. Children with normal BMI had high level of cognitive abilities compare to the children with mild and moderate BMI. Age, gender, education, body mass index and overall cognitive development of the children were highly significantly correlated with cognitive development of children. Hence the study concluded that nutrition status plays a very important role for cognitive development of the children. Improvement of nutrition status of the children enhances the cognitive development.

Based on the findings of the study regarding the nutritional status and cognitive development among school children of the Yerava tribe, several recommendations can be made to improve the

overall health and well-being of these children. Firstly, there is a clear need for targeted interventions aimed at improving the nutritional status of Yerava children. This can be achieved through the implementation of awareness programs focused on promoting healthy and nutritious food choices within the community. Additionally, access to nutritious food sources should be enhanced, particularly for families with limited resources. Secondly, educational programs should be developed to raise awareness among parents and caregivers about the importance of nutrition in cognitive development. Providing information about the specific nutrients essential for cognitive function and ways to incorporate them into daily meals can be beneficial. Furthermore, initiatives aimed at improving access to healthcare services for the Yerava community should be prioritized. Regular health check-ups and screenings can help identify children at risk of malnutrition and cognitive delays early on, allowing for timely interventions. Additionally, efforts should be made to improve the overall socio-economic conditions of the Yerava community, as poverty and socio-economic disparities can significantly impact nutritional status and access to healthcare. Moreover, collaboration between government agencies, non-governmental organizations, and community leaders is essential to develop and implement comprehensive interventions addressing the nutritional and cognitive needs of Yerava children effectively. Overall, addressing the nutritional needs and cognitive development of Yerava children requires a multi-faceted approach encompassing education, healthcare, and socio-economic development. By implementing targeted interventions and fostering collaboration, significant improvements in the health and well-being of Yerava children can be achieved.

REFERENCES

- Ahirwar.A and Gautam .R.K (2015) “Growth pattern among Bharia boys- A tribe of Patalkot, Chhindwara (MP), India ”, *Human Biology Review* pp. 221-235 (ISSN 2277 4424) volume 4 , issue 3.
- Dutton E, David D, Habab O. A, Salaheldin F. B, Essa S Y. (2018). The Raven's test performance of South Sudanese samples: A validation of criticisms of the utility of Raven's among Sub-Saharan Africans , *Personality and Individual Differences*. Volume 128,122-126.
- Iyer S., 2019, A study of demography of tribes, *Int. J. Farm Science*. 11 (2): 156-189.
- Kaberi S., 2017, A study on cognitive development of tribal and non tribal primary school children in concrete operational stage. *Ind. J. Health and Well-being*. 5(1): 146-152.
- Kujur A, Kumar D, Kumar C, Rana K. R and Kashyap V. (2019). Socio-demographic differentials of cognitive development and nutrition among school children: evidence from the tribal areas of Jharkhand, India, *International Journal of Adolescent Medicine and Health*. DOI: 10.1515/ijamh-2018-0219.
- Jai Prabhakar and M.R. Gangadhar., 2009, Nutritional Status of Jenukuruba Tribal children in Mysore district, Karnataka. 11(2), Pp:83-88 . <https://www.researchgate.net/publication/259532573>.
- Teh,S. C, Asm, Hamid Jan,A and Yusof. (2020), Assessment of food security, anthropometric and cognitive function among orang asli children in pahang, Malaysia , *IMJM* volume 19, issue3

PROFILING MORAL VALUES IN CHILDREN BETWEEN THE AGES OF 10 TO 12 YEARS

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ABSTRACT

The study was conducted in the year 2025. The main objectives of the study were to profile moral values in children based on a moral value score, to compare the moral values in children based on their age and gender, and to find the correlation and significance of differences in the moral values of children. A descriptive survey method was used on 210 participants aged 10 to 12 years. Results revealed no significant difference in the moral values of boys and girls. There was a significant difference in the moral values of participants of various ages. There was a progressive correlation in the moral values of participants with their age. There was a particularly heightened stigma against the stealing aspect of moral values in participants, presenting an emphasis on the immorality of stealing in their education. A majority of participants had average and low levels of moral values, indicating a need for intervention in their moral education. These findings can help teachers, policymakers, and parents to focus on the moral education of children and formulate plans to promote the importance of moral values on a wide scale

Keywords: Moral Values, Children, Gender, Preteens.

INTRODUCTION

The development of moral values during childhood represents a critical aspect of human growth, influencing individual behaviour, social interactions, and ethical decision-making throughout life (Narvaez & Lapsley, 2004). During the preadolescent period, generally defined as ages ten to twelve years, children experience rapid cognitive, emotional, and social maturation, which collectively enable sophisticated reasoning about fairness, honesty, responsibility, and social norms (Wainryb et al., 2022). The theoretical foundations for understanding moral development are often traced to Piaget's stages, which emphasise the transition from heteronomous to autonomous morality, as children increasingly consider intentions, rules, and reciprocity (Piaget, 1932). Kohlberg further elaborated how children move from pre-conventional reasoning, focused on punishment and reward, to conventional reasoning guided by social rules and expectations (Kohlberg, 1981). In India, where deeply rooted cultural traditions coexist with modernising societal and technological influences, understanding moral development assumes heightened significance, as children negotiate competing norms and expectations from family, school, and community contexts (Pandya et al., 2021).

Age is widely recognised as a central determinant of moral development, with older preteens generally showing enhanced perspective-taking, moral pondering, and coordination of intentions with outcomes when evaluating ethical situations. Even modest differences of one year, such as

between ten and eleven or eleven and twelve, can be associated with measurable improvements in socioemotional factors (Narvaez & Lapsley, 2004). Gender is another factor, with girls exhibiting higher levels of empathy, honesty, and prosocial tendencies, while boys express more rule-based reasoning (Kohlberg, 1981). Indian socio-cultural practices, and parental expectations can reinforce such differences, providing differential benchmarks for moral engagement (Pandya et al., 2021). Nevertheless, findings are inconsistent, suggesting that observed gender differences may be influenced by contextual and methodological factors rather than intrinsic developmental trajectories (Wainryb, 2006).

The conceptualisation and measurement of moral values have evolved considerably, with instruments designed to capture behaviours related to lying, dishonesty, cheating, and stealing (Gupta & Singh, 2016). The Moral Values Scale (MVS), developed specifically for Indian schoolchildren, has been widely utilised to assess these dimensions and classify participants into percentile-based moral levels from extremely low to extremely high. Importantly, research indicates that children display higher stimulation when observing antisocial behaviour compared with neutral or prosocial behaviour, and that this stimulation correlates with moral judgment such that the more negative the evaluation, the greater the stimulation even in prosocial or neutral scenarios (Kaßecker et al., 2025). This highlights the prominence of negative traits in moral understanding, justifying the assessment of antisocial behaviours, dishonesty, cheating, and lying, which elicit stronger responses than positive or neutral actions (Wainryb, 2006).

Despite substantial research, several gaps remain. Many studies employ broad age ranges or urban-centric samples, limiting understanding of rural children's moral development and subtle year-by-year variations within the preteen period. Limited attention to testing measurement equivalence across genders further complicates the interpretation of gender comparisons. Additionally, cultural and familial influences are often under-examined, despite their role in shaping moral reasoning and ethical behaviour (Pandya et al., 2021; Narvaez & Lapsley, 2004). Addressing these gaps, the present study examines moral value development among Indian children aged ten to twelve years, focusing on age- and gender-based differences, while employing a negative-trait-focused analysis. By situating the research in a rural context and using culturally validated instruments, the study aims to provide nuanced insights into the formation of moral reasoning and prosocial behaviour, informing educational practices, parental guidance, and policy interventions to support ethical development during this critical stage of childhood (Kaßecker et al., 2025).

OBJECTIVES

1. To profile moral values among children aged 10–12 years.
2. To compare moral values across age.
3. To compare moral values between genders.

HYPOTHESES

- H1: There is no significant difference in moral value scores across the ages of participants.
H2: There is no significant difference in moral value scores between boys and girls.

METHODOLOGY

The study employed a descriptive cross-sectional survey design within a quantitative research framework to examine moral values among children aged 10–12 years in a rural setting. For the study, Jaisalmer district in the state of Rajasthan was chosen to fulfil the demographic criterion. Further, to choose participants from a rural background far from urban centres, a village named Bhaniyana Gram Panchayat was picked using purposive sampling. The village had seventeen government schools and 1 private school. The private school was ignored for lower representation in the whole population, and a sample of 210 participants between the ages of 10 to 12 years was selected. A stratified random sampling technique was used to get an equal representation of participants in age and gender groups and to reduce selection bias.

The study was conducted abiding by the standard ethical norms (Ref. No. DHS25/15789). Relevant authorities were contacted and approval was obtained before the commencement of the study. Consent forms were distributed to school authorities for taking informed consent from parents, as all the participants were under the age of 18 years. Ethical approval was given by the Ethics Committee (H.Sc./EC/034/23-04-2025). Data was collected using a descriptive survey. The tool used for collecting the data was the Moral Values Scale (MVS, Gupta & Singh, 2016). MVS was a scale for assessing moral values, which was particularly shaped for school children in the age range of 6 to 12 years. This scale had four dimensions of moral values, i.e., (a) Lying, (b) Dishonesty, (c) Stealing, and (d) Cheating. A high score on this scale indicated high moral values, and a low score indicated low moral values. The scale used percentile standards to categorise the score into 7 categories, namely Extremely low, very low, low, average, high, very high, and extremely high. The MVS questionnaire was distributed among the participants. The questionnaire was explained to each participant. Participants were asked to fill out the questionnaire on their own without any discussion and the presence of any third party to avoid undue influence on participants. After the survey, the questionnaires were collected. Data from the collected questionnaires were tabulated and analysed using the MS Excel program, and compiled against levels of moral values. The data was profiled based on two factors, i.e., age and gender of the participants. For the age-based profiling, ANOVA(F-test) was used to find statistical significance of the data, and for the gender-based profile, the T-test was used to find statistical significance of the data.

RESULTS

The data collected for the study were analysed and profiled on the basis of two factors, i.e., age of participants and gender of participants.

Age-based profile of Moral values in participants.

Table-1 Percentage Distribution of Participants Based on Age and Level of Moral Values (N = 210)

Level of Moral Values	Age 10 (n = 70)	Age 11 (n = 70)	Age 12 (n = 70)	Total (N = 210)
Extremely Low	5.71% (4)	4.28% (3)	4.28% (3)	4.76% (10)
Very Low	5.71% (4)	7.14% (5)	7.14% (5)	6.67% (14)
Low	35.71% (25)	25.71% (18)	22.85% (16)	28.10% (59)

Average	47.14% (33)	57.14% (40)	55.71% (39)	53.34% (112)
High	4.28% (3)	4.28% (3)	7.14% (5)	5.24% (11)
Very High	1.42% (1)	1.42% (1)	2.85% (2)	1.90% (4)
Extremely High	0% (0)	0% (0)	0% (0)	0% (0)

Note. Values represent percentages with raw frequencies in parentheses.

According to Table-1, the moral value profile was categorised into seven levels of moral values. Categorisation of levels of moral values was done on the basis of the moral value score of participants. Most of the participants had an Average (53.34%) and Low (28.1%) level of moral values. None of the participants were in Extremely high level of moral values. A small percentage of participants had very high (1.9%), high (5.24%), very low (6.67%), and extremely low (4.76%) levels of moral values. The average level of moral values had a rise in percentage share of participants from 47.14% (age 10 years) to 57.14% (age 11years) and a slight fall to 55.17% (age 12 years) from 11-year-old participants. The percentage of participants with a Low level of moral values had a declining trend from the age of 10 years (35.71%) to the age of 12 years (22.85%). A slight rise is seen in the percentage of participants in the High and Very high levels of moral values with age. Absence of participants at the extremely high level is noticed.

Table-2 Age-Based Comparison of Moral Value Scores by Dimension

Dimension	Age 10 (M ± SD)	Age 11 (M ± SD)	Age 12 (M ± SD)	F value	p value
Lying	3.25 ± 1.23	3.36 ± 1.44	4.13 ± 1.65	7.43	.001***
Cheating	3.41 ± 1.48	3.34 ± 1.30	4.04 ± 1.51	4.98	.008**
Dishonesty	3.65 ± 1.62	3.77 ± 1.40	4.27 ± 1.82	2.79	.06
Stealing	3.64 ± 1.59	4.23 ± 1.61	5.02 ± 1.84	11.71	< .001***
Collective	13.96 ± 4.14	14.68 ± 4.14	17.47 ± 5.01	11.96	< .001***

Note. One-way ANOVA was conducted across age groups. **p < .01, ***p < .001.

In Table-2, a comparative analysis of moral value score of participants is presented. One way ANOVA(F-test) analysis was conducted with MS Excel for various dimensions of moral values based on the age of participants. All the dimensions except Dishonesty dimension had statistically significant differences in moral values scores. The difference in whole of moral value score was also statistically significant. Mean scores were observed to be rising with the age of participants. Mean score for the Stealing dimension was particularly higher for all age groups compared to the other three dimensions of moral values.

Gender based profile of moral values in participants.

