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Smruti Bulsari
University of Essex

Kiran Pandya
Veer Narmad South Gujarat University

Jayesh Desai
BRCM College of Business Administration

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Abstract

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Keywords

Health economics, consumer choice, economic cost, explicit cost, public health

Cost of Menstrual Hygiene Practices in Gujarat, India

Smruti Bulsari¹, Kiran Pandya², Jayesh Desai³

¹University of Essex

²Veer Narmad South Gujarat University

³BRCM College of Business Administration

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The study is undertaken in Gujarat (India), from a cross-section of districts (developed, developing and tribal), and also a cross-section of socioeconomic status and age. A total of 1025 responses are collected and analysed to get insights into product preferences and resultant cost. The study finds that it is economical to make use of menstrual cups, however, cultural constrains might restrict its use.

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Background

Choice of menstrual products is crucial to menstrual hygiene. Economics explain how choices are made. However, standard classical economics theory suggest that a rational woman would optimizes her choice (and the resultant utility), subject to budget constraint. Choices are further constrained by the information set about the product, and access to the products. Findings of earlier studies from different disciplines tell different stories. Choice of menstrual product could be better explained by behavioural economics. Theories of behavioural economics suggest that an individual does not always attempt at maximizing her utility, rather she may maximize the utility of others, within her budget constraints. Such choices are termed as "other-regarding preferences". The social conditioning of a woman drives her choice in favour of the products for family consumption over those for her individual consumption, given her budget constraint, and choice of menstrual products is no exception.

Menstruation is one such health condition that is experienced by a woman every 28 days, for almost a two-third of her life. The inner lining of the uterus is shed, which results in bleeding. This blood requires to be soaked by some absorbent, since a woman sheds 60 millilitres (2.7 ounces) of blood, that is equivalent to one and a half shot glasses full [InformedHealth.org (Internet), 2017]. Moreover, it is important to look after the vaginal hygiene during menstruation since, it becomes more susceptible to infections during the menstrual cycles. Therefore, choice of product to and the way it is used to soak blood is important to ensure vaginal hygiene.

The information asymmetry about menstrual products arises out of the limited choice set comprising of the products available in the vicinity of the girl's / woman's residence. Education, media and the activities of non-governmental organizations (NGOs) help in reducing this information asymmetry to some extent. Many small and large-scale NGOs have been active in spreading awareness about menstruation, menstrual products and hygiene associated with menstrual product practices. They also work towards selling menstrual hygiene products, mainly sanitary napkins, either at subsidized rates or for free. In some areas, even government institutions like Anganwadis¹ and ASHA² workers help reducing information asymmetry and increasing the affordability (by providing the sanitary napkins at subsidized rates). Online shopping platforms also help in reducing the information asymmetry and also in increasing access to a wide range of menstrual products. However, online platforms cater only to those women who have access to smart phone and internet. Also, online buying requires planning in advance. So, in case of emergency requirement of an absorbent, a nearby local store appears to be the most convenient place to buy the menstrual product. Online orders are restricted by the locations served by those online selling platforms (like Amazon, Flipkart, BigBasket etc.).

In case where the menstrual product is sold at subsidized rates by the Government or the NGO, the state / NGO bears that proportion of the cost. In absence of availability of any such subsidized menstrual products, the entire cost is required to be borne by an individual (the woman / the girl). Therefore, an effort is made to understand and estimate the costs of menstrual hygiene, as it would give insights into an individual's affordability of menstrual product. This estimation can also give insights to the policy makers about pricing the product, determining the subsidy amount, or making it available for free to women of lower socioeconomic strata. Estimating the explicit cost of a health care product can be helpful to the policy makers in terms of subsidizing the products, making available different products at subsidized rates, developing an awareness campaign etc.

The choice of menstrual product constitutes the direct cost. Indirect cost of menstrual hygiene is derived from menstrual hygiene practices like regular cleaning of the private parts and thorough washing of hands after using the washroom. This also requires using some disinfectant / antiseptic / soap / intimate hygiene product to clean the private parts, and disinfectant / antiseptic / soap / hand wash / hand sanitizer etc. to wash the hands. The cost of these products comprises the indirect cost component of explicit cost of menstrual hygiene. On the other hand, non-adherence to hygiene can result in infections and diseases, and menstruation is no exception. This, constitutes the implicit cost of menstrual hygiene. However, this paper focuses on the methodology and estimation of explicit cost of menstruation.

