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ORIGINAL ARTICLE

What a Women Desire: Application of Conjoint Analysis for Analysing the Choice of Menstrual Hygiene Products and Factors Influencing Their Consummatory Behaviour

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Abstract

Background/Aim: Middle-aged adolescent girls and women experience menstruation, a normal and physiologic occurrence. Using the myths and beliefs that were already prevalent, they created their own approach of dealing with the menstrual cycle. Aim of this study was to examine women's readiness to purchase any sanitary product by examining their preferences for the characteristics of sanitary goods used during menstruation.

Methods: The utility values and relative weights assigned to various aspects, such as comfort, efficacy, hygiene, etc, have been determined through analysis. Two hundred and ten women who lived on the campus of the Banaras Hindu University were questioned. The demographic features of the respondents, the attributes with their corresponding levels and the relationship between these qualities and the type of approach employed over time were explained using descriptive and Chi-square techniques. Conjoint analysis was employed to ascertain utility value and elicit preferences.

Result: Following investigation, findings indicate that synthetic sanitary napkins were used by women more frequently than any other menstrual hygiene products and that inaccessibility and cost were the main barriers to sanitary product use. Demographic factors and the type of sanitary product used, as well as knowledge of innovative methods of menstrual hygiene, were found to be strongly correlated. The results also showed that women place the least value on hygiene and the most value on the type of sanitary product.

Conclusion: Women preferred to choose any synthetic sanitary product that is more efficient, safe, pleasant and economical and does not require replacement in less than four hours.

Key words: Menstruation; Menstrual hygiene products; Multilevel analysis; Cost-benefit analysis.

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Introduction

Menstruation is a natural biological process that starts when a girl is in her middle adolescence (ie 13-16 years) and could last for 2-7 days.[1, 2] Menstruation is also a physiological maturity of a female. Menstruation is derived from Mensis which signifies monthly occurrence.[1] *Menarche* is considered a milestone in a woman's life as it signifies the onset of a healthy reproductive cycle and the onset of reproductive capacity, it also points to the transition from girlishness to femininity.[1, 3] Globally

conducted studies show that adolescent girls are unaware and are not well prepared about menstruation and as a consequence of this lack of information girls are in a situation where they have to deal with different emotions including fear, guilt, anxiety and embarrassment which make it even worse.[1, 3, 4] Lack of information and awareness, emotional support, social-cultural support and involvement of men are some of the main reasons for negligence on the topic of menstruation. Suzanne et al. during a study in Australia found that the source of information is their mothers but for most of them (51 %) the provided information was not sufficient.[5]

In the era of feminism, there exist several myths that associate menstruation with impurity and a girl is treated as impure. In a cross-sectional study carried out in the village of Pondichery two-thirds of respondents agree with the myth that menstruating blood is dirty and more than 90 % say yes to the question of whether entry in the kitchen, sleeping in bed should be prohibited while 100 % of them agreed that women should not be allowed to enter temples during these days.[6] While exploring the experiences of boys in Taiwan, Chang raised an issue that no one was willing to talk about menstruation and its related problems for boys. The same problem was revealed by women of Nigeria during a focus group discussion.[7, 8] A study in Malawi revealed that men were clueless about menstrual products and related problems.[8, 9] The topic of menstruation hygiene whirls around the idea of impure, taboo and restrictions in a woman's life in India hence it is barely talked about and is kept under an overall silence making the experience of a girl even more traumatic.[2] Men and women should keep their shyness and awkwardness aside and start talking about menstruation and hygiene openly.