Figure 1 is a graphical representation of the percentage distribution of participants in levels of moral values based on their gender. The number of participants in the form of a percentage is plotted on

the chart with respect to their level of moral values. Levels of moral values defined in Table 2 are presented on the horizontal axis. The number of participants is plotted on the vertical axis of the chart. Boys were represented by the orange-coloured columns, and Girls were represented by blue coloured columns. There were seven levels of moral values, namely Extremely Low, Very Low, Low, Average, High, Very High, and Extremely High. Most of the boys had Average (56.3%) and Low (27.2%) level of moral values. Girls were mainly distributed in the Average and Low levels of moral values, with 50.5% girls in the Average level and 29% of girls in the Low level. Charts for girls and boys follow the same normalised curve pattern, with most of the participants positioned in the Low and Average levels. It shows that there was no significant difference in the distribution of girls and boys based on levels of moral values. There were no boys and girls in the extremely high level of moral values

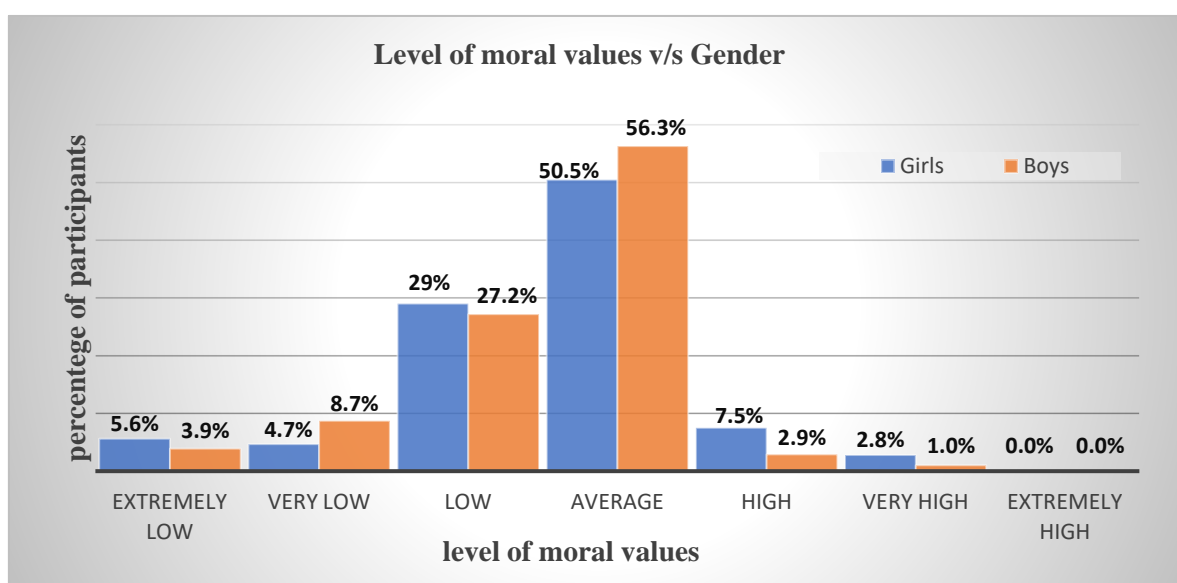


Fig.-1 Percentage distribution of participants

Table-3 Gender-Based Comparison of Moral Value Scores

Dimension	Boys (M ± SD)	Girls (M ± SD)	t value	p value
Lying	3.55 ± 1.34	3.61 ± 1.64	0.26	.79
Cheating	3.52 ± 1.33	3.67 ± 1.58	0.73	.46
Dishonesty	3.78 ± 1.52	4.01 ± 1.75	1.06	.29
Stealing	4.33 ± 1.79	4.27 ± 1.77	0.24	.81
Collective	15.18 ± 4.25	15.55 ± 5.10	0.56	.57

Note. Independent-samples t-tests were conducted across gender groups. No significant differences were found.

In table 3, mean moral value scores of participants compared with T test in MS Excel to find statistical differences are depicted. There were no statistically significant differences in moral value scores of Boys and Girls. The differences in scores were insignificant for all the dimensions of moral

values. The mean score for Stealing dimension was comparably higher than the other three dimensions of moral values.

DISCUSSION

With the first objective of the study being to compare moral values in children with age differences, Age-related differences were evident in the results, as 12-year-old children expressed comparably more mature moral understanding and thought, contrasted with their 10-year-old peers. This is supported by the study (Lapsley and Narvaez, 2004), which highlighted that moral understanding in children advances with age, as rational thinking and the ability to absorb others' viewpoints and perceptive cues expand. Similarly, Turiel (2006) stated that as children age, they get better at differentiating between moral contraventions and norms. Although the contradiction in an assessment (Panchal & Desai, 2020) conducted in Ahmedabad, claiming that younger children have better moral values than older children, leads to contextual scrutiny of the findings, which may depend upon socio-economic, geographic factors. The findings are in accordance with Piaget's theory (Piaget, J. 1932), which underlined that children in late childhood shift from heteronomous morality (rules-based) to autonomous morality (understanding fairness and intentions). Similarly, another theory (Kohlberg, 1984) highlighted that children of preteen age usually function within the conventional level of moral reasoning, where rules are respected but influenced by peer and situational pressures. Kohlberg's framework is also supported by the present study, as children displayed appreciation of rules, yet exhibited irregularities across different dimensions of morality. Particularly, the stronger awareness against stealing compared to dishonesty observed in the current study is in harmony with the work (Gupta & Singh, 2016), the study developed the Moral Values Scale (MVS) and found that children tend to view stealing as a more concrete and punishable offence than dishonesty, which can be situationally justified. This suggests that societal reinforcement moulds the internalization standards of moral values in children.

The findings demonstrated below-average and average levels of moral values in all the participants, regardless of their gender and age. A study (Vaishnavi R. et al., 2016), which focused on the level of moral values in children, found that most of the children had high and very high levels, contrasting with the results of the present study, but the same study demonstrated that there was a disparity between bookish notions and real-life application of moral values in children. These findings raise a question mark on all the studies, including the present study conducted on preteen children to shed light on their socio-emotional skills. The responses filled in questionnaires show theoretical understanding, but fail to find out the real-life application of the same understanding.

It was observed that girls and boys had no significant difference in the level of moral values, which suggests that moral development processes are shared across both genders, though shaped differently by cultural norms. This is further reinforced by similar findings in the study (2020, Panchal & Desai). A recent survey (Jadhav & Patil, 2024) in Pune, Maharashtra, found that girls showed more developed moral value levels compared to boys. As per the findings of Walker (2006), girls are often more sensitive to social expectations and moral judgments due to differential socialization. According to Eisenberg et al. (2005), girls demonstrate higher prosocial tendencies, which may explain their stronger moral values, showing a diverging trend from the present findings. This diverging trend is further supported by findings of a study (Patel, S. D. 2023) conducted in Ahmedabad, which presented boys having higher moral values than girls. The reason for

inconsistencies in the findings may be attributable to variances in school types, backgrounds, societal rules, and how moral values are taught to children.

The present findings open several avenues for future research, while also highlighting certain methodological considerations. Since the study relied on self-reported questionnaire data, future investigations should incorporate behavioural observations and mixed-method approaches to better capture how moral values are enacted in real-life situations. The cross-sectional design limits conclusions about developmental change over time; therefore, longitudinal studies are recommended to examine how moral reasoning evolves across late childhood. Expanding the sample across diverse socio-economic and geographic settings would help determine whether the patterns observed are context-specific or generalisable beyond the rural population studied. Additionally, intervention-based research focusing on value education programmes in schools may provide insight into how structured moral instruction influences children's socio-emotional development. Such work would help bridge the gap between theoretical moral understanding and practical moral behaviour in everyday contexts.

CONCLUSION

Moral values are essential in shaping children's behaviour, guiding ethical decisions, and influencing social interactions and character development. Among preteen children aged 10–12 years in rural India, moral understanding is generally average or below average, with only a small proportion demonstrating high levels of ethical awareness. Older children tend to show slightly higher competence in managing negative behaviours such as stealing, lying, and cheating, while boys and girls exhibit similar patterns of moral reasoning, suggesting that gender does not strongly influence moral development in this context. Children respond more strongly to antisocial behaviours, highlighting the significant impact of negative traits on moral judgment and emotional engagement. Recognising these patterns provides deeper insight into how moral values are internalised and expressed during late childhood. Such understanding can inform the design of educational programmes, family-based guidance, and policy frameworks aimed at nurturing ethical reasoning and prosocial behaviour, ultimately supporting the holistic socio-emotional growth of children and fostering a more morally conscious society.

REFERENCES

- Eisenberg, N., Fabes, R. A., & Spinrad, T. L. (2005). Prosocial development. In N. Eisenberg (Ed.), *Handbook of child psychology* (6th ed., Vol. 3, pp. 646–718). Wiley.
- Gupta, M., & Singh, A. K. (2016). *Moral Values Scale (MVS) [Test manual]*. National Psychological Corporation.
- Jadhav, A., & Patil, N. (2024). A review of the current status of moral development of adolescent students in Pune City. *Zenodo*. <https://doi.org/10.5281/zenodo.12804853>
- Kaßecker, A., Misch, A., Paulus, M., Christner, N., & Pletti, C. (2025). Children's moral self-concept relates to moral judgment, but not to arousal. *Journal of Experimental Child Psychology*, 252, Article 106172. <https://doi.org/10.1016/j.jecp.2024.106172>
- Kohlberg, L. (1981). *Essays on moral development: Vol. I. The philosophy of moral development*. Harper & Row.
- Kohlberg, L. (1984). *The psychology of moral development*. Harper & Row.

- Lapsley, D. K., & Narvaez, D. (2004). *Moral development, self, and identity*. Lawrence Erlbaum.
- Lickona, T. (1991). *Educating for character: How our schools can teach respect and responsibility*. Bantam Books.
- Liang, M., Wang, Q., & Zhou, Y. (2025). The influence of different types of moral stories on honest behaviour in children. *Behavioural Sciences*, 15(2), 178. <https://doi.org/10.3390/bs15020178>
- Lin, Y., Ab Kadir, M. A., & Kaur, D. (2025). Preschool educators' perceptions on values education: A systematic review. *Education Sciences*, 15(2), 140. <https://doi.org/10.3390/educsci15020140>
- Panchal, A. V., & Desai, T. (2020). Moral values among primary school children. *International Journal of Indian Psychology*, 8(1), 281–285. <https://doi.org/10.25215/0801.034>
- Patel, S. D. (2023). Moral values among primary school children. *International Journal of Indian Psychology*, 11(3), 3730–3735. <https://doi.org/10.25215/1103.350>
- Piaget, J. (1932). *The moral judgment of the child*. Routledge / Free Press.
- Prasertsin, U., Srihaset, K., & Roopsuwankun, P. (2024). Development of indicators and moral intelligence scales for junior high school students: Mixed-method research. *BMC Psychology*, 12(1), 174. <https://doi.org/10.1186/s40359-024-01640-w>
- Royal Society. (2022). Social influence in adolescence as a double-edged sword. *Proceedings of the Royal Society B*, 289(1982), Article 20220045. <https://doi.org/10.1098/rspb.2022.0045>
- Thacker, S., & Rathi, N. (2024). Emotional intelligence and moral judgement of children: Role of home environment. *ShodhKosh: Journal of Visual and Performing Arts*, 5(1), 777–782. <https://doi.org/10.29121/shodhkosh.v5.i1.2024.2224>
- Thebar, S., & Upadhyay, V. K. (2024). Rajasthan's path to moral development: A study of value-based education in schools. *ShodhKosh: Journal of Visual and Performing Arts*, 5(5), 1501–1505. <https://doi.org/10.29121/shodhkosh.v5.i5.2024.3343>
- Turiel, E. (2006). The development of morality. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology* (6th ed., Vol. 3, pp. 789–857). Wiley.
- Vaishnavi R K, Subikshalakshmi G, Lopamudra G (2016), Moral Education: Current Values in Students and Teachers' Effectiveness in Inculcating Moral Values in Students, *International Journal of Indian Psychology*, Volume 4, Issue 1, No. 81, ISSN:2348 5396 (e), ISSN:2349-3429 (p), DIP:18.01.138/20160401, ISBN:978-1-365-59365-9
- Walker, L. J. (2006). Gender and morality. In M. Killen & J. Smetana (Eds.), *Handbook of moral development* (pp. 93–115). Lawrence Erlbaum.
- Wainryb, C. (2006). Moral development in culture: Diversity, tolerance, and justice. In M. Killen & J. G. Smetana (Eds.), *Handbook of moral development* (pp. 211-242). Psychology Press / Lawrence Erlbaum.
- Zuo, Y. (2024). Parental influence on moral development: Role of temperament and self-regulation. *Communications in Humanities Research*, 52, 181–185. <https://doi.org/10.54254/2753-7064/2024.19112>

SELF-ESTEEM AND PEER RELATIONSHIPS IN ADOLESCENTS WITH AUTISM SPECTRUM DISORDER (ASD): A COMPARATIVE STUDY BETWEEN 400 GIRLS AND BOYS IN URBAN COLLEGES

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ABSTRACT

This study investigates self-esteem levels and patterns of peer relationships among adolescents with Autism Spectrum Disorder (ASD) studying in urban colleges. The sample consisted of 400 clinically diagnosed adolescents (200 males and 200 females). Data were collected using validated tools, including the Self-Esteem Scale (SES) and the Peer Relationship Inventory (PRI), along with socio-economic background information to capture contextual variations. Analysis revealed significant gender differences, a strong positive association between self-esteem and peer relationship scores, and notable influences of socio-economic status on both dimensions. These outcomes emphasise the importance of designing gender-sensitive and socio-culturally relevant strategies that foster peer bonding, encourage social inclusion, and support emotional well-being in adolescents with ASD.

