A comparative study to assess the knowledge and attitude regarding menstrual cup vs sanitary pads among females residing in the urban area of Bengaluru

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Abstract : Menstrual hygiene management is a crucial, yet often overlooked, aspect of women's health. While sanitary pads are widely used, sustainable alternatives like menstrual cups are emerging. However, their adoption is influenced by the knowledge and attitudes of potential users. This study provides a comparative assessment of the knowledge and attitudes regarding menstrual cups versus sanitary pads among females in an urban Indian setting. ***Methodology:*** A quantitative, descriptive research design was employed, with a sample of 100 females aged 15-49 from a selected urban area in Bengaluru, who had used both products. Data were collected using a structured, self-administered questionnaire and a modified Likert scale to assess socio-demographics, knowledge levels, and attitudes. The collected data were analyzed using descriptive and inferential statistics. ***Results:*** The study found no statistically significant difference ($p=0.225$) in the level of knowledge between menstrual cups (mean score 11.21) and sanitary pads (mean score 10.93). However, a highly significant difference ($p<0.0001$) was observed in attitudes. A majority of participants (67%) held a favorable attitude towards menstrual cups (mean score 40.39), whereas attitudes towards sanitary pads were predominantly moderately favorable (64%) or unfavorable (36%), with a significantly lower mean score of 26.96. ***Conclusion:*** The findings indicate that despite comparable knowledge levels, urban women hold a significantly more positive attitude towards menstrual cups. This favorable perception suggests a high potential for the adoption of this sustainable menstrual product. Public health strategies should focus on leveraging this positive attitude to overcome barriers to adoption.

IndexTerms **- Menstrual Cup, Sanitary Pads, Knowledge, Attitude, Menstrual Hygiene.**

INTRODUCTION

Menstrual health management remains a critical public health concern affecting millions of women globally, with significant implications for their physical well-being, social participation, and economic empowerment. In India, where approximately 355 million women menstruate, the landscape of menstrual hygiene practices has witnessed considerable transformation over recent decades. The National Family Health Survey-5 data reveals that 77% of Indian women aged 15-24 years now use hygienic menstrual products, representing a substantial increase from previous years. However, this progress masks significant disparities in knowledge, attitudes, and product preferences that continue to influence women's menstrual health choices.

The contemporary menstrual hygiene market in India presents women with two primary options: traditional disposable sanitary pads, which dominate usage patterns with 64.4% of women preferring them, and innovative menstrual cups, which despite their proven benefits remain underutilized by only 0.3% of the population. This stark disparity reflects deeper sociocultural, economic, and knowledge-based factors that shape women's menstrual health decisions. Recent research indicates that while 74.8% of women possess knowledge about menstrual cups, only 17.4% currently use them, highlighting a significant gap between awareness and adoption that warrants comprehensive investigation.

The urban context of Bengaluru presents a unique research environment for examining these patterns. As a major metropolitan center with a diverse, educated population, Bengaluru represents both the opportunities and challenges of modernizing menstru al health practices in urban India. Recent studies from the city reveal that while 90% of women prefer sanitary pads, only 6% use

menstrual cups, indicating that even educated, urban populations face barriers to adopting sustainable menstrual products. Environmental concerns are particularly relevant in Bengaluru, where the city generates approximately 90 tonnes of menstrual waste daily, underscoring the urgent need for sustainable alternatives.

Contemporary research demonstrates that menstrual cup adoption is influenced by complex factors including insertion apprehensions (reported by 56.2% of non-users), cultural taboos, inadequate healthcare guidance, and limited access to accurate information. Systematic reviews and meta-analyses reveal that while menstrual cups offer superior cost-effectiveness, environmental sustainability, and health benefits, including reduced infection rates and longer wear duration, their acceptance remains limited by knowledge gaps and sociocultural barriers. Recent studies indicate that 62% of non-users express willingness to try menstrual cups following educational interventions, suggesting significant potential for increasing adoption through targ eted awareness programs.

This comparative study aims to bridge the existing research gap by examining the knowledge and attitude patterns regarding menstrual cups versus sanitary pads among women in Bengaluru. Given the city's diverse demographic profile and progressive healthcare infrastructure, understanding these patterns will provide valuable insights for developing targeted interventions that promote informed menstrual health choices. The research addresses contemporary public health priorities around menstrual equity, environmental sustainability, and women's empowerment while contributing to the evolving evidence base on menstrual hygiene management in urban Indian contexts.

