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RESEARCH ARTICLE

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MENSTRUAL PRODUCTS AND USER EXPERIENCE: EVALUATING SATISFACTION AND COST EFFECTIVENESS OF MENSTRUAL CUPS VS. SANITARY NAPKINS

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ABSTRACT

This paper explores satisfaction and cost-effectiveness of menstrual cups and sanitary napkins in menstruating individuals, including demographic and menstrual aspects. One-hundred respondents were sampled through the use of a structured questionnaire that included variables of age, employment, income, menstrual history, product use, satisfaction, and that of cost-effectiveness. The findings showed that the vast majority of participants were young adults and students with most of them earning lower-moderate income which implies that awareness, affordability and accessibility are factors that affected the adoption of menstrual products. Sanitary napkins are still used the most, yet menstrual cups were much more associated with higher satisfaction in terms of comfort, protection against leakage, ease of daily living and willing to recommend, which was statistically confirmed. The cost-effectiveness analysis revealed that menstrual cups, though more expensive to start with, were more cost-effective in the long run, and that there were no differences in cost-effectiveness perceptions according to income. In the study, menstrual cups have been identified as a sustainable, cost-effective and highly satisfactory alternative, which should be advocated through awareness and educational programs to enhance menstrual health.

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INTRODUCTION

Women live a complex life of responsibilities which include family, work and social commitments and through it all they deal with the natural biological process called menstruation. A period is also known as menstruation which is a normal physiological process through which the uterine lining is shed out after a pregnancy has failed to take place (Dasgupta & Sarkar, 2008). Menstrual flow is composed of blood and uterine tissue and discharges through the vagina and can generally take three to seven days in a month (WHO, 2020). Menstruation remains a social taboo in most regions of the world including India despite it being a natural phenomenon. Consequently, a significant number of women are afraid to talk about menstrual health or consult with advice on hygiene management (Kaur et al., 2018). Since an average female spends almost 2 280 days (a month or 6.25 years) of her life on a menstrual cycle, safe, hygienic, and affordable menstrual products are crucial to her health and dignity (Patkar, 2017). Menstrual hygiene market has over the years recorded the presence of various products including sanitary napkins, tampons and menstrual cups. Of all these, sanitary napkins have become the most popular item since they are readily available and are generally promoted (Narayana et al., 2021). Most of these pads consist of almost 90 percent plastic and are therefore very difficult to biodegrade, which makes them a significant issue to the

environment (Bharadwaj and Patkar, 2020). The pads are not reusable but are used once leading to millions of tons of menstrual waste annually that add to landfill amounts and pollution (Gupta et al., 2022). Menstrual cups, however, which are reusable and medical grade silicone cups capable of trapping menstrual fluid, are also becoming a viable, sustainable and cost-effective choice (North & Oldham, 2011). The cup is inserted in the vagina where it expands to seal the cervix preventing leakage. It is eco-friendly and economical as it can be used up to 8-12 hours before emptying, washed and reused again up to ten years (Howard et al., 2011). Menstrual cups are not used, even though they have the benefits of being cost-effective, environmentally friendly, and disposable. Some women are reluctant to use them because they are not aware of it, they are misled, they have cultural taboos, or they feel uncomfortable (Van Eijk et al., 2019). Such low adoption brings some crucial questions on comparative user satisfaction, comfort, convenience, and financial concerns of menstrual cups and sanitary napkins. The current research, thus, seeks to carry out a comparative study of menstrual cups and sanitary napkins among Kerala women in two dimensions, namely, user satisfaction and cost-effectiveness. The high level of literacy and health awareness in Kerala is an appropriate setting to assess the evolving menstrual hygiene habits (Government of Kerala, 2023). The study explores the parameters like comfort, leakage protection, ease of use, affordability and general satisfaction and also looks at the

demographic factors like age and income on product preferences. Through these areas, the study aims at closing knowledge gaps and provides contributions to informed decision-making in the management of menstrual hygiene. It is anticipated that the findings could provide useful ideas to women consumers, policymakers, and health educators who attempt to popularize sustainable menstrual practices and develop the quality of menstrual health management in young women.