This paper is organized in six sections: Section 2 describes the methodology of the study, with a focus on data collection approach, adapted to the COVID-19 pandemic situation. It would be important to state that the survey exercise was undertaken while the first wave of COVID-19 pandemic was at its peak and hence, the methodology for collecting data had to be adapted to suit the unforeseen circumstances. Section 3 discusses the menstrual hygiene practices in terms of product awareness and usage pattern of menstrual products. This section also examines whether the socioeconomic background has any influence on the choice of menstrual products. Section 4 describes the methodology to estimate yearly direct cost of menstrual hygiene and also provides an estimate of the yearly cost. Section 5 describes the methodology of estimation of indirect cost of menstrual hygiene and provides a yearly estimate for the same, and section 6 summarizes and presents a brief note on policy implications.

¹ Anganwadi means "a courtyard shelter" and are government facilities that work primarily towards addressing the nutritional needs of women and children.

² ASHA, an acronym for Accredited Social Health Activists, are community female health workers appointed by the government. ASHA literally means "hope".

Methodology of the Study

This study is conducted in the state of Gujarat in India. Gujarat is a coastal state and shares an international border with Pakistan on its northern boundary. Gujarat has one of the strongest economic fundamentals among the states of India; it contributes 7.99% share to the GDP, 16.8% share of industrial output (the highest in India), with just 4.99% population of the country. Gujarat also has the lowest unemployment rate [Government of Gujarat, 2020].

The sampling frame for this study is: menstruating women in the age of 14 to 49 years; the average age of menarche is 13.76 years [Pathak et al., 2014] and the average age of menopause is 46.2 years of Indian women and it is 51 years for the women from the western countries [Ahuja, 2016]. It is imperative to state here that though the age range of girls / women for the sampling frame is 14 to 49 years, the sampling frame included only those women who were menstruating at the time, when the survey was undertaken. This is because the study focuses to get insights into current menstruation practices, and the resultant cost. Therefore, women who have already entered the menopause or those girls who have not reached menarche, despite being in the given age range, were excluded. This is because the details of practices and allied cost for the women in menopause would not give a comparable estimate with those who currently menstruate. Moreover, women in the menopausal phase would have different sets of health issues, which would differ from those women who are still in the menstruating phase. The question of practices and allied cost doesn't arise for the girls who have not yet entered their menarche. Therefore, the sampling frame consisted of women in the age of 14 to 49 years and those who were menstruating at the time of the survey.

The survey was undertaken in four phases, over a period of six months: (1) in-depth interviews of gynaecologists and women doctors, (2) administering questionnaire on the respondents sampled from the sampling frame, (3) focus-group discussions (FGDs) and in-depth interviews of girls / women to get deeper insights into the hygiene practices and the reasons for adopting the same, and (4) in-depth interview of ASHA workers / healthcare professionals to get their opinion on the extent of awareness and hygiene practices adopted by girls / women, and to triangulate the findings derived from the data collected through questionnaire. The data for cost estimation is based on the second phase of the survey.

The questionnaire was designed, primarily on the basis of responses received from the gynaecologists / women doctors, in the first phase of the survey. The insights derived from reviewing the existing literature on menstruation hygiene and practices were also incorporated in the questionnaire design.

The questionnaire is designed to include questions on (1) awareness, beliefs and taboos, (2) practices during menstruation, and (3) explicit and implicit cost of menstrual hygiene (or otherwise). The questionnaire is organized into 9 modules; module 1 is designed to capture the socioeconomic profile of the respondents, and modules 6 and 7 seek information on direct and indirect cost of menstrual hygiene respectively.

The questionnaire was administered on 1050 girls / women from across Gujarat, mainly from Surat, Vadodara, Anand, Tapi and Navsari districts. Different approaches had to be adopted to minimize disruption in the data collection activity because of the pandemic. This ranged from online self-administering of questionnaires by sharing the link, to questionnaires administered over telephonic / WhatsApp calls and recording of responses by trained field investigators through the online link. After the relaxation of the lockdown, some questionnaires were administered offline by trained field investigators in their local areas. After, data cleaning 1025 responses were retained. Change in data collection approach also resulted in changing the sampling method. The selection of respondents for online self-administered questionnaires was done through Respondent Driven Sampling (RDS) method. RDS is akin to and a development

over network sampling. Network sampling is a variant of snowball sampling, which differs in the intensity of acquaintance of the referrals, while both snowball and network sampling designs use random sampling for the first stage respondents [Goodman 1961; Granovetter 1976]. RDS employs convenience sampling at the first stage and is largely used for samples that are difficult to approach [Handcock and Gile 2011]. The questionnaires administered (over telephonic / WhatsApp call as well as face-to-face) adopted the originally planned multi-stage sampling approach.