The significance of this research extends beyond individual health outcomes to encompass broader societal implications, including environmental impact reduction, economic empowerment, and the advancement of women's rights to dignified menstrual health management. By examining knowledge and attitude differentials between these two primary menstrual products, this study will inform evidence-based strategies for healthcare providers, policymakers, and public health practitioners working to optimize menstrual health outcomes in rapidly evolving urban environments.

NEED OF THE STUDY.

Despite over a century of availability, menstrual cups remain critically underutilized in India (0.3% adoption versus 64.4% for sanitary pads). Knowledge deficits—77.3% of women lack adequate menstrual health information—hinder informed choices. A 25-point rural–urban gap persists (43% vs 68% using hygienic materials), driven by socioeconomic disparities. Bengaluru alone generates 90 tonnes of menstrual waste daily, exacerbating environmental and public health concerns. Yet 62% of non-users express willingness to adopt menstrual cups after educational interventions. The WHO's 2024 report highlights persistent school absenteeism (38.2%) due to menstruation, underscoring the urgent need to study knowledge and attitudes toward menstrual products through comprehensive research.

RESEARCH METHODOLOGY

This study employed a descriptive, cross-sectional design to compare knowledge and attitudes toward menstrual cups versus sanitary pads among women residing in selected urban areas of Bengaluru. The target population comprised females aged 18 –45 years, with a sample size of 100 determined using the formula $n = Zn = \frac{z^2pq}{d^2}$(Zα/2 = 1.96 at 5% significance, precision = 10%). Participants were recruited via purposive sampling following guidance from nursing experts and the principal investigator. Data were gathered using a structured, self-administered questionnaire—validated by a panel of five subject-matter experts and pilot-tested on 10 participants to ensure clarity and reliability (Cronbach's α = 0.82). The tool captured socio-demographics, knowledge items (scored correct/incorrect), and a 5-point Likert scale for attitudes. Trained research assistants conducted face-to-face data collection over four weeks. Data were coded and analyzed using SPSS v25, with descriptive statistics for demographic and survey variables, chi-square tests for associations, and logistic regression to identify predictors of product preference.

3.1 Population and Sample

The study population consisted of females aged 18 to 45 years residing in selected urban areas of Bengaluru, representing women of reproductive age who use menstrual hygiene products. This population was chosen to capture diverse knowledge and attitudes toward menstrual cups and sanitary pads among an urban female demographic. The universe of the study includes all females in this age group living in Bengaluru's metropolitan region who menstruate and have experience with menstrual hygiene management. A sample size of 100 participants was calculated using a standard formula at a 5% significance level with 10% precision. The sample was selected through purposive sampling, guided by nursing experts and the principal investigator, to ensure inclusion of women with varying backgrounds and menstrual product usage patterns within Bengaluru city limits. Data collection occurred over four weeks in 2025, focusing on the urban female population actively managing menstrual hygiene with either menstrual cups or sanitary pads.

3.2 Data and Sources of Data

For this study, primary data were collected using a structured, self-administered questionnaire designed to assess knowledge and attitudes toward menstrual cups and sanitary pads among females aged 18 to 45 years living in selected urban areas of Bengaluru. Prior to data collection, formal written permission was obtained from the Deputy Health Officer of the Mahadevapura zone, Bengaluru, ensuring ethical compliance and administrative support. Data collection occurred over a 19-day period, from April 2 to April 20, 2024. During this phase, the investigator introduced herself to participants, clearly communicated the study's purpose, and requested their cooperation, assuring confidentiality of responses to encourage honest and accurate data. Informed consent was