LITERATURE REVIEW

A literature review provides an overview of existing scholarly work on a specific topic to understand the scope, key findings, and debates within that area of research. In the context of menstrual hygiene management, previous studies have explored various dimensions such as the availability, usage, social perceptions, health impacts, and cost-effectiveness of menstrual products. This section synthesizes past studies that are relevant to understanding user satisfaction and cost-effectiveness between menstrual cups and sanitary napkins. Van Eijk *et al.* (2021) conducted a systematic review and meta-analysis indicating that menstrual cups are a safe, acceptable, and effective menstrual management option worldwide. The study emphasized the need for further research on cost-effectiveness and environmental implications when comparing different menstrual products. Similarly, Stolz *et al.* (2019) performed a comprehensive literature review to identify reported side effects associated with menstrual cup use. The researchers concluded that although menstrual cups are widely used, healthcare professionals must be equipped to recognize possible complications, such as cup misplacement, to prevent health risks like hydronephrosis. Tolonen (2020) examined the sociocultural dimension of menstruation, highlighting how restrictive norms and inadequate menstrual hygiene practices contribute to period teasing, which in turn undermines gender equality and educational opportunities. The author argued that a purely biomedical approach to menstrual education is insufficient; instead, addressing menstrual stigma is essential to ensure holistic menstrual health awareness. Supporting this, Hennegan (2019) reviewed existing qualitative studies on menstrual experiences, primarily among adolescent girls, and found that most research disproportionately focuses on adolescents rather than adult women. The study identified consistent challenges related to menstrual stigma, inadequate facilities, and limited product access, underscoring the need for inclusive research encompassing diverse age and socioeconomic groups. Moreover, Shah (2019) noted that reusable cloth is the most widespread type of menstrual product among girls in the low- and middle-income countries unless the girls receive free sanitary pads as part of institutional programmes. This paper has observed that taboos, secrecy, and embarrassment do not allow open debate on menstruation, which restricts the management of proper menstrual hygiene (MHM). Montgomery *et al.* (2016) supported this view and discovered that the delivery of menstrual education and sanitary pads enhanced school attendance in girls. Nevertheless, the authors also admitted some methodological weaknesses, such as low retention of the participants and non-homogeneous attendance records. Laserson (2016) did a feasibility study on primary schoolgirls in rural Kenya and compared the use of menstrual cups, sanitary pads and the normal practices. The findings indicated that menstrual cups are viable and acceptable substitutes provided the right education and support is offered. Peranovic (2016) examined the perceptions of men towards menstruation in the framework of social constructionism. The analysis has shown that the reason behind negative or dismissive attitudes toward menstruation is usually a result of the early gendered messages in childhood. Such attitudes may shape the attitudes of men between menstrual products and the experiences of menstruation that women have and strengthen stigma in society. Kothari (2010) explored the degree of menstrual education in adolescent girls as well as married men in rural Jaipur, India. The researchers discovered that a very low level of girls was psychologically ready to face menarche, and the commercial sanitary napkins could not be used due to the reasons of cost, shyness, and social restrictions. In her qualitative research on adolescent schoolgirls in rural Kenya, Nyothach (2016)

has found that menstruation itself is the cause of absenteeism and school dropouts, and access to menstrual products is an additional factor that makes education difficult. According to Khanna (2005) majority of girls knew nothing about menstruation prior to menarche and what mothers or their classmates taught them about it was based on myths and prohibitions as opposed to knowledge. In a literature review, Johnson (2005) has highlighted the negativity that surrounds both traditional and feminist research on menstruation even though some studies do show some positive elements of the cultural or bodily awareness of menstruation. The imbalance highlights the stigma surrounding menstruation and use of menstrual products, which has remained constant. Altogether, these researches indicate that there is increasing awareness of menstrual health issues and the changing environment in menstrual hygiene products. Although sanitary napkins are most often used because they are most available, it has been shown that menstrual cups can be an alternative that is both reusable and sustainable and cheaper (Van Eijk *et al.*, 2021, and other research). However, there are gaps in the knowledge about user satisfaction, comfort and acceptance of culture and the actual cost comparison between these two types of menstruation products in the real world particularly in India where both modernity and culture co-exist.