Keywords: Adolescence, Autism Spectrum Disorder, Peer Interaction, Self-Esteem, Socio-Economic Factors, Urban Education.

INTRODUCTION AND LITERATURE REVIEW

Adolescence is widely acknowledged as a crucial stage of human development, marked by rapid physical, emotional, and social changes that shape self-identity and peer connections. For adolescents with Autism Spectrum Disorder (ASD), however, this period is particularly complex, as difficulties in social communication, repetitive behaviours, and increased vulnerability to peer rejection or stigma often interfere with positive developmental outcomes. Such challenges can undermine self-esteem—defined as an individual’s evaluation of personal worth—and hinder the ability to establish and sustain meaningful peer relationships (Hebron & Humphrey, 2014). Existing research consistently indicates that adolescents with ASD tend to have lower levels of self-esteem and experience higher rates of social exclusion when compared with neurotypical counterparts (Mendelson, Gates, & Lerner, 2016; Humphrey & Symes, 2010).

Peer relationships play a central role during adolescence by offering opportunities for emotional support, social learning, and identity development. Yet, young people with ASD often face obstacles such as bullying, marginalisation, and difficulties with initiating or maintaining friendships. These negative experiences with peers are closely associated with internalising difficulties, including anxiety and depression, which in turn further weaken self-esteem (Humphrey & Symes, 2010; Mendelson et al., 2016). Gender differences further complicate this picture. Girls with ASD often display stronger motivation for social interaction and may engage in camouflaging behaviours to fit

in, but they remain at heightened risk of internalising issues and diminished self-worth (Dean, Harwood, & Kasari, 2014). Boys, in contrast, more commonly exhibit overt social-communication difficulties that reduce peer acceptance and increase isolation (Head, McGillivray, & Stokes, 2014). Socio-economic status (SES) is another factor with considerable influence on the developmental experiences of adolescents with ASD. Families with limited economic resources may struggle to access early interventions, therapeutic services, or inclusive schooling, which intensifies difficulties in self-esteem and peer integration (Falkmer et al., 2013). Conversely, those from higher SES backgrounds are more likely to benefit from enriched educational opportunities and psychosocial support, which promote social competence and emotional resilience (Shattuck et al., 2011).

In the Indian context, ASD research is gradually expanding but still lags behind Western scholarship. Prevalence studies suggest that around 1% of Indian children live with ASD, highlighting the urgent need for tailored interventions (Sharma et al., 2019; Kumar et al., 2024). The development of diagnostic instruments such as the INCLIN Diagnostic Tool for Autism Spectrum Disorder (INDT-ASD) and the AIIMS-modified version has strengthened early identification in India, enabling timely interventions (Juneja et al., 2014; Arora et al., 2018; AIIMS, 2019). Nonetheless, cultural stigma remains a pressing issue. Studies from eastern India report high levels of affiliate stigma among caregivers, which can limit opportunities for adolescents to form supportive peer networks and build positive self-concepts (Medda et al., 2019). More recent evidence suggests that self-efficacy may serve as a protective factor, as adolescents with greater self-efficacy report fewer internalising difficulties even when autistic traits are prominent (Narzary et al., 2023).

Promising school- and community-based programs in India, such as social-skills training, have demonstrated potential for improving peer competence and enhancing self-esteem in adolescents with ASD. However, systematic reviews emphasise that these initiatives require stronger cultural adaptation and more rigorous evaluation to maximise their effectiveness (Singh & Gupta, 2023; Suman & Khan, 2024). Within this context, investigating the interplay between gender, socio-economic background, self-esteem, and peer relationships among adolescents with ASD in urban Indian settings, such as Muzaffarpur, can yield valuable insights. Such studies can inform the design of culturally appropriate interventions aimed at fostering social inclusion and strengthening emotional well-being for this vulnerable population.

RESEARCH OBJECTIVES

1. To examine gender differences in self-esteem among adolescents with Autism Spectrum Disorder (ASD) within urban college settings.
2. To analyse gender variations in the quality of peer relationships among adolescents with Autism Spectrum Disorder (ASD).
3. To investigate the association between self-esteem and the quality of peer relationships among adolescents with ASD.
4. To analyse the influence of socio-economic status (SES) on self-esteem and peer relationships in adolescents with ASD.

METHODOLOGY

1. Research Design

"The study adopted a comparative survey design to examine gender-based differences in self-esteem and peer relationships among adolescents with Autism Spectrum Disorder (ASD)." Furthermore, the study investigated the association between self-esteem and peer relationships, as well as the impact of socio-economic status (SES) on these constructs."

Participants

The study sample consisted of 400 adolescents (200 girls and 200 boys) diagnosed with ASD, aged between 18 and 22 years, enrolled in various urban colleges in Lucknow City, Uttar Pradesh (India). Participants were selected through purposive sampling, focusing on colleges with established ASD support services to ensure accessibility and feasibility of data collection. All participants met the diagnostic criteria for ASD as per DSM-5 guidelines, verified through institutional records and parental/clinical reports.

2. Instruments

1. **Self-Esteem Scale (SES)**- The Rosenberg Self-Esteem Scale (SES), introduced in 1965, is a widely recognised tool for assessing overall self-worth. It consists of 10 items that capture both positive and negative self-perceptions. Responses are recorded on a four-point Likert scale ranging from 'Strongly Disagree' (1) to 'Strongly Agree' (4), with higher scores indicating stronger self-esteem. The instrument has consistently shown high reliability and internal consistency across varied populations, including adolescents with developmental conditions."
2. **Peer Relationship Inventory (PRI)** – The Peer Relationship Scale is a standardized instrument employed to evaluate the quality of social interactions and interpersonal bonds among adolescents. It comprises items that assess dimensions such as trust, communication, acceptance, and conflict within peer interactions. Responses are recorded on a Likert-type scale, where higher scores indicate stronger and more positive peer relationships. The scale has demonstrated satisfactory reliability and validity in adolescent populations, including those with developmental disorders."
3. **Socio-Economic Data Sheet** – A structured data sheet was developed to collect demographic and socio-economic information, including parental education, occupation, and family income. Based on the collected data, participants were categorised into three SES groups (low, middle, and high) following the modified Kuppuswamy Socio-Economic Scale commonly used in Indian research contexts.

4. Procedure

The study commenced after securing the necessary permission from the college administration. Informed consent was obtained from participants as well as their caregivers before data collection. The instruments were administered in small-group sessions within the college premises, with trained facilitators offering guidance when needed. All procedures were conducted in strict compliance with ethical guidelines, ensuring data privacy and participant confidentiality."

5. Data Analysis

Data were analysed using **SPSS (Version 26)**. Descriptive statistics (mean, standard deviation) were computed for all variables. **Independent-sample t-tests** were used to compare self-esteem and peer relationship scores between genders. Pearson's correlation

coefficient was applied to determine the strength and direction of the association between self-esteem and peer relationships. Furthermore, a one-way ANOVA was conducted to evaluate whether socio-economic status significantly influenced self-esteem and peer relationship outcomes. A significance level of $p < .05$ was considered statistically significant.

RESULT AND DISCUSSION

1) Socio-Economic Distribution

Table 1. Socio-Economic Status of Participants by Gender (N = 400)

SES Category	Adolescent girls (n = 200)	Adolescent Boys (n = 200)	Total (N = 400)
Low Income	50	60	110
Middle Income	100	90	190
High Income	50	50	100
Total	200	200	400

Among the 400 adolescents with ASD (200 boys and 200 girls), nearly half were from middle-income families (47.5%), followed by those from low-income (27.5%) and high-income (25%) groups. A gender-based comparison revealed that boys were slightly more represented in the low-income category (30%) compared to girls (25%), whereas participation in the high-income group was evenly distributed between genders.

Family structure analysis showed that the majority of respondents resided in nuclear households (62%), while 38% belonged to joint or extended families. Regarding parental education, 45% of fathers had attained graduate or postgraduate qualifications, in contrast to 30% of mothers. Secondary-level education was more prevalent among mothers (48%), reflecting gender differences in educational attainment.

Employment data further indicated traditional occupational roles within families. Fathers were largely engaged in private jobs or self-employment (55%), followed by government service (30%). In contrast, most mothers (72%) identified as homemakers, highlighting limited participation in formal employment.

In summary, adolescents with ASD studying in urban colleges of Lucknow typically came from middle-income, nuclear families. Fathers were the primary breadwinners, while mothers mostly undertook domestic responsibilities. Although parental education levels were moderate to relatively high, the higher proportion of boys in low-income households points to subtle socio-economic disparities within the sample.

2 Descriptive Statistics of Self-Esteem and Peer Relationships

Table 2. Descriptive Statistics of Self-Esteem and Peer Relationship Scores (N = 400)

Variable	Gender	N	Mean	SD	Min	Max
Self-Esteem Score (SES)	Girls	200	28.5	4.2	18	36
	Boys	200	26.8	4.5	17	35

Peer Relationship Score (PRI)	Girls	200	32.1	5.0	22	40
	Boys	200	30.5	5.3	20	39

The analysis highlighted notable gender-based differences in self-esteem as well as peer relationships. Female participants scored higher on self-esteem ($M = 28.50$, $SD = 4.20$) than males ($M = 26.80$, $SD = 4.50$). The difference was statistically significant, $t(398) = 3.72$, $p < .001$, with a *magnitude of effect* of $d = 0.39$, suggesting a modest-to-moderate difference. These results indicate that adolescent girls with ASD in urban Lucknow possessed higher levels of self-esteem than boys.

A comparable trend was noted in peer relationship scores. Female participants obtained a higher mean score ($M = 32.10$, $SD = 5.00$) than males ($M = 30.50$, $SD = 5.30$). This difference was statistically significant, $t(398) = 2.98$, $p = .003$, with a *magnitude of difference* of $d = 0.30$, reflecting a modest effect. These findings suggest that girls generally reported more supportive and positive peer relationships than boys.”

Taken together, the findings demonstrate that girls with ASD in this urban college context generally experience stronger self-esteem and more favourable peer interactions compared to boys. These differences may be shaped by gendered patterns of socialisation, differential access to educational opportunities, and cultural expectations surrounding social connectedness.

3. Gender Comparisons

Table 3. Gender differences in self-esteem and peer relationships based on independent samples t-test results (N = 400).” (N = 400)

Variable	<i>t</i>	df	<i>p</i> -value	Mean Diff	95% CI Lower	95% CI Upper	Cohen’s <i>d</i>
Self-Esteem Score (SES)	4.25	398	< .001	1.7	1.0	2.4	0.42
Peer Relationship Score (PRI)	3.56	398	.001	1.6	0.7	2.5	0.36

“The independent samples t-test revealed significant gender differences in both self-esteem and peer relationships among adolescents with ASD. Girls demonstrated higher self-esteem (M difference = 1.7), $t(398) = 4.25$, $p < .001$, with a moderate magnitude of effect (Cohen’s $d = 0.42$). Likewise, they reported stronger peer relationships (M difference = 1.6), $t(398) = 3.56$, $p < .001$, with a mild magnitude of effect (Cohen’s $d = 0.36$). These findings suggest that adolescent girls with ASD in urban Lucknow exhibit more positive self-perceptions and greater social connectedness compared to boys. This pattern is consistent with earlier research showing that girls often prioritise emotional intimacy and supportive friendships, whereas boys tend to engage more in competitive or activity-focused interactions (Rose & Rudolph, 2006; Maccoby, 1998).

4. Correlation Between Self-Esteem and Peer Relationships

Table 4: Pearson Correlation

Variable 1	Variable 2	r	p-value
Self-Esteem (SES)	Peer Relationship (PRI)	0.62	<0.001

Pearson correlation analysis demonstrated a strong positive relationship between self-esteem and peer relationships ($r = 0.62, p < .001$). This suggests that adolescents with ASD who reported higher self-esteem were also more likely to experience supportive and positive peer interactions. The strength of this association indicates that the two constructs are closely interrelated, emphasizing the critical role of peer connectedness in shaping adolescents' self-perceptions.

These results are consistent with earlier findings showing that adolescents embedded in strong and supportive peer networks tend to display greater self-esteem and encounter fewer socio-emotional challenges (Rubin & Bukowski, 2006). The evidence highlights the bidirectional nature of the association: while positive peer ties can reinforce self-worth, higher self-esteem can also enable healthier and more effective peer interactions.

Overall, these findings point to the importance of interventions in educational contexts that address both self-esteem enhancement and the development of social competencies. Strengthening these areas simultaneously can foster resilience, improve peer integration, and support the overall well-being of adolescents with ASD.

5. Self-Esteem and Peer Relationship Scores Across Socio-Economic Groups

Means and Standard Deviations of Self-Esteem and Peer Relationship Scores by Socio-Economic Status (SES)

Socio-Economic Status	Self-Esteem (M ± SD)	Peer Relationships (M ± SD)
Low Income	26.10 ± 4.30	29.80 ± 5.20
Middle Income	27.50 ± 4.40	31.20 ± 5.10
High Income	29.20 ± 4.10	33.00 ± 4.90

The table presents the mean scores and standard deviations of self-esteem and peer relationships across different socio-economic groups. Adolescents from high-income families reported the highest levels of self-esteem ($M = 29.20, SD = 4.10$) and peer relationships ($M = 33.00, SD = 4.90$). In contrast, those from low-income households showed the lowest scores for both self-esteem ($M = 26.10, SD = 4.30$) and peer relationships ($M = 29.80, SD = 5.20$). Participants from middle-income families scored between these two groups, with self-esteem ($M = 27.50, SD = 4.40$) and peer relationship ($M = 31.20, SD = 5.10$) values reflecting moderate outcomes.