secured from all 100 purposively selected participants, indicating their voluntary agreement to partake in the study. The questionnaire included sections capturing socio-demographic information, knowledge-based questions scored as correct or incorrect, and attitudinal items measured on a 5-point Likert scale. The tool was validated through expert review by five subject-matter specialists and pilot tested on 10 individuals, achieving a reliability coefficient of Cronbach's alpha = 0.82, thereby ensuring clarity and consistency. Trained research assistants assisted in face-to-face administration of the questionnaire, guiding participants where needed to minimize errors and non-responses. Secondary data sources supplemented the study by providing contextual background and supporting literature, including national and regional reports (such as the National Family Health Survey-5 and WHO publications), recent peer-reviewed articles on menstrual hygiene practices, and environmental studies on menstrual waste management in Bengaluru. Data coding, entry, and analysis were performed using SPSS version 25, with rigorous double-entry verification to maintain data integrity. Statistical analysis encompassed descriptive statistics to summarize participant characteristics and survey responses, chi-square tests to examine associations between demographic variables and product preferences, and logistic regression to identify key predictors influencing attitudes and usage patterns. The integration of primary, rigorously collected field data with authoritative secondary literature enables a comprehensive understanding of the current knowledge and attitudes surrounding menstrual hygiene products in urban Bengaluru, highlighting critical areas for intervention in menstrual health education and sustainable product adoption initiatives.

3.3 Theoretical framework

This study utilizes Ludwig von Bertalanffy's General System Theory (GST) as its theoretical foundation to examine knowledge and attitudes regarding menstrual cups versus sanitary pads among females in urban Bengaluru. Bertalanffy's GST posits that every system—biological, social, or mechanical—consists of interacting components that work together toward a specific purpose. Here, the chosen population (females aged 18–45), their socio-demographic attributes (age, education, occupation, income, etc.), and menstrual health behaviors collectively form a dynamic, open system influenced by both internal and external factors.

Inputs in this system include the participants' demographic profiles, age at menarche, education, socioeconomic status, pre-existing knowledge, and sources of information about menstrual products. These inputs are shaped by wider influences like social norms, healthcare accessibility, family attitudes, and media exposure—all of which either enable or hinder the adoption of sustainable menstrual hygiene practices.

Throughput (Process) describes the internal mechanisms through which these inputs are catalyzed. In this study, throughputs include informational processing, attitude development, and value assignment to menstrual hygiene products. The process is operationalized via validated questionnaires assessing levels of knowledge, beliefs, behavioral intentions, and overall attitudes toward menstrual cups and sanitary pads.

Output is manifested as participants' stated preferences, actual usage patterns, willingness to adopt new products, and observable changes in knowledge and attitude. These outputs reflect the system's response to various informational and contextual stimuli, providing actionable insights for public health intervention.

Feedback occurs when the study's findings inform future menstrual health education, policy design, or community engagement. Effective feedback can modify the inputs for subsequent cycles, fostering a progressive increase in menstrual health awareness and adoption of sustainable products.