Research Gap: Although there is evidence on the safety and acceptability of menstrual cups across the world, there are few empirical studies that have compared menstrual cups and sanitary napkins based on variables like user satisfaction, comfort, leakage protection, and cost-effectiveness in the Indian context. The majority of the previous research did not consider the comparative cost-benefit analyses and the experience of adult women but discussed adolescent girls and attendance at school and hygiene awareness (Hennegan, 2019; Shah, 2019). Moreover, the cultural factors, lower awareness, and the impact of demographic factors such as age, education, and income on the selection of menstrual products are insufficiently studied. Thus, this study attempts to fill these gaps through a comparative study of user satisfaction and cost-effective usage of menstrual cups and sanitary napkins among women in Kerala, a state that can be said to be literate, health conscious, and with a changing socio-cultural dynamics.

MATERIALS AND METHODS

Research Design: The research design used is the descriptive and comparative research design where the analysis and comparison is on the level of satisfaction and cost effectiveness of menstrual cups and sanitary napkins among menstruating women. The method allows conducting a systematic evaluation of the quantitative and perceptual aspects of menstrual products usage (Creswell & Creswell, 2018).

Population and Sample: The target population in the study will be menstruating women mostly students and young adults living in Vadakara City, Kerala. The sample of respondents in the research was restricted to people who were well acquainted with either of the two products of menstruation in the survey. The convenience sampling technique was applied to achieve a sample of 100 respondents, who will be selected depending on accessibility and voluntary participation (Kothari and Garg, 2019).

Data Collection Method: Primary data were gathered by use of a structured questionnaire that was administered online and face to face. The questionnaire was broken down into sections which included:

- Demographic data and menstrual history,
- Parameters of user satisfaction (comfort, leakage protection, ease of use) of both menstrual cups and sanitary napkins,
- Cost related factors, such as cost of purchase, replacement rate, and monthly expenses, and,
- The perceived cost-effectiveness and readiness to use it further.

The degree of satisfaction was measured on a 5-point Likert's scale, with an option of the most unlikely to the most likely: Very Dissatisfied, Fairly Dissatisfied, Fairly Satisfied, and Very Satisfied (Likert, 1932).

Data Analysis Tools: Data were coded and analysed using the SPSS software. The statistical methods involved the following:

- *Descriptive Statistics* (frequency, percentage, mean, and standard deviation) used to describe the demographic and satisfaction data.
- *Paired Samples t-test* will be used to compare the means of satisfaction between menstrual cups and sanitary napkins (Field, 2013).
- Lastly, *Chi-Square Test* of Independence to ascertain the relationship between demographic factors (i.e. age and income) and product preference or cost perception. The sample of 100 respondents used in the study makes the research generalized because it only captures the respondents who are mostly students and young adults and leaves out older and rural women. Data were self-reported and this might have led to recall and social desirability biases. There was no clinical assessment of the safety or health outcome of menstrual products. Furthermore, cultural, psychological and behavioural obstacles to the use of menstrual cups were not thoroughly investigated, which limited the knowledge of the non-financial variables that could determine the use and acceptance.

RESULTS AND DISCUSSION

This section includes the analysis and discussion of the data collected by the research using a designed questionnaire and the study was focused on Satisfaction and Cost Effectiveness of Menstrual Cup and Sanitary Napkins. The aim is to evaluate the user satisfaction, cost-efficiency of the two menstrual products and to determine how they correlate with some of the important demographic factors and menstrual related factors. The data has been interpreted using statistical methods like descriptive analysis, cross-tabulations and hypothesis testing.