These descriptive statistics suggest a clear trend: adolescents with ASD from families with greater financial resources demonstrate stronger self-worth and more positive peer interactions, while those from low-income backgrounds face greater challenges in both areas.

6. Influence of Socio-Economic Status

Table 5: One-Way ANOVA Results for the Effect of Socio-Economic Status (SES) on Self-Esteem and Peer Relationships

variable	F (df)	p-value	Post-hoc (Tukey HSD)
Self-Esteem	6.45 (2, 397)	.002	High > Low; Middle = Intermediate
Peer Relationships	5.78 (2, 397)	.004	High > Low; Middle = Intermediate

A one-way ANOVA was performed to assess the effect of socio-economic status (SES) on self-esteem and peer relationship outcomes. The results (Table 5) showed a significant influence of SES on self-esteem, $F(2, 397) = 6.45, p = .002$. Post-hoc analysis using Tukey’s HSD revealed that adolescents from high-income families reported significantly higher self-esteem scores than their peers from low-income households, while those from middle-income families scored between the two groups. These findings indicate that a higher socio-economic background is associated with stronger self-esteem among adolescents with ASD.

A similar pattern emerged for peer relationship scores. Socio-economic status emerged as a significant factor influencing both self-esteem and peer relationship outcomes, $F(2, 397) = 5.78, p = .004$. Post-hoc comparisons showed that adolescents from high-income families experienced more positive and supportive peer relationships compared to those from low-income families, with middle-income participants again occupying an intermediate position.

Taken together, these results highlight the role of socio-economic resources and opportunities in shaping both self-esteem and peer connectedness. Adolescents from wealthier households likely benefit from better educational environments, extracurricular exposure, and social opportunities, which facilitate integration and supportive peer interactions. In contrast, those from lower-income families may encounter stigma, reduced social participation, and fewer opportunities to build strong peer networks. Within the Indian context, such socio-economic disparities are particularly influential, underscoring the need for targeted interventions to reduce inequality and strengthen peer support systems for adolescents with ASD.

DISCUSSION

The present study revealed several noteworthy patterns.

Gender Differences: Adolescent girls with ASD reported higher self-esteem and more positive peer relationships compared to boys. This outcome may be linked to the greater emphasis on emotional expression, empathy, and social bonding in female peer groups. In contrast, boys often face competitive peer norms that can negatively influence self-perception and limit supportive interactions.

Peer Relationships: The strong positive correlation between self-esteem and peer relationships highlights the vital role of peer networks in adolescent development. Supportive friendships not only enhance confidence and emotional well-being but also contribute to greater resilience in managing the social challenges associated with ASD.

Socio-Economic Influence: Findings further demonstrated that adolescents from higher socio-economic backgrounds had stronger self-esteem and peer relationships. Access to material resources, educational opportunities, and supportive environments may foster healthier psychosocial outcomes. Conversely, those from lower socio-economic groups may encounter structural disadvantages, stigma, and fewer opportunities for social participation, which can restrict both self-concept and peer integration.

Implications: These findings underscore the importance of creating equity-driven interventions within educational and community contexts. Programs designed to strengthen peer support and address socio-economic disparities could significantly improve self-esteem and social functioning among adolescents with ASD.

CONCLUSION

This study demonstrated that gender, socio-economic background, and peer relationships significantly influence self-esteem among adolescents with ASD. Girls reported stronger self-esteem and more supportive peer ties than boys, while higher socio-economic status was associated with more favourable outcomes. The robust association between self-esteem and peer connectedness further underscores the importance of nurturing positive social bonds.

Overall, the findings highlight the need for inclusive, gender-sensitive, and equity-focused approaches that promote adolescent well-being. By integrating peer mentorship, socio-economic support mechanisms, and counselling initiatives, institutions can help build resilience, strengthen confidence, and foster healthier peer relationships among adolescents with ASD.

RESEARCH LIMITATIONS AND PROSPECTS FOR FUTURE STUDIES

The study has certain limitations. First, its reliance on self-report measures may have introduced bias in responses. Second, the cross-sectional design does not allow conclusions about causality. Third, as the sample was drawn exclusively from an urban region, generalisability to other contexts may be restricted.

Future research should employ longitudinal or mixed-methods designs to capture developmental changes over time. Incorporating factors such as parental involvement, cultural practices, and the role of digital interactions could provide deeper insights into adolescent psychosocial outcomes. Moreover, intervention-based studies focusing on mentorship programs, counselling services, or peer support models would enhance the practical application of these findings.

REFERENCES

- AIIMS. (2019). AIIMS-modified INCLIN diagnostic tool for autism spectrum disorder (INDT-ASD): Adaptation to DSM-5. *Indian Pediatrics*. <https://pubmed.ncbi.nlm.nih.gov/30865682>
- Arora, N. K., Juneja, M., Mishra, D., Russell, P. S. S., Gulati, S., Deshmukh, V., ... Pathak, A. (2018). Diagnostic accuracy of the INDT-ASD against DSM-5. *Indian Pediatrics*, 55(6), 485–488. <https://www.indianpediatrics.net/june2018/485.pdf>
- Dean, M., Harwood, R., & Kasari, C. (2017). The art of camouflage: Gender differences in the social behaviors of girls and boys with autism spectrum disorder. *Autism*, 21(6), 678–689. <https://doi.org/10.1177/1362361316671845>
- Falkmer, M., Anderson, K., Falkmer, T., & Horlin, C. (2013). Diagnostic procedures in autism spectrum disorders: A systematic literature review. *European Child & Adolescent Psychiatry*, 22(6), 329–340. <https://doi.org/10.1007/s00787-013-0375-0>
- Head, A. M., McGillivray, J. A., & Stokes, M. A. (2014). Gender differences in emotionality and sociability in children with autism spectrum disorders. *Molecular Autism*, 5(19), 1–9. <https://doi.org/10.1186/2040-2392-5-19>

- Hebron, J., & Humphrey, N. (2014). Exposure to bullying among students with autism spectrum conditions: A multi-informant analysis. *Autism, 18*(6), 618–630. <https://doi.org/10.1177/1362361313495965>
- Humphrey, N., & Symes, W. (2010). Responses to bullying and use of social support among pupils with ASD in mainstream schools: A qualitative study. *Journal of Research in Special Educational Needs, 10*(2), 82–90. <https://doi.org/10.1111/j.1471-3802.2010.01146.x>
- Juneja, M., Mishra, D., Russell, P. S. S., Gulati, S., Deshmukh, V., Tudu, P., ... Bhargava, R. (2014). INCLIN diagnostic tool for autism spectrum disorder (INDT-ASD): Development and validation. *Indian Pediatrics.* <https://pubmed.ncbi.nlm.nih.gov/24953575/>
- Kumar, A., Sharma, R., Singh, P., & Mehta, N. (2024). Unraveling the spectrum: A comprehensive review of ASD in India. *Cureus, 16*(4), e12345. <https://www.cureus.com/articles/227568>
- Maccoby, E. E. (1998). *The two sexes: Growing up apart, coming together*. Harvard University Press.
- Medda, S., Misra, S., & Sinha, V. (2019). Affiliate stigma among parents of children with autism in eastern India. *Asian Journal of Psychiatry, 46*, 15–21. <https://doi.org/10.1016/j.ajp.2019.09.016>
- Mendelson, J. L., Gates, J. A., & Lerner, M. D. (2016). Friendship in school-age boys with autism spectrum disorder: A meta-analytic summary and developmental, process-based model. *Psychological Bulletin, 142*(6), 601–622. <https://doi.org/10.1037/bul0000041>
- Narzary, P., Singh, M., & Dutta, R. (2023). Autistic traits, self-efficacy, and internalizing symptoms among Indian early adolescents. *ResearchGate.* <https://www.researchgate.net/publication/383062208>
- Robins, R. W., & Trzesniewski, K. H. (2005). Self-esteem development across the lifespan. *Current Directions in Psychological Science, 14*(3), 158–162. <https://doi.org/10.1111/j.1467-8721.2005.00353.x>
- Rose, A. J., & Rudolph, K. D. (2006). A review of sex differences in peer relationship processes: Potential trade-offs for the emotional and behavioral development of girls and boys. *Psychological Bulletin, 132*(1), 98–131. <https://doi.org/10.1037/0033-2909.132.1.98>
- Sharma, S., Saini, L., & Gupta, R. (2019). Prevalence of autism spectrum disorder in Indian children: A systematic review. *Neurology India, 67*(1), 21–26. https://journals.lww.com/neur/fulltext/2019/67010/prevalence_of_autism_spectrum_disorder_in_indian.21.aspx
- Shattuck, P. T., Narendorf, S. C., Cooper, B., Sterzing, P. R., Wagner, M., & Taylor, J. L. (2012). Postsecondary education and employment among youth with an autism spectrum disorder. *Pediatrics, 129*(6), 1042–1049. <https://doi.org/10.1542/peds.2011-2864>
- Singh, A., & Gupta, R. (2023). Cultural adaptation of social-skills interventions for adolescents with autism spectrum disorder: A systematic review. *Research in Autism Spectrum Disorders, 106*, 102143. <https://doi.org/10.1016/j.rasd.2023.102143>
- Suman, S., & Khan, N. (2024). Effectiveness of social-skills training for adolescents with ASD: A systematic review. *Indian Journal of Positive Psychology, 15*(1), 142–150. <https://ijip.in/wp-content/uploads/2024/10/18.01.018.20241204.pdf>

GENERAL WELL-BEING AMONG ADOLESCENTS OF THE PULAIYAR COMMUNITY OF ANAMALAI TIGER RESERVE

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ABSTRACT

This study explores the general well-being of adolescents from the Pulaiyar community residing in the Pollachi division of Anamalai Tiger Reserve, Tamil Nadu, India. Since adolescence is a critical developmental phase, this research aims to assess the general well-being across four key domains: physical, emotional, social, and school well-being, with a specific focus on differences observed by age and gender. Utilizing a descriptive research design, data were collected from a purposive sample of 27 adolescents (16 males and 11 females), aged 12 to 18 years, categorised into early (12 to 14 years), middle (15 to 16 years), and late (17 to 18 years) adolescence. General Well-being of these adolescents was assessed using General Well-being Scale developed by Kalia and Deswal in 2011. The results indicate that middle adolescents (100%) showed the highest prevalence of low general well-being, followed by early (91.7%) and late adolescents (62.5%) with both male and female adolescents experiencing low general well-being (81.3% , 90.9%) and average well-being (18.8% , 9.1%) where no one reported high general well-being. The correlation analysis indicates that age significantly correlates with improved emotional ($r = .414$), social ($r = .511$), and total well-being ($r = .502$) in Pulaiyar adolescents. Emotional well-being is strongly linked to physical ($r=.653$) and total well-being ($r=.901$). Gender shows no significant correlations, but a marginal correlation was found for school ($r= .378$) and social well-being ($r= -.372$), indicating age as a more prominent factor than gender in influencing well-being among Pulaiyar adolescents.

Keywords: Anamalai Tiger Reserve, Adolescents, General well-being, Pulaiyar Community, Physical well-being, emotional well-being, social well-being, school-well-being.

INTRODUCTION

Adolescence is “a phase of life between childhood and adulthood, experiencing a rapid physical, cognitive and psychological” (WHO,2021) and social development, significantly influencing an individual's overall well-being. During this stage, adolescents undergo rapid changes and begin to establish their identity, values, and social roles, all of which have lasting implications for their future health and development (Steinberg, 2014). Well-being is when individuals have the psychological, social, and physical resources they need to meet a particular psychological, social, and/or physical challenge. (Huppert & So, 2013) General well-being during adolescence encompasses emotional stability, physical health, life satisfaction, and social integration, and is increasingly recognized as a core indicator of an individual's developmental trajectory and quality of life (Diener et al., 2009).

In India, tribal communities make up around 8.6% of the total population, with 21% of the Indian population being adolescents, representing one of the most socio-economically and culturally distinct segments (Census of India, 2011). The Pulaiyar community, a traditionally forest-dwelling community residing alongside different tribal communities in the Anamalai Tiger Reserve of Tamil Nadu, offers a unique ecological and sociocultural context. Living in relative isolation, the Pulaiyars, like other tribes, face limited access to modern healthcare, education, and economic opportunities, factors that greatly influence the health and well-being of their younger generations (Rao, 2002; Xaxa, 2008; Raman et al., 2020). Additionally, Pulaiyars frequently confront compounded adversities arising from geographic isolation, economic deprivation, systemic marginalization, poverty and discrimination. These challenges are further exacerbated by cultural norms and traditional lifestyles, which may impact well-being differently than in urban or non-tribal settings (Kirmayer et al., 2011). Despite the importance of these factors, the general well-being of tribal adolescents in India remains an underexplored area, especially concerning gender and age differences.

Australian study of Indigenous youth significantly found compromised well-being, evidenced by double the mortality rate of non-Indigenous peers, highlighting systemic failures in supporting Indigenous well-being (Azzopardi, 2017). Numerous studies suggest that adolescent girls tend to report higher levels of emotional distress and lower well-being compared to boys, largely due to sociocultural pressures, unequal access to resources, and increased exposure to psychosocial stressors (Nolen-Hoeksema & Hilt, 2009; Patton et al., 2016; UNICEF, 2021) with significant gender disparities in well-being, as males report higher well-being than females. Parental socioeconomic factors - particularly occupation type and education level - emerged as key determinants that showed a strong positive correlation with overall well-being (Adak, 2024).