Having access to sufficient sanitation services, access to clean water to wash the used cloth, a place to dry it, access to a private place for changing the used cloth or sanitary pad, facilities for safely disposing of the used cloth or pad, information regarding menstrual cycle are some of the basic priorities for a woman to be able to manage menstruating days effectively and hygienically and with dignity.[10]

The traditional way of managing menstrual bleeding in low and middle-income families is the use of old clothes, cotton, paper, etc which have unreliable levels of absorbency and infection issues. The women of low and middle-income families struggle to maintain good menstrual hygiene.[11] A sanitary pad is a much safer and hygienic option for girls and at the same time, it is more comfortable but at a higher price as compared to the cloth.[7, 8] Sukankara et al. determined that women focused on odourless and soft surface sanitary napkins in addition to the absorption properties such as leakproof and dryness. One of the main reasons for these struggles is the lack of affordable sanitary products. Poor menstrual hygiene can cause serious health risks like reproductive and urinary tract infections which can result in future infertility and birth complications.[11] In urban areas, women can easily buy sanitary napkins from chemists, pharmacies and general stores however, in rural areas, women use unhygienic products due to lack of unavailability, awareness and non-affordability.[12] To feel free during periods any woman would want an absorbent that is more effective and cost-efficient for her.[5, 12]

Women need clean, comfortable and dependable materials; they also need access to private, safe and secure disposal facilities; they need soap and water for purposes other than bathing and they need privacy for all menstruation-related activities, not just changing. It was also found there are needs for pain management, social support and an enabling sociocultural context that go beyond the current categorisation.[13]

Several other menstrual absorbents are also introduced in the business such as reusable sanitary pads, tampons, menstrual cups, etc. These products are any day better than a piece of cloth or rag, much more hygienic and comfortable but with all this goodness it comes with a very high cost. Gautam et al. analysed that a blue-collar worker will choose to purchase a sanitary napkin with wings, a long length and a good capacity for absorption and customers won't stick with if they have a terrible or neutral feeling about product, which might mean they weren't comfortable using it or had a bad past encounter. They may occasionally purchase goods, but if they find a competitor's product to have superior features or to be more comfortable, they won't think twice about switching.[14]

Suzanne et al. evaluated that the majority of women used sanitary pads during periods and 34 % used tampons while 85 of those using sanitary pads are worried about their cloth getting

stained. In the same study, 26 % of women had the intention to switch to tampons soon or later as tampons are more comfortable, odourless more effective and also allow girls to participate in sports activity and swim also.[5]

Aim of this study was to examine women's readiness to purchase any sanitary product by examining their preferences for the characteristics of sanitary goods used during menstruation.

Methods

Study site and source of data

The conclusion of this study has been assisted by a primary survey carried out at Banaras Hindu University, Varanasi, Uttar Pradesh, India. A two-stage stratified sampling design was used in this investigation. Six hostels (Sarojini Naidu Girls Hostel, Gargi Hostel, New PhD Girls Hostel, Triveni Complex, Maitreyi hostel, Sukanya Girls Hostel) were chosen in the first phase and 210 respondents were chosen in the second. Only female participants who are at least 15 years old and have ever gone through menstruation were chosen for this study.

The information was gathered using a standardised questionnaire that included detailed questions on the factors of interest in addition to basic and descriptive inquiries. To paint a picture of the preferences and profile sorting of female consumers, pilot research including 15 females was conducted prior to the data collection.

Nine of the categories concerned general characteristics, such as sex, age, degree of education, type of residence and other elements of participants that can affect an individual's understanding of and opinions about menstruation. The knowledge of menstruation and the preference of the product was assessed using thirteen combinations.

A descriptive analysis was presented to analyse the socio-demographic characteristics of the women that took part in the study. To find out the existing relationship between different variables bivariate analysis has been applied. To understand the preference pattern among the interviewed women conjoint analysis approach has been adopted.

Conjoint analysis approach

Conjoint analysis is a technique where a marketer identifies the possible combinations of several attributes and determines the utilities attached to each level of the attribute and also defines the relative importance adhered to different attributes.[15] Using conjoint analysis researchers can provide answers to questions such as which attributes are important to the consumer and which levels of attributes are most desirable for the consumers.[15-17]

Phases of conjoint analysis:

Phase 1. During the establishment of a conjoint analysis problem, identification of all the attributes and their respective attribute level is necessary and the selection of attributes should be such that they influence the customer preference and their shopping behaviour. For this study, the attributes were identified through discussion with experts, pilot study and literature review. The present study examines the influence of six attributes on women's purchasing behaviour.[15, 17]