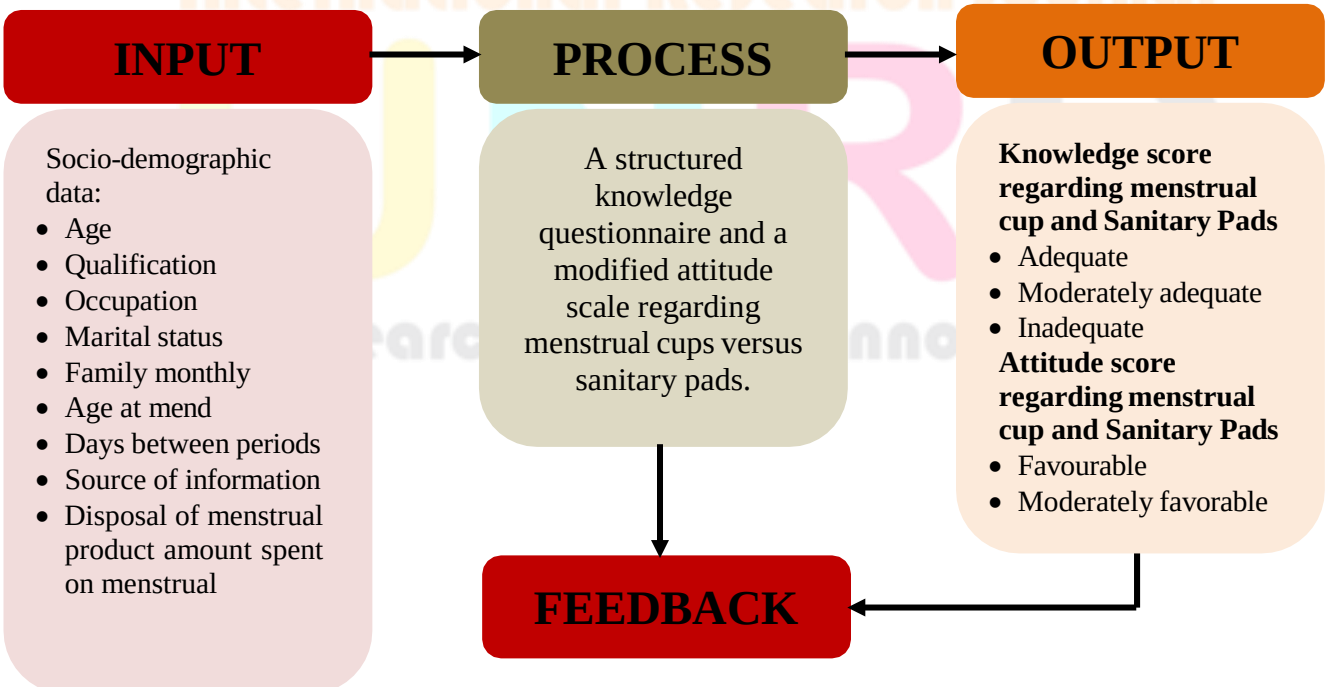

Fig.1: Conceptual framework based on Ludwig von Bertalanffy's General System Theory

3.4 Statistical tools and econometric models

This research applied a comprehensive suite of statistical tools and methods to rigorously analyze the data collected on knowledge and attitudes regarding menstrual cups and sanitary pads among women in Bengaluru. Following data coding and double-entry verification in SPSS version 25, the statistical approach commenced with descriptive statistics—frequencies, percentages, means, and standard deviations—to summarize socio-demographic characteristics, knowledge scores, and attitude levels for the overall sample and key subgroups.

For inferential analysis, chi-square (χ^2) tests were employed to examine associations between categorical variables such as product preference (menstrual cups vs sanitary pads) and demographic characteristics (age group, education, income, etc.), as well as between levels of knowledge or attitude and different socio-demographic factors. This tested the independence and potential correlation among study variables.

Where group comparisons were needed (for example, mean differences in knowledge or attitude scores by age or education level), t-tests were utilized, depending on the number of groups and the type of data distribution. Normality of data was gauged prior to application of these parametric tests.

The statistical significance threshold for all inferential tests was set at $p < 0.05$. The reliability of the knowledge and attitude scales was assessed using Cronbach's alpha coefficient, ensuring internal consistency ($\alpha = 0.82$ achieved during pilot testing). Cross-tabulation, graphical representation (bar charts, pie diagrams), and tabulation were also used for clear data visualization and reporting.

This combination of descriptive and inferential statistical methods provided a solid framework for addressing the study's research questions and for extracting actionable insights into the determinants of knowledge and attitude regarding menstrual hygiene products among urban women in Bengaluru.

IV. RESULTS AND DISCUSSION

Results of this study has be discussed under the various categories below,

Socio-Demographic Profile

Among the 100 urban female participants in Bengaluru, the majority (75%) were aged between 15 and 25 years, with the remaining 25% falling within the 26–35 year range. Educational attainment skewed higher, with 63% being undergraduates, 15% having completed senior secondary education, 12% holding diplomas, and 10% postgraduates. Students comprised the principal occupational group (66%), followed by private or government employees (20%), housewives (8%), and self-employed women (6%). Most of the sample was unmarried (68%), while 32% were married. Family monthly income was notably high, with 68% reporting income levels above ₹20,000, indicative of a relatively affluent, urban sample. Regarding menstrual history, 47% experienced menarche after age 12, and 37% reported regular 28-day cycles. Key sources of information included family members (46%) and social media (32%). Menstrual product use at first period was predominantly sanitary pads (84%), with menstrual cups accounting for 10%. Most participants disposed of menstrual products by burning (47%) or using trash bins (43%). Annual expenditure on menstrual hygiene ranged predominantly between ₹1,500–2,000 for 62% of respondents, underscoring patterns of modern, urban menstrual health practices in this cohort.