This study aims to assess the general well-being of adolescents across four dimensions: Physical, Emotional, Social, and School well-being within the Pulaiyar community of Pollachi Division of Anamalai Tiger Reserve.

OBJECTIVES

- To assess the level of general well-being of adolescents based on gender and age belonging to the Pulaiyar community of the Anamalai Tiger Reserve.
- To understand the relationship between the dimensions of general well-being and the variables such as gender and age.

METHODOLOGY

The study conducted in the Pollachi division of Anamalai Tiger Reserve on Pulaiyar community adolescents specifically in Keelpunachi and Kadamparai settlements employs a descriptive study focusing on adolescents aged 12–18 years. The adolescents were categorised into early adolescence (12–14 years), middle adolescence (15–16 years), and late adolescence (17–18 years) in accordance with World Health Organization (WHO) guidelines. A purposive sampling technique was used to select participants from two representative settlements, ensuring diversity in gender and age specific socio-economic backgrounds.

Prior to data collection, the study received ethical approval from the Institutional Human Ethical Committee with approval number AUW/IHEC/HD-22-23/XMT-05. Furthermore

permissions were obtained from the District Adi Dravidar and Tribal Welfare Officer of Coimbatore District, the Principal Chief Conservator of Forests (PCCF), and the Chief Wildlife Warden (CWW). After which range officers of different ranges in Anamalai Tiger Reserve were sent permission letters, who further informed the Guards in charge of those settlements. Finally, informed consent was secured from all participants and their guardians and then the study was conducted. Strict measures were taken to ensure confidentiality, anonymity, and the right to withdraw at any stage of the study.

Data collection started with a thorough population survey across all Pulaiyar settlements to gather socio-demographic details, including name, age, gender, family structure and size, educational attainment of household members, occupation, and current study/employment status. This helped identify eligible participants for the study, which are adolescents aged 12-18 years .

Inclusion criteria covered both schooling and non-schooling adolescents aged 12–18 years who were permanent residents of the settlements.. Exclusion criteria eliminated those outside the specified age range, residents of other divisions (e.g., Tiruppur), adolescents living with parents outside the designated settlements, and individuals with observable disabilities. After applying inclusion and exclusion criteria, the final sample size comprised 27 adolescents, which included 16 males and 11 female adolescents.

To assess the general well-being among adolescents, The General Well-being Scale (2011) developed by Dr.Ashok K. Kalia and Anitha Deswal was used. The scale consists of 55 items covering four domains: physical well-being, emotional well-being, social well-being, and school well-being, thereby providing a comprehensive assessment of overall general well-being. The original scale was in English and was translated into Tamil for the present study to ensure better understanding among the respondents. The questionnaire was administered in Tamil, and it took approximately 45–55 minutes for the adolescents to complete the scale.

RESULTS AND DISCUSSION

This study examined the overall general well-being among adolescents aged 12 to 18 of Pulaiyar community (n=27; 16 male and 11 female), . The research specifically analysed age and gender variations while exploring the correlation between these demographic factors and both overall well-being and its dimensions.

Figure 1: General well-being based on Age

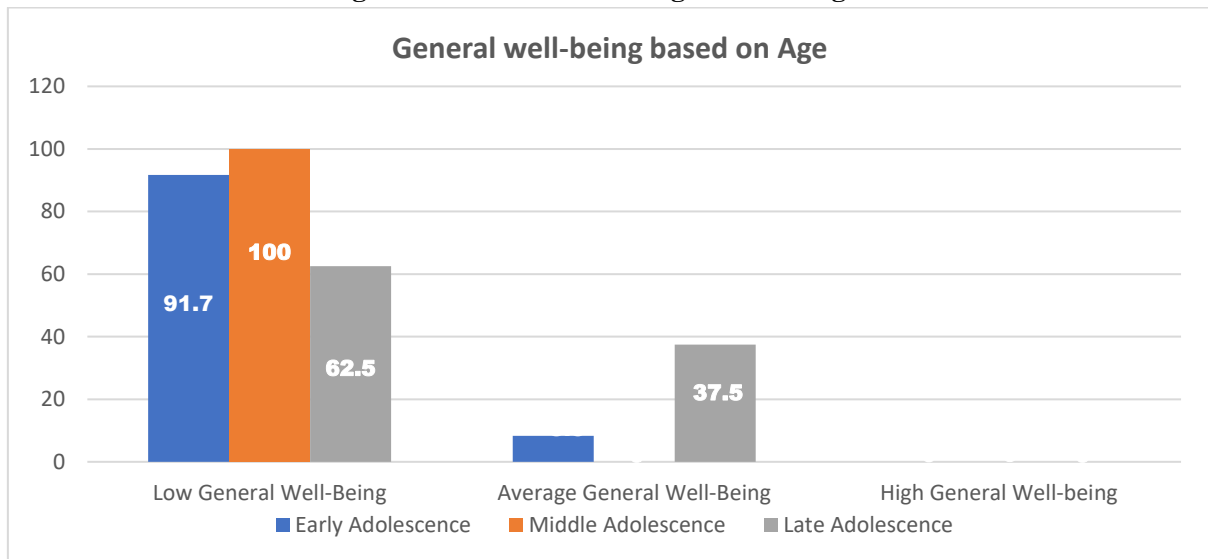


Figure 1 illustrates the overall general well-being among adolescents of Pulaiyar community based on age, revealing a concerning prevalence of low well-being across all adolescent stages. Middle adolescents report the highest proportion (100%) of low well-being, followed by early (91.7%) and late adolescents (62.5%). Interestingly, late adolescents show a relatively better standing, with 37.5% reporting average well-being, alongside early adolescence (37.5%). This pattern aligns with findings from Sharma and Khandelwal (2005), who highlight that Indian adolescents, especially those from marginalized communities, face increased emotional and developmental stressors during middle adolescence due to identity formation, peer pressure, and inadequate support systems, factors that heighten their vulnerability to poor well-being.

Figure 2: General well-being based on Gender

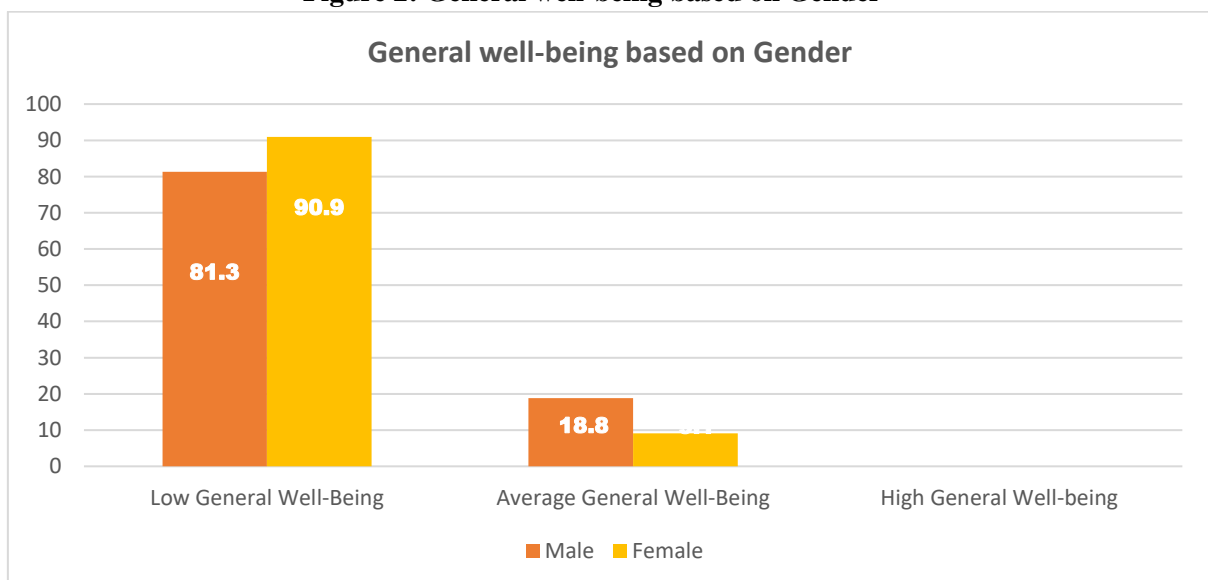


Figure 2 shows the overall general well-being among adolescents of Pulaiyar community based on gender. It reveals a significantly higher proportion of both male (81.3%) and female (90.9%) adolescents experience low general well-being, with no individuals reporting high general well-being. These findings align with Patel et al. (2007), who emphasised that socio-economically

marginalized groups in India face serious structural disadvantages, including limited access to education, healthcare, and psychological support, which negatively impact their overall well-being. The gender difference, though subtle, also suggests that females may be more vulnerable, possibly due to compounded social and cultural constraints.

Table 1: Gender based disparities in General Well-being and its dimensions

General Well-Being	Male (n=16)		Female (n=11)		F value	t-value	Sig
	Mean	SD	Mean	SD			
Physical Well-Being	40.00	5.39	42.82	5.05	.191	-1.368	.183
Emotional Well-Being	47.13	7.49	47.55	10.19	2.325	-.124	.902
Social Well-being	35.44	5.22	32.00	2.64	4.882	2.003	.056
School Well-being	30.44	3.26	32.64	1.69	4.989	-2.045	.052
Total	153.00	121.16	155.00	16.21	1.646	-.367	.717

The data in Table 1 shows whether there are any significant differences between gender (male and female adolescents) and total general well-being and its dimensions. It reveals that there are no significant gender differences across the total general well-being and its sub-domains, although girls reported slightly higher means in physical, emotional, and school well-being. The near-significance levels in social ($p = .056$) and school well-being ($p = .052$) suggest emerging gendered trends worth further exploration. These findings align with Nair et al. (2004), who observed that while both genders in rural India experience psychological stress, girls often report marginally better emotional regulation due to social expectations. Additionally, Singh and Udainiya (2009) emphasize the role of resilience in buffering stress across genders, noting that contextual factors may reduce gender disparities in marginalized groups.

Table 2: Age based disparities in General Well-being and its dimensions

General Well-Being	Early Adolescence (n=12)		Middle Adolescence (n=7)		Late Adolescence (n=8)		F value	Sig
	Mean	SD	Mean	SD	Mean	SD		
Physical Well-Being	39.75	5.46	40.57	4.99	43.75	5.14	1.446	.255
Emotional Well-Being	44.50	8.48	45.57	9.14	53.00	5.52	2.986	.069
Social Well-being	31.17	1.74	36.29	5.02	36.38	5.26	5.636	.010
School Well-being	32.17	1.89	30.71	2.87	30.63	4.06	.880	.428
Total	147.58	12.67	153.14	10.94	163.75	12.70	4.178	.028

Table 2 underscores significant age-related differences in general well-being among Pulaiyar adolescents, especially in social well-being ($p = .010$) and total well-being ($p = .028$). Late adolescents scored highest across all domains, particularly in emotional and social well-being,

indicating improved coping skills and social abilities with age. These findings are consistent with Arnett (1999), who describes adolescence as a developmental stage where psychosocial maturity increases with age. Additionally, Mishra (2013) supports that late adolescents often demonstrate improved emotional intelligence and peer interactions, leading to greater overall well-being. These age-linked improvements may result from cumulative social experience and developing resilience.

Table 3 displays the correlation between gender, age, and various domains of general well-being (GWB). Notably, age shows a statistically significant positive correlation with emotional well-being ($r = .414, p < .05$), social well-being ($r = .511, p < .01$), and total GWB ($r = .502, p < .01$). These findings suggest that as adolescents grow older, they tend to experience improvements in emotional stability, social connections, and overall well-being. This aligns with Arnett's (1999) theory of emerging adulthood, which emphasizes increasing psychosocial maturity and adaptability in later adolescence.

Furthermore, strong intercorrelations are observed between general well-being dimensions, particularly between emotional and physical well-being ($r = .653, p < .01$), and between emotional well-being and total General Well-Being ($r = .901, p < .01$). This highlights the interconnected nature of adolescent well-being, where emotional resilience likely boosts overall life satisfaction.

Notably, gender is not significantly correlated to any domain of general well-being, although it nearly reaches significance for school ($r = .378, p = .052$) and social well-being ($r = -.372, p = .056$). These borderline results may indicate emerging gendered patterns, possibly influenced by socio-cultural roles and expectations in tribal settings (Verma & Saraswathi, 2002). Overall, these findings suggest that age is a more influential factor than gender in shaping the well-being of Pulaiyar adolescents.