Phase 2. Pair-wise and full-profile procedures are two approaches for constructing conjoint analysis. Pair-wise approach respondents evaluate two attributes at time until all the possible pairs of attributes have been evaluated. In the full-profile approach, complete profiles of branches are constricted for all the attributes however it is not feasible to evaluate all the possible combinations hence the number of combinations is reduced using different designs. In pair-wise procedure, cyclical design and in full-profile approach fractional factorial design (orthogonal array) is used to reduce the possible combination that will be used in the analysis. For the current study, if all possible sets of combinations were considered in the study ie (2 x 2 x 2 x 2 x 2 x 5 = 160) then it will be a cumbersome process. In this study, 16 design cards involved in the analysis and 6 holdout cards not involved in the analysis and the conjoint analysis was performed.[15]

Phase 3. To find out the preference or intention to buy any product is the main objective of conjoint analysis and this intention can be shown by providing ranking and ratings. Women can rank and rate their preferences and based on that input data is classified as non-metric or metric. For non-metric respondents rank the possible combinations while ratings are provided in metric data.[15]

The elementary conjoint model is represented as following:

$$U(X)=\sum_{i=1}^{m}\sum_{j=1}^{k_i}u(a_{ij})x_{ij}\ \ (i=1,2,...,m)(j=1,2...,k) \quad (1)$$

Where, *U(X)* = total utility of a combination

$u(a_{ij})$ = utility – related with the jth level of ith atribute

m = number of attributes included in the cojoint analysis

k_i = number of levels of any attribute

$$x_{ij}=\begin{cases}1, if\ j^{th}\ \text{level of}\ i^{th}\ \text{attribute is present}\\0, \text{otherwise}\end{cases}$$

The range of part-worth utility over the levels of an attribute is regarded as the importance of any attribute and is defined as

$$I_{a_i}=\{\ \max(u(a_{ij}))-\min(u(a_{ij}))\ \}\ \text{for each}\ i \quad (2)$$

and Relative importance or Importance score is defined as

$$RI_{a_i}=\frac{I_{a_i}}{\sum_{i=1}^{m}I_{a_i}} \quad (3)$$

The results obtained from the conjoint analysis study provide two important kinds of information:[15]

1. Part-worth utility, is a numerical value that describes the utility attached to the level of each consumer.

2. Relative score also known as Importance relative score, indicates or estimates which attributes are important in influencing consumer choices or it shows which attributes of a product or service are more or less important when a purchasing decision.

Results

The method used during the menstrual period had 5 levels: organically prepared napkins, sanitary pads, cloth, tampons and menstrual cups. The rest of the attributes were hygiene, effectiveness, comfort, price and longevity. Each had two levels.

Table 1 represents the demographic characteristics of the respondents. The data has been collected based on eight demographic characteristics such as age, type of residence, education qualification, religion, caste, marital status, job status and family income. The distribution of the respondents according to the mentioned characteristics is given in Table 2.

Table 1: Demographic characteristics of studied population

Variable	N (%)
Age group	
15-20	12 (5.7 %)
20-25	90 (42.8 %)
25-30	85 (40.4 %)
30-35	23 (10.9 %)
Residence	
Urban	102 (48.5 %)
Rural	108 (51.5 %)
Education	
≤ 12th grade	34 (16.1 %)
Graduation/PG	103 (49.0 %)
Research scholar	73 (34.7 %)
Religion	
Hindu	155 (73.8 %)
Muslim	48 (22.8 %)
Others	7 (3.3 %)
Caste	
General	76 (36.1 %)
OBC	69 (32.8 %)
SC	50 (23.8 %)
ST	15 (7.1 %)
Marital status	
Unmarried	122 (58.0 %)
Married	88 (41.9 %)
Job status	
Employed	13 (6.1 %)
Unemployed	61 (29.0 %)
Student	136 (64.7 %)
Family income	
< 10,000	7 (3.3 %)
10,000-20,000	40 (19.0 %)
20,000-50,000	121 (57.6 %)
50,000-100,000	42 (20.0 %)