Demographic Characteristics of the Respondents: Age, employment status, as well as monthly personal income are the demographic characteristics of the respondents. These are used in explanations of the background of the study participants as well as examining differences in the satisfaction and cost perceptions.

Demographic Overview

Table 1. Combined Demographic Profile of Respondents

Demographic Variable	Category	Frequency	Percentage
Age Group	Below 18 Years	11	11%
	18–24 Years	59	59%
	25–34 Years	19	19%
	Above 34 Years	11	11%
Employment Status	Student	58	58%
	Homemaker	15	15%
	Employed	14	14%
	Self-Employed	13	13%
Monthly Personal Income (₹)	Below 10,000	61	61%
	10,000–20,000	21	21%
	20,001–30,000	12	12%
	30,001–50,000	3	3%
	Above 50,000	3	3%

(Source: Primary data)

Discussion: Most of the respondents (59%) are aged between 18-24 years old with the majority being students (58%). A large percentage (61) stated that their monthly income was less than 10000 rupees, which is a demonstration of a young and largely dependent population group. This target market offers an appropriate foundation

on which to analyse awareness, adoption and satisfaction, regarding affordable menstrual hygiene products such as menstrual cups.

Menstrual Background of Respondents: Understanding menstrual history provides crucial context for interpreting product usage and satisfaction.

Table 2. Summary of Menstrual Background of Respondents

Variable	Category	Frequency / Mean	Percentage / Std. Dev.
Age at Menarche (Years)	Mean = 13.35	Min = 8, Max = 18	SD = 1.54
Menstrual Cycle Length	<21 Days	34	34%
	21–28 Days	49	49%
	29–35 Days	14	14%
Menstrual Health Issues	>35 Days	3	3%
	Yes	58	58%
	No	42	42%

(Source: Primary data)

Discussion: The majority of the respondents (49 percent) had a normal menstrual cycle of 21-28 days and the mean age of menarche was 13.35 years. More than half (58%) had menstrual health problems, most commonly cramps or irregular menstrual cycle. This points to the pertinence of comfort, leakage security and health factors in the satisfaction of menstrual products.

Usage Pattern of Menstrual Products

Table 3. Distribution of Menstrual Product Usage

Menstrual Product Used	Frequency	Percentage
Sanitary Napkins	60	60%
Menstrual Cup	27	27%
Both (Cup and Napkin)	11	11%
Others (Cloth/Cotton)	2	2%

(Source: Primary data)



Figure 1. Menstrual products

Discussion: Sanitary napkins are the most frequently used one (60%), and menstrual cups are applied by 27% in isolation (11%), or with the help of napkins (11%). Even 2% remain dependent on the traditional variants like cloth or cotton. This tendency presents an incremental yet encouraging transition towards sustainable menstrual products, particularly among younger, more educated users.

Satisfaction Analysis

Table 4. Comparative Mean Satisfaction Scores for Napkins and Menstrual Cups

Satisfaction Parameter	Sanitary Napkin (Mean ± SD)	Menstrual Cup (Mean ± SD)
Comfort	3.46 ± 0.94	4.76 ± 0.49
Leakage Protection	3.18 ± 0.82	4.58 ± 0.60
Ease of Daily Activity	3.27 ± 0.97	4.66 ± 0.48
Recommend to Others	3.14 ± 0.95	4.66 ± 0.63
Overall Satisfaction	3.31 ± 0.94	4.68 ± 0.52

(Source: Primary data)

Comparative Satisfaction Levels

Discussion: The findings demonstrate that there are astonishing dissimilarities in satisfaction. The menstrual cup users rated their levels of satisfaction much higher. The highest scores were recorded on comfort and ease of difficulty of daily activity (Mean = 4.7), whereas the lowest were recorded on sanitary napkins (Mean = 3.3). This is an indication that menstrual cups have better user experience which can probably be attributed to higher comfort, less leakage and convenient usage.