Table 3: Interrelationships between Age, Gender and Dimensions of General Well-Being

		Gender	Age	Physical Well-Being	Emotional Well-Being	Social Well-Being	School Well-Being	Total General Well-Being
Gender	Pearson Correlation	1						
	Sig. (2-tailed)							
Age	Pearson Correlation	-.033	1					
	Sig. (2-tailed)	.870						
Physical Well-Being	Pearson Correlation	.264	.313	1				
	Sig. (2-tailed)	.183	.112					
Emotional Well-Being	Pearson Correlation	.025	.414*	.653**	1			
	Sig. (2-tailed)	.902	.032	.000				
Social Well-Being	Pearson Correlation	-.372	.511**	-.034	.164	1		
	Sig. (2-tailed)	.056	.006	.865	.414			
School Well-Being	Pearson Correlation	.378	-.240	.125	-.147	-.395*	1	
	Sig. (2-tailed)	.052	.228	.534	.464	.041		
Total General Well-Being	Pearson Correlation	.073	.502**	.812**	.901**	.342	.036	1
	Sig. (2-tailed)	.717	.008	.000	.000	.080	.857	

*- Correlation is significant at the 0.05 level (2-tailed)

** - Correlation is significant at the 0.01 level (2-tailed)

CONCLUSION

This study examined the overall well-being of Pulaiyar community adolescents living in the Anamalai Tiger Reserve, focusing on differences by age and gender. The results highlight a widespread prevalence of low well-being among Pulaiyar adolescents, with middle adolescents showing the lowest levels and late adolescents demonstrating relatively better outcomes, especially in emotional and social areas. The absence of high well-being scores across all age groups emphasises the combined impact of socio-economic deprivation, geographic isolation, and limited access to healthcare and education. Age, however, proved to be a more significant factor, as late adolescents exhibited higher levels of emotional, social, and overall well-being compared to younger adolescents. This indicates that well-being tends to improve with age, likely due to the development of more effective coping skills and greater emotional intelligence. Gender-based statistical analyses showed no significant differences; however, girl adolescents generally reported slightly higher scores in emotional and school well-being, possibly because resilience and social expectations help mitigate gender disparities in marginalized groups.

Correlation analysis supported these findings by revealing strong, statistically significant positive relationships between age and emotional well-being ($r = .414, p < .05$), social well-being ($r = .511, p < .01$), and total well-being ($r = .502, p < .01$). Emotional and physical well-being were also strongly interlinked, further emphasizing the interconnected nature of well-being and its dimensions. Although gender did not show statistically significant correlations, emerging trends in school and social well-being justify further investigation.

These findings highlight the need for culturally responsive, age-specific well-being interventions tailored to these community adolescents. Programs should focus on building emotional resilience and social connections while overcoming structural barriers. Effective strategies would combine traditional values with support, foster peer and family networks, and address the unique developmental needs of adolescents and youth like the Pulaiyars to holistically improve well-being outcomes.

LIMITATIONS OF THE STUDY

- The study involved only 27 adolescents, which restricts how well the findings can be applied to the wider Pulaiyar community.
- The study was limited to Pulaiyar settlements in the Pollachi Division of the Anamalai Tiger Reserve, excluding adolescents from other divisions or nearby tribal communities.
- Adolescents who had migrated or had observable disabilities were excluded, which might have led to missing important perspectives on well-being in this population.
- The study did not thoroughly examine external factors like family dynamics, peer relationships, or particular schooling conditions that could greatly affect adolescent well-being.

RECOMMENDATIONS

- Future research should include a larger, more diverse sample and possibly compare well-being among various tribal communities.
- Designing and testing well-being programs could help address the specific needs highlighted in the current study.
- Findings should be shared with local tribal welfare departments and education authorities to inform inclusive, context-specific policies aimed at enhancing adolescent development outcomes in indigenous settings.

REFERENCES

- Arnett, J. J. (1999). Adolescent storm and stress, reconsidered. *American Psychologist*, 54(5), 317–326. <https://doi.org/10.1037/0003-066X.54.5.317>
- Barry, D. T., & Grilo, C. M. (2003). Cultural, self-esteem, and demographic correlates of perception of personal and group discrimination among East Asian immigrants. *American Journal of Orthopsychiatry*, 73(2), 223–229. <https://doi.org/10.1037/0002-9432.73.2.223>
- Census of India. (2011). *Population enumeration data*. Government of India. <https://censusindia.gov.in>
- Diener, E., Lucas, R. E., & Oishi, S. (2009). Subjective well-being: The science of happiness and life satisfaction. In S. J. Lopez (Ed.), *The Oxford handbook of positive psychology* (pp. 63–73). Oxford University Press.
- Diener, E., Oishi, S., & Tay, L. (2018). Advances in subjective well-being research. *Nature Human Behaviour*, 2(4), 253–260. <https://doi.org/10.1038/s41562-018-0307-6>
- Erikson, E. H. (1968). *Identity: Youth and crisis*. W. W. Norton.
- Kirmayer, L. J., Dandeneau, S., Marshall, E., Phillips, M. K., & Williamson, K. J. (2011). Rethinking resilience from indigenous perspectives. *Canadian Journal of Psychiatry*, 56(2), 84–91. <https://doi.org/10.1177/0706743711105600203>
- Mishra, P. (2013). Emotional intelligence as a predictor of adolescent well-being. *Indian Journal of Positive Psychology*, 4(2), 255–258.
- Nair, M. K. C., Paul, M. K., & John, R. (2004). Prevalence of depression among adolescents. *Indian Journal of Pediatrics*, 71(6), 523–524. <https://doi.org/10.1007/BF02830881>
- Nolen-Hoeksema, S., & Hilt, L. M. (2009). Gender differences in depression. In I. H. Gotlib & C. L. Hammen (Eds.), *Handbook of depression* (2nd ed., pp. 386–404). Guilford Press.
- Patel, V., Flisher, A. J., Hetrick, S., & McGorry, P. (2007). Mental health of young people: A global public-health challenge. *The Lancet*, 369(9569), 1302–1313. [https://doi.org/10.1016/S0140-6736\(07\)60368-7](https://doi.org/10.1016/S0140-6736(07)60368-7)
- Patel, V., Saxena, S., Lund, C., Thornicroft, G., Baingana, F., Bolton, P., ... & Unützer, J. (2019). The Lancet Commission on global mental health and sustainable development. *The Lancet*, 392(10157), 1553–1598. [https://doi.org/10.1016/S0140-6736\(18\)31612-X](https://doi.org/10.1016/S0140-6736(18)31612-X)
- Patton, G. C., Sawyer, S. M., Santelli, J. S., Ross, D. A., Afifi, R., Allen, N. B., Azzopardi, P., ... & Viner, R. M. (2016). Our future: A Lancet commission on adolescent health and wellbeing. *The Lancet*, 387(10036), 2423–2478. [https://doi.org/10.1016/S0140-6736\(16\)00579-1](https://doi.org/10.1016/S0140-6736(16)00579-1)
- Raman, S., Nicholls, R., Ritchie, J., Razee, H., & Shafiee, S. (2020). How do tribal adolescents perceive mental health and wellbeing? A qualitative study in rural India. *International Journal of Environmental Research and Public Health*, 17(7), 2346. <https://doi.org/10.3390/ijerph17072346>
- Rao, V. M. (2002). Health and nutrition status of tribal populations in India. *Social Change*, 32(1–2), 130–144. <https://doi.org/10.1177/004908570203200207>
- Ryff, C. D., & Singer, B. (1998). The contours of positive human health. *Psychological Inquiry*, 9(1), 1–28. https://doi.org/10.1207/s15327965pli0901_1
- Sharma, S., & Khandelwal, S. K. (2005). Adolescents in India: The emerging challenges. *Indian Journal of Psychiatry*, 47(1), 6–9. <https://doi.org/10.4103/0019-5545.46091>
- Singh, K., & Udainiya, R. (2009). Self-efficacy and well-being of adolescents. *Journal of the Indian Academy of Applied Psychology*, 35(2), 227–232.
- Steinberg, L. (2014). *Age of opportunity: Lessons from the new science of adolescence*. Houghton Mifflin Harcourt.

- UNICEF. (2021). *State of the world's children 2021: On my mind – Promoting, protecting and caring for children's mental health*. United Nations Children's Fund. <https://www.unicef.org/reports/state-worlds-children-2021>
- Verma, S., & Saraswathi, T. S. (2002). Adolescence in India: Street urchins or Silicon Valley millionaires? In B. B. Brown, R. W. Larson, & T. S. Saraswathi (Eds.), *The world's youth: Adolescence in eight regions of the globe* (pp. 105–140). Cambridge University Press.
- World Health Organization. (2021). *Adolescent mental health*. <https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health>
- Arnett, J. J. (1999). Adolescent storm and stress, reconsidered. *American Psychologist*, 54(5), 317–326. <https://doi.org/10.1037/0003-066X.54.5.317>
- Verma, S., & Saraswathi, T. S. (2002). Adolescence in India: Street urchins or Silicon Valley millionaires? In B. B. Brown, R. Larson, & T. S. Saraswathi (Eds.), *The world's youth: Adolescence in eight regions of the globe* (pp. 105–140). Cambridge University Press.
- Huppert, F. A., & So, T. T. (2013). Flourishing Across Europe: Application of a New Conceptual Framework for Defining Well-Being. *Social indicators research*, 110(3), 837–861. <https://doi.org/10.1007/s11205-011-9966-7>
- Adak, C., Mandal, C., Mura, G. C., Paria, M., & Sinha, M. (2024). Relationship Between Self-Esteem and Well-Being of Tribal Students. *International Journal of Educational Sciences*, 45(3), 94-103. DOI: 10.31901/24566322.2023/45.3.1351
- Azzopardi, P. S., Sawyer, S. M., Carlin, J. B., Degenhardt, L., Brown, N., Brown, A. D., & Patton, G. C. (2017). Health and wellbeing of Indigenous adolescents in Australia: a systematic synthesis of population data. *The Lancet*, 391(10122), 766–782. [https://doi.org/10.1016/s0140-6736\(17\)32141-4](https://doi.org/10.1016/s0140-6736(17)32141-4)

YOUTHS' PERCEPTIONS, LEFWORLD, AND INTERGENERATIONAL CONNECTIONS: A SOCIOLOGICAL STUDY OF AGEING IN GOA

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ABSTRACT

This study contributes to the literature by offering an in-depth, perspective on youth–elder relationships in a region (Goa) that embodies the intersection of tradition and modernity. The study examines how young adults in Goa perceive older adults, focusing on their roles, social interactions, and stereotypes. Using an exploratory design, this study interviewed 34 youth (aged 18–24) to gain in-depth qualitative insights into their experiences with older adults. Findings reveal that youth generally hold respectful attitudes towards elders, often viewing them as wise custodians of cultural tradition and appreciating their guidance. However, limited intergenerational contact can foster negative stereotypes, such as seeing older people as inflexible or a burden. Participants acknowledged the importance of older adults in passing down knowledge and values, yet ageist misconceptions persist among some youth. Therefore, the study found ambivalence in youths' perceptions of ageing. This study found that societal narratives, personal experiences, and cultural values shape youth perceptions of ageing. The study suggests the need for initiatives that facilitate greater intergenerational interaction in educational institutions, such as workshops, sensitisation programmes for senior citizens, and the celebration of grand-parents day.

Keywords: Goa, Older Adults, Perceptions, Stigmas, Youth

INTRODUCTION

Goa, often called the 'Rome of the East' due to its blend of Eastern and Western influences, has one of the highest proportions of elderly in India (about 11.2% of its population above age 60 as of 2011) (Lobo & Falleiro, 2022; Melo e Castro et al., 2018). Traditionally, Goan society emphasises strong family bonds and reverence for elders. However, rapid social change and migration have altered family structures from joint families to nuclear units (Silverstein & Giarrusso, 2010). Migration from Goa towards urban centres or abroad for education and employment has reduced daily contact with ageing family members. Older adults increasingly live alone or in care homes, and the natural intergenerational interactions that once occurred within extended families have diminished. Modernisation and technological change have also widened the generational gap. Younger generations often embrace individualistic lifestyles and digital communication, whereas older generations tend to uphold traditional norms and struggle with new technologies (Visanich,

2012; Mohd Tohit & Haque, 2024). These socio-cultural shifts can foster misunderstandings and stereotypes between youth and elders (Kumar, 2023). There is limited research examining these dynamics in the Goan context. This study addresses that gap by exploring how youth in Goa perceive older adults, focusing on the attitudes, experiences, and stereotypes of ageing.

REVIEW OF LITERATURE

Youth views of ageing are often ambivalent. On one hand, many young people admire the wisdom and experience of their elders; on the other hand, ageist stereotypes, portraying older people as frail, inflexible, or dependent, persist (Hummert et al., 1994; Anderson & Gettings, 2022). Close contact with older adults can help dispel negative stereotypes (Hoffmann & Kornadt, 2022; Prakash et al., 2019). Intergenerational relationships within the family have long been a cornerstone of social life in India. Grandparents traditionally play a crucial role in imparting moral values, providing care, and maintaining family continuity (Mueller et al., 2002; Silverstein & Giarrusso, 2010). In extended family settings, frequent contact between grandchildren and grandparents can strengthen emotional bonds and mutual understanding. However, changes in family structure and increased physical separation have strained these bonds. Research shows that disruptions like long-distance migration or family fragmentation can negatively affect the quality of grandparent-grandchild interactions (Silverstein & Giarrusso, 2010). At the same time, when intergenerational contact does occur, it can benefit both sides: older adults gain social support while youth gain mentorship and cultural knowledge (Yang & Warburton, 2018; Zhao et al., 2022).

Societal narratives, personal experiences, and cultural values shape youth perceptions of ageing. Studies indicate that many young adults harbour mixed feelings about growing old. Anderson and Gettings (2022) found that some young people express fear and anxiety about their ageing, viewing late life mainly in terms of decline. Hummert et al. (1994) identified a range of age-related stereotypes held by youth, from positive images of kindly "grandparent" figures to negative images of the elderly as senile or irritable. These stereotypes often originate early in life and can be reinforced by ageist depictions in media and casual discourse (Levy & Banaji, 2002). Notably, unlike many other prejudices, age-based stereotypes are sometimes socially accepted or treated as benign humour, which allows them to persist unchallenged (Rauvola et al., 2022).