SC: Scheduled castes; ST: Scheduled tribes; OBC: Other backward class; PG: postgraduate;

Table 2 and Table 3 show the result of the bivariate analysis (Chi-square test). Both Table 3 and 4 examine the relationship between the socio-demographic characteristics of the respondents with the type of method used during the menstrual period and the knowledge about new methods of menstrual hygiene respectively. From the table, it can be inferred that for all characteristics such as age, education, residence, religion,

Table 2: Dependence between background predictors and type of used sanitary product

Parameter	X^2_{cal}	X^2_{tab}	Conclusion
Age x method used during the menstrual period	62.27	12.59	Significant
Education x method used during the menstrual period	86.76	9.49	Significant
Residence x method used during the menstrual period	21.02	5.99	Significant
Religion x method used during the menstrual period	14.26	9.49	Significant
Caste x method used during the menstrual period	36.37	12.59	Significant
Marital status x method used during the menstrual period	7.29	5.99	Significant
Job x method used during the menstrual period	32.35	9.49	Significant
Income x method used during the menstrual period	59.84	12.59	Significant

Note: p-value < 0.05;

Table 3: Dependence between background predictors and knowledge about new methods of menstrual hygiene

Parameter	X^2_{cal}	X^2_{tab}	Conclusion
Age x knowledge about new methods of menstrual hygiene	12.65	7.81	Significant
Education x knowledge about new methods of menstrual hygiene	14.92	5.99	Significant
Residence x knowledge about new methods of menstrual hygiene	17.04	3.84	Significant
Religion x knowledge about new methods of menstrual hygiene	13.83	5.99	Significant
Caste x knowledge about new methods of menstrual hygiene	35.42	7.81	Significant
Marital status x knowledge about new methods of menstrual hygiene	19.35	3.84	Significant
Job x knowledge about new methods of menstrual hygiene	30.59	5.99	Significant
Income x knowledge about new methods of menstrual hygiene	28.37	7.81	Significant

Note: p-value < 0.05;

caste, job, marital status and income the results were statistically significant. The method used during the menstrual period and the knowledge about new methods of menstrual hygiene was dependent on age, education, residence, religion, caste, job and income.

This study also unfolds what were the menstrual hygiene products that a woman desires to use during menstruation and the major reason why women are not able to use them. Table 4 discusses 52.2 % of women want to switch to better eco-friendly sanitary products that includes menstrual cups, tampons and organically prepared sanitary napkins. A 23.8 % prefer any product according to their past experiences and hence they were not switching as they were comfortable in using their regular method, however, 49.5 % were not able to use it as they were afraid to use the new method due to different myths regarding these products. Due to a lack of accessibility and non-affordability, 17.6 % and 9.0 % of women were deprived of their desired needs.

Higher utility implies greater preference ie that attribute level has the highest impact or greatest influence on women.

Table 4: Dependence between background predictors and knowledge about new methods of menstrual hygiene

Parameter	Reason for not using the desired method				Overall
	New/desired methods are costly	Not available in nearby markets/ areas	Afraid to use any new method	Comfortable with my currently using method	
Desired method					
Organically prepared napkins	6	1	0	2	9 (4.2 %)
Sanitary napkins	1	27	25	41	94 (44.7 %)
Cloth	6	0	0	0	6 (2.8 %)
Tampons	3	1	23	3	30 (14.2 %)
Menstrual cups	3	8	56	4	71 (33.8 %)
Total	**19 (9.04 %)**	**37 (17.6 %)**	**104 (49.5 %)**	**50 (23.8 %)**	**210 (100.0 %)**

Table 5: Utility value estimates

Attribute	Levels	Utility estimate	Relative importamce
Type of menstrual hygiene products	Organically prepared napkins	-0.486	0.549
	Sanitary napkins	4.459	
	Cloth	-2.934	
	Tampons	0.538	
	Menstrual cups	-1.577	
Hygiene	Hygienic/safe	0.211	0.016
	Hygienic/less safe	0.422	
Effectiveness	More effective	-2.867	0.215
	Less effective	-5.734	
Comfort	More comfortable	-1.119	0.083
	Less comfortable	-2.238	
Price	Affordable	-1.724	0.128
	Costly	-3.448	
Continuation	> 4 hour-changeable products	-0.142	0.011
	< 4 hour changeable products	-0.283	