Knowledge Levels: Menstrual Cup vs Sanitary Pads

Table 1: Comparison of Knowledge of females regards to menstrual cup and sanitary pads

N = 100

Level	Menstrual Cup	Sanitary Pads
Adequate	43%	38%
Moderately Adequate	56%	59%
Inadequate	1%	3%
Mean	11.21	10.93
SD	1.63	1.62
Un paired ‘t’ value	1.2157	
p value	0.225	

The knowledge levels table summarizes participants’ understanding regarding menstrual cups and sanitary pads, categorizing them as adequate, moderately adequate, or inadequate. Among respondents, 43% demonstrated adequate knowledge of menstrual cups, while 38% showed adequate knowledge of sanitary pads. A majority fell into the moderately adequate category for both products (56% for menstrual cups, 59% for sanitary pads), and only a small fraction had inadequate knowledge (1% for menstrual cups, 3% for sanitary pads). The mean knowledge scores were slightly higher for menstrual cups (11.21) compared to sanitary pads (10.93).

Statistical comparison using a t-test produced a t-value of 1.22 and a p-value of 0.225, indicating no significant difference in knowledge levels between the two product groups.

Attitude Levels: Menstrual Cup vs Sanitary Pads

Table 2: Comparison of Attitude of females regards to menstrual cup and sanitary pads

N = 100

Level	Menstrual Cup	Sanitary Pads
Favourable	67%	0%
Moderately Favourable	33%	64%
Unfavourable	0%	36%
Mean	40.39	26.96
SD	4.19	5.07
Un paired 't' value	20.407	
p value	<0.0001	

The attitude levels table assesses how favourably participants view the two products, again using three categories: favourable, moderately favourable, and unfavourable. Attitudes toward menstrual cups were markedly more positive, with 67% expressing a favourable attitude (compared to 0% for sanitary pads), and 33% moderately favourable (vs 64% for sanitary pads). Notably, 36% reported an unfavourable attitude toward sanitary pads, whereas none did so for menstrual cups. The mean attitude score was significantly higher for menstrual cups (40.39) than sanitary pads (26.96). This was confirmed by a t-test with a t-value of 20.41 and a highly significant p-value of < 0.0001, demonstrating a statistically significant difference in attitudes favoring the menstrual cup.

Association Analyses

Knowledge Associations

A detailed evaluation of associations revealed that knowledge about menstrual cups was significantly influenced by participants' educational qualification (p=0.036) and occupation (p=0.0306). Higher educational levels and being a student were correlated with more adequate knowledge regarding menstrual cups, underlining the importance of formal education and student life in shaping awareness and correct information. In contrast, knowledge about sanitary pads correlated significantly only with family month ly income (p=0.001); participants from higher-income households demonstrated better knowledge about sanitary pads, reflecting access-driven awareness.

Attitude Associations

In terms of attitudes, the study found no statistically significant association between participants' socio-demographic variables (such as age, education, occupation, or income) and their attitudes toward either menstrual cups or sanitary pads ($p > 0.05$). This suggests that while knowledge is shaped by educational and economic factors, positive or negative attitudes towards menstrual hygiene products may be more uniformly distributed in the urban female population, indicating the potential for wide-reaching attitudinal interventions across diverse groups.

V. DISCUSSION

The present study reveals that while participants in urban Bengaluru possess comparable levels of knowledge about menstrual cups and sanitary pads, their attitudes are significantly more favourable toward menstrual cups, despite these products' longstand ing underutilization. Education and occupation were found to be key determinants for knowledge regarding menstrual cups, while knowledge about sanitary pads was related primarily to family income. These findings suggest that although access to accurate information has improved, targeted educational interventions remain necessary to address remaining knowledge gaps and nurture positive attitudes, especially toward sustainable menstrual hygiene options.

A recent study by van Eijk et al. (2019) in The Lancet Public Health reviewed 43 studies and found that with adequate education and awareness, acceptance and satisfaction rates for menstrual cups increase significantly, paralleling the higher favourability found in the current research. This corroborates the notion that improved outreach and tailored information can drive an attitudina l shift, further promoting the adoption of environmentally sustainable products among women in urban India.

VI. CONCLUSION

This study demonstrates that urban women in Bengaluru hold comparable knowledge about menstrual cups and sanitary pads, yet attitudes are markedly more favourable toward menstrual cups. Educational attainment and occupation are significant factors influencing knowledge of menstrual cups, while family income shapes knowledge of sanitary pads. Despite improvements in awareness, a gap persists between knowledge and the actual adoption of sustainable menstrual products. These findings highlight the necessity for targeted, education-based interventions to further empower women, correct misconceptions, and promote the acceptance of environmentally friendly menstrual hygiene options, enhancing both public health and sustainable practices in urban India.

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