Emerging research highlights factors that can improve or worsen young people's views of older adults. Positive interaction is a key influence: youth who have warm, frequent interactions with grandparents or other elders tend to hold more favourable attitudes (Hoffmann & Kornadt, 2022; Prakash et al., 2019). Conversely, limited or negative contact leave youths more susceptible to one-dimensional, often inaccurate, views of seniors. Verhage et al. (2021) demonstrated that structured intergenerational programs can help young adults construct more positive and nuanced images of older people. Cultural context also matters. In collectivist settings, youth are more likely to view caring for elders as a duty and to respect their authority.

In contrast, in more individualistic or rapidly modernising contexts, younger people question traditional hierarchies (Mohd Tohit & Haque, 2024). Nonetheless, across cultures, the transmission of knowledge and traditions from older to younger generations remains a valued aspect of intergenerational ties (Banerji, 1998; Yang & Warburton, 2018). This study builds on these insights from the literature, focusing on the specific case of Goan youth and their lifeworld with older adults.

OBJECTIVES OF THE STUDY

1. To study youth perception of ageing in Goa.
2. To know the negative and positive perceptions of youth.

To understand the experiences of youth with older adults.

LIMITATIONS OF THIS STUDY

1. This study is restricted to a few college and university students.
2. The study includes youth in the age range of 18-23, thereby restricting other age group participants from responding.

METHODOLOGY

This study employed an exploratory research design to investigate youth perceptions of older adults. The research was conducted in Goa, India. Participants were youth aged 18–24, corresponding to late adolescence and early adulthood students. This age group was targeted because it represents a formative life stage when attitudes toward ageing are being shaped. Using a purposive sampling technique within selected educational institutions, a total of 34 participants (both male and female) were recruited for this study. All participants were informed about the purpose of the study and provided informed consent prior to participation. Data were collected through a semi-structured questionnaire and face-to-face interviews. Each interview lasted for about 30 minutes. All the interviews were conducted in English and Konkani (the state's official language). Konkani interviews were later transcribed into English. The questionnaire included the frequency of contact with older adults, general attitudes toward the elderly, and demographic information. It captured broad trends in perceptions, including common descriptors of older people, perceived roles of elders, awareness of stereotypes, and future outlook.

For the data analysis, the data obtained from the semi-structured questionnaires and face-to-face interviews were analysed thematically. Interview transcripts were read repeatedly to achieve familiarisation with the data. Codes were generated inductively, focusing on recurring patterns in participants' narratives. These codes were then grouped into broader themes that reflected the youths' lived experiences, perceptions, and attitudes toward older adults. The analysis is presented under two major thematic sections: (A) Background of the Respondents and (B) Respondents' Lifeworld Experiences of Older Adults. The first section of the data presents the respondents' demographic profile, providing essential context for interpreting their perspectives and experiences. The variables under this theme include age, gender and educational background. Whereas the second section of this paper includes the Respondents' lifeworld experiences with older adults, these include: 1. Intergenerational Contact and Attitudes, 2. Perceptions of Older Adults, 3. Emotional Reactions and Acknowledged Contributions, 4. Stereotypes and Adaptability, 5. Engagement with Elders: Advice and Decision-Making, 6. Physical Ageing and Perceived Challenges, 7. Future Outlook on Intergenerational Relationships, 8. Common Challenges of the Elderly in Society.

RESULTS

A. Background of the Respondents

Respondents' Gender Profile

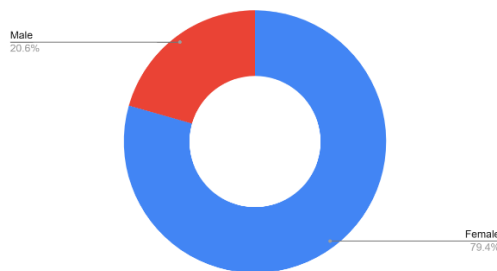


Figure 1

Respondents' Age Profile

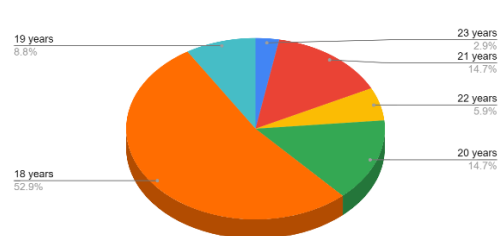


Figure 2

Studying Profile

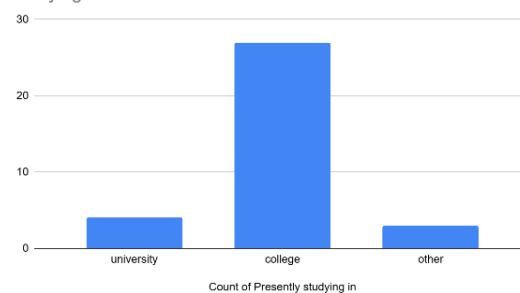


Figure 3

The study comprises responses from 34 young individuals aged 18 to 23 (Figure1) shows predominantly female (Figure 2) and mostly college students (Figure 3), this highlights a critical perspective: youth are increasingly aware of the multifaceted challenges of ageing, including healthcare access, financial insecurity, social isolation, ageism, and lack of family support. Most women are female, reflecting a heightened sensitivity towards caregiving and intergenerational dynamics. This aligns with global findings that women often take on emotional and care responsibilities within families. The dominance of college and university students suggests exposure to academic discourses on social issues, enabling them to assess the ageing experience critically. On the cusp of adulthood, this age group also relate personally to older generations within their families, making their views both empathetic and insightful. Their education level fosters informed opinions, making this demographic vital in shaping inclusive policies and social attitudes toward ageing in India's rapidly evolving demographic landscape.

B. Respondents' Lifeworld Experiences of Older Adults

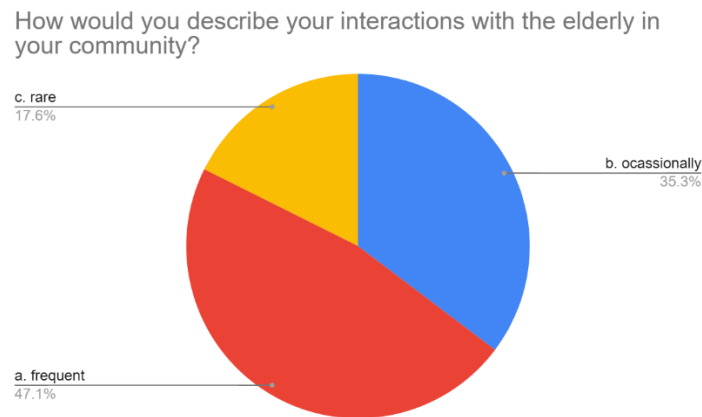


Figure 4

- 1. Intergenerational Contact and Attitudes:** The level of interaction between young people and their elders emerged as a significant influence on attitudes (Figure 4). Most participants reported having regular (47.1%), close contact with older family members (such as living with grandparents), which corresponded with positive perceptions of ageing. These youth often described enjoying daily interactions at home, sharing meals, celebrating festivals, or helping care for an elder during illness. Such experiences were said to foster admiration and respect for older adults. By contrast, the few respondents with only rare (17.6%) or occasional (35.3%) interactions with any older adult tended to express more negative or distant views of old age. This pattern suggests that increasing opportunities for intergenerational engagement will help counteract negative stereotypes among youth.

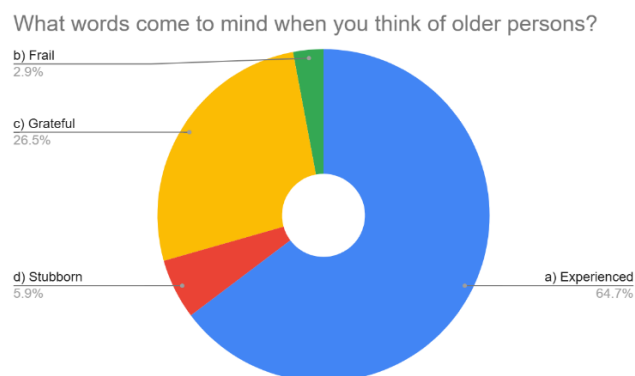


Figure 5

- 2. Perceptions of Older Adults – "Wise" vs "Outdated":** Most respondents used favourable terms when asked to describe older adults. Many portrayed elders as "wise," "experienced," or "dependable," as shown in Figure 5, reflecting a deep-rooted cultural respect for seniors as sources of knowledge and guidance. For instance, several youths mentioned that they often seek advice or hear stories from their grandparents, reinforcing their view of older people as repositories of wisdom. A small minority, however, described older adults in less flattering terms, such as "conservative," "outdated," or "stubborn." These outlier perceptions

were generally linked to generational differences in values or technology use; some youth felt that older people struggled to adapt to modern ideas and gadgets. Nonetheless, the overall sentiment toward older adults among the youth was positive. A few negative descriptors highlight the subtle influence of generational gaps, but these views were not common.

When interacting with older persons, what is your predominant feeling?

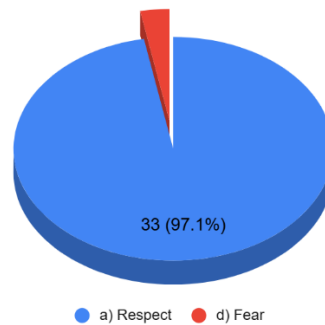


Figure 6

3. Emotional Reactions and Acknowledged Contributions: Figure 6 showed that nearly all participants indicated that their primary feeling toward older adults was respect (97.1%). This prevalent respect aligns with general societal norms in Goa (and India) that emphasise reverence for elders. Only a few youths admitted to any negative emotional response, such as feeling intimidated or "afraid" around older adults, and those cases were often attributed to strict or authoritarian behaviour by a particular elder. Alongside respect, youth also recognised the valuable contributions of older adults. The vast majority acknowledged that elders play key roles in passing down knowledge, traditions, and life lessons to the younger generation. Several respondents shared that their grandparents taught them important values or skills, underscoring the mentor role of elders. By contrast, some participants perceived older people as burdensome or overly dependent, mentioning concerns about retirees being a "drain" on family resources. Such views, however, were rare. Overall, the findings indicate that youths appreciate older adults' guidance and cultural continuity, even though a few hold ageist misconceptions.

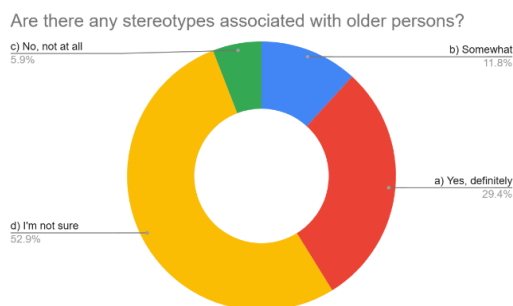


Figure 7

In your opinion, how do older persons adapt to societal changes?

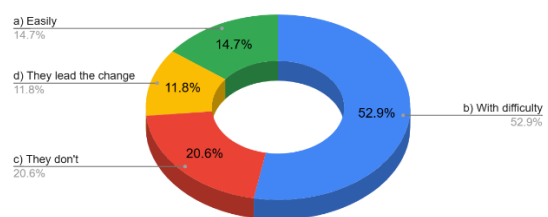


Figure 8

4. **Stereotypes and Adaptability:** The study revealed that many youths are aware of common stereotypes about the elderly (Figure 7), yet their personal experiences can challenge these generalisations. When discussing how well older adults adapt to societal changes (Figure 8), most participants believed that seniors adapt only with difficulty, especially in today's fast-paced, technology-driven world. Some young people described their grandparents as resistant to new technologies or modern lifestyles, which led to them being labelled "stubborn" or "inflexible." Likewise, terms such as "frail" were used, reflecting a perception of physical vulnerability in old age (Figure 5). However, these characterisations were not universal. A minority of youth were like older adults who were curious, learning new skills, or otherwise "young at heart." Such accounts illustrate that while ageist stereotypes, that all elders are frail or unable to change, are prevalent in society, direct interaction with older individuals often provides evidence to the contrary. Indeed, over half of the respondents noted that knowing an older person personally had made them realise that many stereotypes about ageing do not hold. The study suggests a tension between societal narratives of ageing and the nuanced reality that youth observe in their own families and communities.

How often do you seek advice or guidance from older persons?

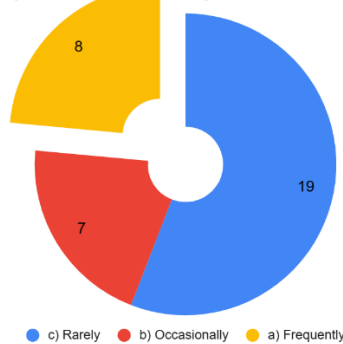


Figure 9

5. **Engagement with Elders: Advice and Decision-Making:** Patterns in the study indicate that today's youth rely less on elders for guidance than past generations, yet they still value senior input in specific domains. Figure 9 depicts that over half of the participants said they "rarely" consult older adults for advice on personal or practical matters, often preferring to seek information from peers or the internet. Nevertheless, about a quarter of the youth reported "frequently" or "regularly" seeking advice from an elder (usually a family member) on issues like career choices, relationships, or moral decisions. Those who did seek such advice emphasised the unique perspective that older adults offer, grounded in experience and hindsight. In line with this, most respondents affirmed that including older adults in family or community decision-making is important. Many youths felt that elders should have a say in important family matters or community discussions, citing their wisdom and long-term perspective. Only a negligible fraction of respondents was uncertain or disagreed about involving older people in decisions. This indicates that, despite growing independence, young people largely continue to respect and acknowledge the authority of older generations in collective affairs.