Table 6: Preferred ranking scenarios for women

Combination	Preferred ranking scenarios for women						Total utility	Rank
1	Cloth	Safe	More effective	More comfortable	Affordable	> 4 hour	7.230	11
2	Cloth	Less safe	Less effective	Less comfortable	Affordable	< 4 hour	3.322	15
3	Organically prepared napkins	Safe	More effective	More comfortable	Affordable	> 4 hour	9.686	6
4	Organically prepared napkins	Safe	More effective	More comfortable	Costly	> 4 hour	7.962	9
5	Organically prepared napkins	Less safe	Less effective	Less comfortable	Affordable	< 4 hour	5.770	14
6	Sanitary napkins	Safe	More effective	More comfortable	Affordable	> 4 hour	14.631	1
7	Sanitary napkins	Safe	More effective	More comfortable	Costly	> 4 hour	12.907	3
8	Sanitary napkins	Less safe	More effective	More comfortable	Costly	> 4 hour	13.118	2
9	Sanitary napkins	Less safe	Less effective	Less comfortable	Affordable	< 4 hour	10.715	4
10	Tampons	Safe	More effective	More comfortable	Affordable	> 4 hour	10.710	5
11	Tampons	Safe	More effective	More comfortable	Costly	> 4 hour	8.986	7
12	Tampons	Less safe	More effective	Less comfortable	Costly	< 4 hour	7.937	10
13	Menstrual cups	Safe	More effective	More comfortable	Affordable	> 4 hour	8.595	8
14	Menstrual cups	Safe	More effective	More comfortable	Costly	> 4 hour	6.871	12
15	Menstrual cups	Less safe	More effective	Less comfortable	Costly	> 4 hour	5.963	13
16	Cloth	Less safe	Less effective	Less comfortable	Costly	< 4 hour	1.598	16

Part-worth utilities are presented in Table 5, these were the numerical values representing how much each attribute level influence women's decision while making their choices. Higher utility implies greater preference ie that attribute level has the highest impact or greatest influence on women. The highest utility was by the level of sanitary napkins (4.459) ie sanitary napkin is women's greatest preference for methods used during the period and lowest preference is for cloth (-2.934) illustrating that it was the least preferred method among women. As it has been observed a negative relationship existed between utility and price and for the attribute level costly (-1.724) was low compared to the attribute level affordable (-3.448) and thus methods with low cost were preferred over high cost. As expected for the attribute effectiveness, comfort and longevity as compared to the attribute levels such as less effective, less comfortable, < 4 hours had less utility and were more preferred choices for women with higher utility. Less hygienic methods had higher utility than more hygienic methods. Table 6 also presents the relative importance score of each attribute indicating which attribute influenced women most and least during the decision-making process while purchasing any sanitary product. Type of menstrual hygiene products had the greatest influence on women with a relative importance of 0.549 followed by effectiveness and price and one of the least influencing attributes was hygiene. Hence it can be concluded that women involved in this study were more sensitive toward the more 'type of menstrual products' and 'hygiene' bothered them the least.

Since each utility is expressed in the same unit, the overall utility of any combination can be estimated using following:
Total utility = Sum of individual part - worth utilities

For example, the total utility of the combination {menstrual cups, more hygienic, more effective, more comfortable, affordable, > 4 hours} is expressed as:

Total utility = utility (menstrual cups) + utility (more hygienic) + utility (more effective) + utility (more comfortable) + utility (affordable) + utility (> 4 hour) + constant
Total utility = (-1.577) + (0.211) + (-2.86) + (-1.119) + (-1.724) + (-0.142) + 15.813
Total utility = 8.595

Table 6 shows the order of preference attribute to the 16 suggested combinations. From the table, it can be interpreted that the combination of {sanitary napkins, more hygienic, more comfortable, more effective, < 4 hours and affordable} had the highest utility value of 14.631, and the combination with {cloth, less hygienic, less comfortable, less effective, > 4 hours and costly} had the lowest utility value of 1.598. Combinations with higher preference showed that women were finding more value in that and that combination of any menstrual hygiene products was most desirable over any of the other menstrual hygiene products combinations.