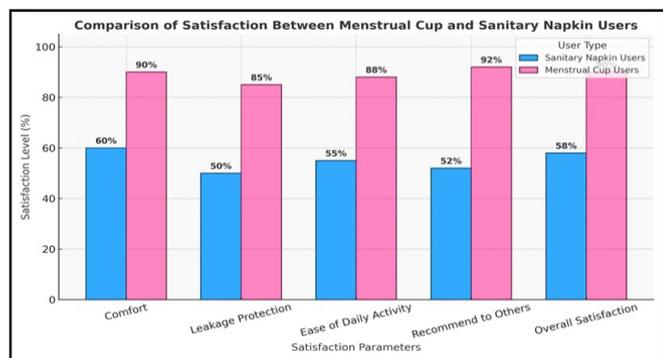


Figure 2. Users' Satisfaction Comparison between menstrual Cups and Napkins

Cost Effectiveness Analysis

Actual Cost Comparison

Table 5. Annual Cost Comparison of Menstrual Cup and Sanitary Napkin

Particulars	Menstrual Cup	Sanitary Napkin
One-time Purchase Cost (₹)	470	Not Applicable
Average Replacement Time	2 years	Monthly purchase
Monthly Cost (₹)	19.58	114
Annual Cost (₹)	235	1368

(Source: Primary data)

Discussion: Menstrual cups prove to be much more cost effective in the long run despite the high upfront cost of purchase. The lifespan of two years comes down to ₹235 per annum as compared to 1,368 in case with sanitary napkins. It proves that menstrual cups offer significant economic savings as well as environmental or convenience.

Perceived Cost Effectiveness

Table 6. Respondents' Perception towards Cost Effectiveness of Menstrual Products

Statement	Sanitary Napkin (%)	Menstrual Cup (%)
Saves More Money Overall	23	77
Better Value for Money in the Long Run	21	79
Affordable for Regular Use	22	78
Reduces Monthly Expenditure	25	75
More Cost-Effective Overall	20	80

(Source: Primary data)

Discussion: There was a solid agreement (approximately 75 to 80%) in preference of menstrual cups due to its low cost on all requirements. The respondents were admitted to admit that cups are less costly, offer greater value in the long run and save on recurrent costs. This is in line with real cost information, which proves menstrual cups are the more economically viable choice.

Hypothesis Testing and Statistical Discussion

Satisfaction Difference between Menstrual Cup and Sanitary Napkin

H1: There is no significant difference in satisfaction levels between menstrual cup and sanitary napkin.

Table 7. Paired Samples t-test Results on Satisfaction Difference

Product	Mean Satisfaction	SD
Menstrual Cup	4.04	0.91
Sanitary Napkin	3.27	0.85

Paired t-test	Value
Mean Difference	0.77
t-value	5.633
p-value	0.000
Cohen's d	0.56 (Moderate Effect)

(Source: Primary data)

Interpretation: The null hypothesis is to be rejected, since $p < 0.001$. There is a statistically significant difference between the level of satisfaction with menstrual cups and sanitary napkins, where menstrual cups are significantly better.

Association between Income Level and Perceived Cost-Effectiveness

H2: There is no significant association between monthly income level and the perceived cost-effectiveness of menstrual products.

Table 8. Users' Income and Perceived Cost effectiveness Association

Income Group (₹)	Sanitary Napkin	Menstrual Cup	Total
Below 10,000	14	47	61
10,000–20,000	4	17	21
20,001–30,000	2	10	12
30,001–50,000	0	3	3
Above 50,000	0	3	3
Total	20	80	100

(Source: Primary data) (Chi-square (χ^2) = 1.927, $df = 4$, $p = 0.749$)

Interpretation: Since $p > 0.05$, there is no significant association between income level and cost-effectiveness perception. This implies that across all income groups, menstrual cups are perceived as the more economical option.