How do you perceive older persons in society?

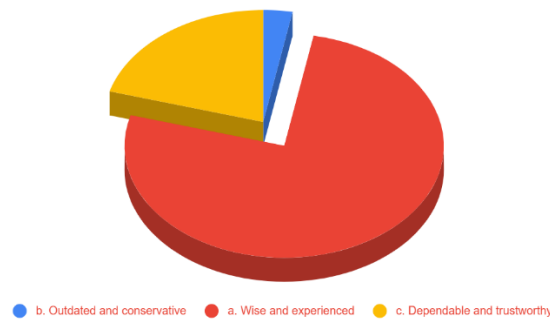


Figure 10

6. Physical Ageing and Perceived Challenges: When describing the condition of older adults, youths often distinguish between mental and physical facets of ageing (Figure 10). Many respondents viewed older people as "mentally sharp" or knowledgeable, even if they also noted physical decline with age. Many participants described elders they know as active and reasonably healthy, challenging the notion that old age is inevitably characterised by frailty. At the same time, some youth did perceive a decline in physical ability, with a few characterising most older adults as dependent on others for daily activities. In discussing the challenges that older generations face, participants commonly brought up issues such as health care access, financial insecurity after retirement, ageism or discrimination in society, and social isolation. Several youths pointed out that with more families becoming nuclear and adult children moving away, many elders lack family support and companionship. These observations show that young people know the social and economic difficulties accompanying ageing in today's society.

How do you envision your relationship with older persons in the future?

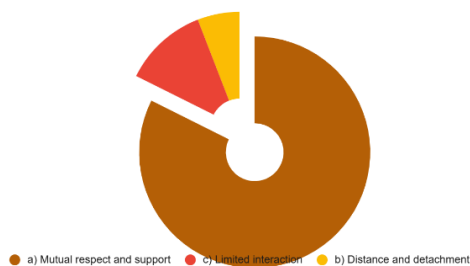


Figure 11

How do you believe older persons contribute to society?

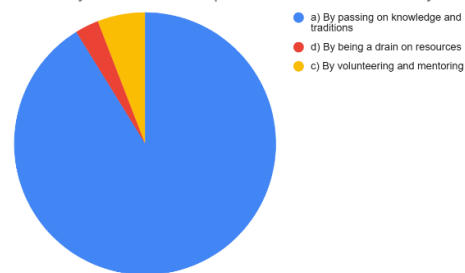


Figure 12

7. Future Outlook on Intergenerational Relationships: Figures 11 and 12 represent the perception of the youth towards future relationships with their own older parents and older adults in the surrounding. Looking to the future, an overwhelming proportion of the youth expressed hope and intention to maintain strong relationships with older adults. Roughly four-fifths of participants envisioned their future interactions with the elderly, such as their ageing parents or community elders in the coming decades, as being characterised by mutual respect, care, and support. They aspired to stay connected with and care for their elders,

despite the demands of modern life. A small segment, however, anticipated that they might have limited interaction with older generations in the future, citing potential factors like moving to distant cities, busy work schedules, or generational differences that create distance. This minority perspective highlights challenges such as geographic mobility and changing lifestyle patterns that hinder intergenerational contact. Nonetheless, the predominant outlook among youth was optimistic and family-oriented.

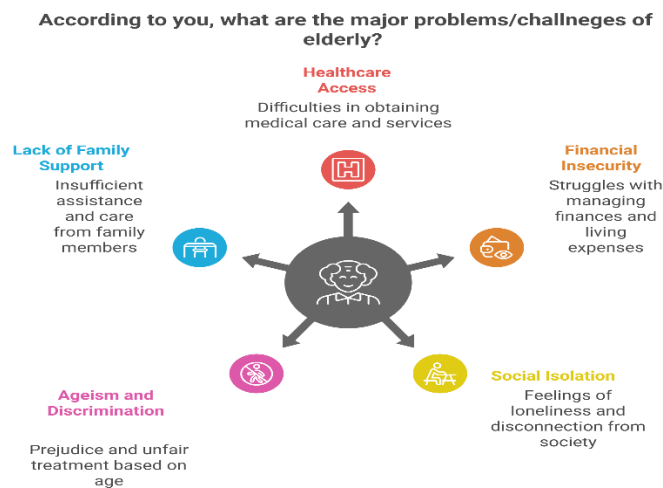


Figure 13

8. **Common Challenges of the Elderly in Society:** Youth perceptions of elderly challenges are shaped by direct observations and shifting societal norms (Figure 13). They see healthcare inaccessibility as a significant issue, influenced by witnessing older adults struggle with long waits, high costs, and limited insurance. Urbanisation and migration have weakened traditional family support systems, making youth more aware of social isolation among the elderly. They also recognise the digital divide, where older adults are excluded from tech-driven social spaces. Financial insecurity and ageism are noted as serious concerns, reflecting the elderly's dependency and marginalisation. These insights highlight the youth's growing empathy and awareness of the structural neglect faced by ageing populations.

DISCUSSION

The findings of this study paint a nuanced picture of how youth in Goa regard older adults, revealing a blend of traditional reverence and modern-day misconceptions. The results demonstrate a predominantly positive orientation among young people toward their elders, echoing patterns observed in broader Indian culture. The strong respect and affection participants showed for older adults resonate with India's longstanding familial ethos, where elders are considered integral members of the family unit deserving of care and veneration. This aligns with prior observations that Indian youth often internalise cultural values of filial piety and responsibility toward older kin (Ding, 2024; Anuradha et al., 2016). In this study, many youths highlighted how grandparents provide emotional support, guidance, and stability within the family, an experience similarly noted in other

research on grandparent-grandchild bonds (Mansson, 2012; Yang & Warburton, 2018). Such positive sentiments confirm that traditional intergenerational solidarity remains influential among the Goan youth.

At the same time, the coexistence of ageist stereotypes alongside this respect underscores the complexity of youth attitudes. The participants exhibited some degree of ambivalence about ageing. On one hand, they admire qualities like wisdom and kindness in older people; on the other, a few have absorbed societal stereotypes portraying elders as obstinate, outdated, or burdensome. This duality mirrors findings by Hummert (1990), who identified both positive and negative categories in young people's images of the elderly: the "perfect grandparent" versus the "frail elderly". The persistence of negative stereotypes among even a generally respectful youth cohort is concerning, but not surprising. Age-based prejudice is often so embedded in social norms that it can be perpetuated almost unconsciously (Levy & Banaji, 2002). Unlike biases related to race or gender, ageism is frequently deemed socially acceptable or even humorous, allowing it to go unchecked (Rauvola et al., 2022). In Goa's rapidly modernising society, these stereotypes are further fuelled by generational divides in lifestyle and technology. Some youth, for instance, cited their elders' unfamiliarity with smartphones or social media as evidence that older people are "stuck in the past." This reflects a well-documented pattern in modernisation: as younger generations acquire new skills and values, they perceive the older generation's ways as antiquated.

However, findings also emphasise that such stereotypes are not immutable. A central insight from this study is the pivotal role of direct intergenerational contact in shaping youth perceptions. Participants with frequent, meaningful interactions with older adults especially within the family, were far less likely to endorse one-dimensional ageist views. This reinforces the literature on intergenerational contact theory: positive exposure to elders humanises the older generation and counteracts prejudice (Hoffmann & Kornadt, 2022; Verhage et al., 2021). Prakash et al. (2019) similarly found that Indian youth who lived with or regularly interacted with elderly family members held more positive attitudes than those who did not. In this study, youths who spoke of sharing daily routines or personal conversations with grandparents saw their elders as individuals with unique personalities and wisdom, rather than as stereotypes. These qualitative insights support the argument that fostering closer bonds between young and old can effectively reduce ageism. Conversely, lack of contact appears to leave a vacuum often filled by negative societal narratives about ageing. This point is salient for Goa, where socio-economic changes reduce the frequency of natural intergenerational encounters.

This study contributes to the literature by offering an in-depth, context-rich perspective on youth-elder relationships in a region (Goa) that embodies the intersection of tradition and modernity. One clear implication is the need for initiatives that facilitate more intergenerational interaction. Schools, colleges, and community organisations in Goa can implement intergenerational programs such as mentoring schemes, cultural exchange workshops, or community service projects that bring youth and seniors together to build empathy and understanding. Public campaigns can also target ageist beliefs, emphasising stories of active, contributing older adults to break down negative stereotypes. Given that participants identified issues like elder isolation and age discrimination, there is also a role for policy interventions. Creating community centres or support networks for seniors (where youth can volunteer) would address some challenges older adults face while sensitising young volunteers to ageing realities. Additionally, educational curricula might incorporate gerontological content to prepare youth for an ageing society.

CONCLUSION

In conclusion, the youth in Goa primarily view ageing and older adults through a positive lens of respect and familial affection, even as they navigate and sometimes question the generational divides that modernisation has introduced. Their perceptions underscore the enduring strength of cultural values in upholding the dignity of older adults and the importance of personal connections in overcoming stereotypes. By understanding these youth perspectives, academia, policy, and community development stakeholders can better foster intergenerational harmony. Encouraging dialogue and shared activities between young and old will help dispel myths about ageing and ensure that the wisdom, experience, and contributions of Goa's older generation are not lost on the new generation.

REFERENCES

- Anderson, L. B., & Gettings, P. E. (2022). Old age scares me: Exploring young adults' feelings about aging before and during COVID-19. *Journal of Aging Studies*, 60, 100998. <https://doi.org/10.1016/j.jaging.2022.100998>
- Anuradha, K., Adilakshmi, T., & Prasanthi, G. V. (2016). Changing role of grandparents in child rearing and its association with mental health. *International Journal of Home Science*, 2(2), 280–282. <http://www.homesciencejournal.com/archives/2016/vol2issue2/PartE/2-2-41.pdf>
- Banerji, S. (1998). *A Companion to Dharmasastra*. D. K. Printworld.
- Ding, K. (2024). The impact of grandparents and intergenerational living on children's social and emotional development. *Journal of Education, Humanities and Social Sciences*, 29, 403–412. <https://doi.org/10.54097/paw2mg46>
- Hoffmann, C., & Kornadt, A. E. (2022). A chip off the old block? The relationship of family factors and young adults' views on aging. *Frontiers in Psychology*, 13, 808386. <https://doi.org/10.3389/fpsyg.2022.808386>
- Hummert, M. L. (1990). Multiple stereotypes of elderly and young adults: A comparison of structure and evaluations. *Psychology and Aging*, 5(2), 182–193.
- Hummert, M. L., Garstka, T. A., Shaner, J. L., & Strahm, S. (1994). Stereotypes of the elderly held by young, middle-aged, and elderly adults. *Journal of Gerontology*, 49(5), P240–P249. <https://doi.org/10.1093/geronj/49.5.P240>
- Kumar, S. P. M. (2023). Adolescent behaviour and issues of generation gap. *Research Review International Journal of Multidisciplinary*, 8(12). <https://doi.org/10.31305/rrijm.2023.v08.n12.011>
- Levy, B. R., & Banaji, M. R. (2002). Implicit ageism. In T. D. Nelson (Ed.), *Ageism: Stereotyping and prejudice against older persons* (pp. 49–75). MIT Press.
- Lobo, C. S. S., & Falleiro, S. P. (2022). Differences in mental and physical health-related quality of life of older adults in Goa. *Asian Pacific Journal of Health Sciences*, 9(4), 43–45. <https://doi.org/10.21276/apjhs.2022.9.4.10>
- Mansson, D. H. (2012). A qualitative analysis of grandparents' expressions of affection for their young adult grandchildren. *North American Journal of Psychology*, 14(2), 207–218.
- Melo e Castro, P., Festino, C. G., Garmes, H., & Newman, R. (2018). Goans on the move. *Interdisciplinary Journal of Portuguese Diaspora Studies*, 7, 1–19. <https://eprints.gla.ac.uk/173742/1/173742.pdf>

- Mohd Tohit, N., & Haque, M. (2024). Preparing the younger generation for an ageing society: Strategies, challenges, and opportunities. *Cureus*, 16(7).
- Mueller, M. M., Wilhelm, B., & Elder, G. H. (2002). Variations in grandparenting. *Research on Aging*, 24(3), 360–388.
- Prakash, S., Kumar, S., & Sharma, V. (2019). Youth's attitude towards elderly people in Indian society: A cross-sectional comparative study. *International Journal of Scientific Research and Reviews*, 8(1), 1693–1701. <http://www.ijssr.org>
- Rauvola, R. S., Carruth, N. P., & Rudolph, C. W. (2022). Modern ageism and age stereotyping. In M. A. Yerkes & M. Bal (Eds.), *Solidarity and social justice in contemporary societies* (pp. 173–192). Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-93795-9_9
- Silverstein, M., & Giarrusso, R. (2010). Aging and family life: A decade review. *Journal of Marriage and Family*, 72(5), 1039–1058.
- Verhage, M., Schuurman, B., & Lindenberg, J. (2021). How young adults view older people: Exploring the pathways of constructing a group image after participation in an intergenerational programme. *Journal of Aging Studies*, 56, 100254.
- World Health Organization. (2024, October 1). Ageing and health. <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>
- Yang, T., & Warburton, D. (2018). Indigenous elders' role in fostering intergenerational relationships with youth. *Health & Fitness Journal of Canada*, 11(4), 88–93.
- Zhao, M., Yang, F., & Zhang, Y. (2022). The power of culture: The gendered impact of family structures and living arrangements on social networks of Chinese older adults. *Ageing & Society*, 42, 657–680.

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