Discussion

It is a known fact that menstrual hygiene products and awareness regarding such products are fundamentally necessary for a woman but the fact that these products are very harmful to the environment cannot be disproved. From this study, it can be clearly seen that most of women were using sanitary napkins while they were menstruating but only 4.2 % of them were using organic sanitary napkins while 44.7 % of the women were using synthetic sanitary napkins as they are harmful to the environment as they are made up of non-biodegradable components which take a long period time to decompose. Many eco-friendly sanitary products such as menstrual cups, tampons, organic sanitary pads, etc are available in the market but people are less aware of these products. Lack of accessibility and high cost is one of the major reasons for not using these products. A significant impact of socio-demographic predictors (age, education, type of residence, religion, etc) can be seen on the type of method used during the menstrual period, revealing a powerful association between the type of product used and demographic characteristics.

This research throws light on the reason behind not switching to environment-friendly sanitary products. It is found that 52.2 % of them wish to switch to environment-friendly menstrual hygiene products but on the other hand, it can be seen that 49.5 % of women were afraid to use any new method because of several myths and 26.6 % of them were unable to use their desired method because of non-availability and non- affordability.

This research concludes with the menstrual product consumption preference pattern. This information is foregathered to put forward relevant facts and figures to the sanitary product producer.[11] In addition to this it also reveals the most important or most preferred requirements for a woman in any sanitary product. It was found *via* the survey that out of all the available menstrual hygiene products, synthetic sanitary pads were most preferred and between the other attributes absorptivity, comfort and low cost, also heavily influence the purchasing behaviour of any woman. However, an alarming situation was seen when women give more preference to less hygienic products over more hygienic products due to their low cost. Less hygienic preference may cause various vaginal infections. Hence here the sanitary napkin market fails or disappoints women as women's preference is a synthetic sanitary pad and less hygienic products that are harmful to the environment as well as women's health.[18] Thus, regardless of how environment-friendly and hygienic the product is if the price is high women will hesitate to buy that product.

In this study, type of product was considered as the most important attribute and hygiene was the least important attribute. A woman will find it easy to purchase a synthetic sanitary napkin that is more effective, safe, more comfortable, affordable and which need not be changed in less than four hours as it has the highest utility of 14.63 among all the other ranking scenarios.

This study suggests that the government should encourage the use of new methods of menstrual hygiene and conduct various awareness pro-

grams so that the myths can be broken and women are encouraged to switch to these eco-friendly products without hesitation and fear which is good for the environment and their health as well. The findings have theoretical ramifications for emerging markets. Entrepreneurs in the menstrual product industry might benefit from the study's findings as they offer a comprehensive understanding of the market.

Conclusion

The study produced a number of significant discoveries. The current study helps to shed light on the variables that influence women's desire for menstrual hygiene products as well as the reasons why certain women were unable to utilise them. This survey also examined women's awareness of the recently released environmentally friendly feminine hygiene products. It was found that type of product was considered as the most important attribute and hygiene was the least important attribute. A woman will find it easy to purchase a synthetic sanitary napkin that is more effective, safe, more comfortable, affordable and which need not be changed in less than four hours as it has the highest utility of 14.63 among all the other ranking scenarios. A comprehensive approach should be used to target the easily accessible and reasonably priced environmentally friendly products for women, allowing them to focus on other activities while using the items they desire and experiencing menstruation.

Ethics

Our institution does not require ethics approval for reporting observational studies with anonymised data. Written informed consent was obtained from participants prior to their participation in the study and for publishing of the anonymised data.

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Conflicts of interest

The authors declare that there is no conflict of interest.

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Data access

The data that support the findings of this study are available from the corresponding author upon reasonable individual request.

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