Association between Age Group and Product Choice

H3: There is no significant association between age group and the type of menstrual product used.

Table 9. Association between users age group and product choice

Age Group	Sanitary Napkin	Menstrual Cup	Both	Others	Total
Below 18	7	3	1	0	11
18–24	38	10	10	1	59
25–34	8	10	0	1	19
Above 34	7	4	0	0	11
Total	60	27	11	2	100

(Source: Primary data) (Chi-square (χ^2) = 15.155, $df = 9$, $p = 0.087$)

Interpretation: The result indicates no significant association between age and product choice ($p > 0.05$). Adoption of menstrual cups appears consistent across age categories, suggesting awareness and preference are influenced more by personal or social factors than by age alone.

Summary of Findings

- The respondent group was mainly made up of young and student respondents who had low levels of income.
- Almost fifty percent of the interviewees had regular menstrual cycles, though half of them had health problems.
- Sanitary napkins are the leading product but menstrual cups are gaining more popularity.
- Menstrual cups were rated much higher in terms of comfort, ease and overall satisfaction.
- Obtained cost data and perceptions proved menstrual cups to be cheaper.
- There was no substantial correlation between product perception or choice and income or age.

Overall Discussion: The study highlights the fact that menstrual cups are better than sanitary napkins in the level of satisfaction of users, and cost-effectiveness. This transition to sustainable menstrual hygiene among young and educated users is being motivated by younger users. The results demonstrate that menstrual cups should be better popularized, more accessible, and accepted in order to spread its use among a wider audience.

CONCLUSION

The current study examined the satisfaction and cost-effectiveness of menstrual cups and sanitary napkins of menstruating persons in terms of demographic and menstrual-related factors. The results suggest that awareness, availability, and affordability affect the use of menstrual products and preferences and are not necessarily age or income dependant. Most of the respondents were young adults (18-24 years) and students, with majority of them having monthly income less than ₹10,000, which indicated that price and availability are decisive issues in product selection. Menstrual background data indicated that the mean age of menarche among the respondents was 13.35 years with majority having normal menstrual cycles (21-28days) although 58 percent reported having problems with menstrual health like cramps or irregular cycles. These results highlight the significance of convenient and comfortable menstrual supplies. The usage trends indicated that sanitary napkins are the most used one (60%), after which menstrual cups (27%) and dual usage are used by 11 and 2 percent respondents respectively. Traditional methods like cloth were rarely used (2%).

The analysis of the satisfaction proved that menstrual cups achieved a much higher score than sanitary napkins in all dimensions, such as comfort, leakage protection, and easiness of daily activities, readiness to recommend, and overall satisfaction. T-tests for the difference in satisfaction between the two samples showed that the difference is statistically significant ($p < 0.001$), indicating that the use of menstrual cups is more acceptable and provides a better user experience. The benefits of menstrual cups were also supported by cost-effectiveness analysis. Although this will add to the initial expenses, their reusability and longevity significantly add to monthly and yearly expenses, making them a cost effective long term investment. The real expenditure information and the perception of users indicated that menstrual cup is always considered a cheaper alternative regardless of the income status. The results of hypothesis testing showed that menstrual cups are much more satisfactory, and the level of income or age does not play a crucial role in perception and product preference, and awareness and more accessible factors are more decisive in adoption. The proposed study addresses a significant gap in research because it incorporates the quantitative indicators of satisfaction, as well as cost-based evaluation, among the varied age groups and income ranges, and offers in-depth information on the experiential and financial dimensions of using menstrual products. The results also leave new research opportunities, such as the adoption in rural or low-resource contexts, review of the ecological effects, the investigation of socio-cultural determinants, and longitudinal investigations of the health outcomes and long-term cost reduction. Comprehensively, the paper gives menstrual cups a positive review as a sustainable alternative to sanitary napkins, which

is cost-effective, highly satisfactory, and can be widely accepted with proper education, accessibility efforts, and market campaigns.

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