In the original multi-stage sampling approach, the first stage stratum were districts, second stage stratum was the region (rural / urban). In each stratum, girls / women belonging to different age-groups, socioeconomic strata and level of education were selected, though convenience sampling was adopted in the third level.

Menstrual Hygiene Practices

The extent of information asymmetry is reflected by examining the awareness of women about the varieties of menstrual products available in the market. As discussed earlier, information asymmetry and availability of products in the vicinity are the determining factors for the choice of menstrual product, over and above budget constraints. This section examines the extent of awareness of respondents about the menstrual products available in the market, and the pattern in menstrual products used by them.

The awareness of the respondents about the available menstrual products for soaking menstrual blood is given in Figure 1 (a) and the percentage of respondents who are aware about the disposable sanitary napkins being made available by the government at subsidized rates are shown in Figure 1 (b). This study examines the awareness of the respondents about disposable sanitary napkin, menstrual cup, tampon, cloth (torn from old saree) and cotton pads¹.

There is almost equal awareness about disposable sanitary napkin (45.75 per cent), cloth (43.70 per cent) (from old saree), and cotton pads (47.12 per cent) among the respondents of this study. Relatively fewer respondents are aware about menstrual cup (19.51 per cent) and tampon (16 per cent). The distribution of menstrual product awareness among the respondents can be seen in Figure 1. It is likely that any respondent would be aware about more than one menstrual product and hence the percentages total up to more than 100 per cent. Figure 1 (b) shows that 51.22 per cent respondents, out of 1025, are aware that the government is distributing disposable sanitary napkins at subsidized rates.

Reduced information asymmetry helps a woman making a more informed choice about menstrual product. The hygiene issues associated with each of the menstrual products are:

The absorbent in case of disposable sanitary napkins is made up of superabsorbent polymer (made from sodium polyacrylate) granules and fluff cellulose, which are encapsulated by cellulose or (nonwoven) polypropylene [Bae et al., 2018; Woeller & Hochwalt, 2015]. Polymeric materials used in disposable sanitary napkins are identified as potential carcinogens [Earls et al., 2003].

Keeping tampons for longer hours could cause rashes while pulling it out since it would be drenched with menstrual blood; in extreme cases, it could result into toxic shock syndrome (TSS)³ [Santos-Longhurst, 2020].

³ "Toxic shock syndrome is a rare but serious medical condition caused by a bacterial infection. It is caused when the bacterium called *Staphylococcus aureus* gets into the bloodstream and produces toxins." (Higuera, 2018).

Both sanitary napkins and tampons are required to be changed, usually between four to six hours. However, if these are used longer than six hours, could result in rashes and vaginal infection, as a dampness due to excess blood results in breeding of bacteria and fungus.

Cloths from sarees is that if they are not properly washed and dried in open space or sun, it would not be completely disinfected. These clothes could then become breeding ground for bacteria and possible cause for bacterial infection. If detergent is not completely washed off, such cloths may also cause rashes in private parts.

Figure 1: Awareness about Menstrual Products



(a)



(b)

Figure 2: Types of Cotton Pads



(a)



(b)



(c)

Source:

<https://images.app.goo.gl/aCFWhNVwPALhv27U6>, accessed on March 28, 2021

Source:

<https://images.app.goo.gl/YufSqqrFKEVqmfkF7>, accessed on March 28, 2021

Source:

<https://images.app.goo.gl/S317t2mXe8S4Pik58>, accessed on March 28, 2021

If disposable sanitary napkins and tampons are changed at stipulated intervals, usually between four to six hours, they would be relatively hygienic. Therefore, assuming the use of disposable sanitary napkins and tampons as per the hygiene norms, they turn out to be relatively hygienic compared to cloths from old sarees, that are reused after washing and not adequately dried in the sun.

The usage pattern of the menstrual product that are normally used by girls / women to soak menstrual blood is shown in Figure 3: a majority (58.34 per cent) respondents use disposable sanitary napkins. This is followed by cotton pads (28.88 per cent) and cloth from old saree / old cloths (10.44 per cent). Menstrual cup and tampon users are very few, 1.17 per cent and 0.88 per cent respectively. However, even today, there are 0.10 per cent women who use natural materials like mud / cow dung / leaves to soak menstrual blood and still higher percentage (0.20) use nothing to soak menstrual blood. These are those women / girls who are trained by their mothers to hold menstrual blood from flowing and they regularly go to the toilets / place for urination during period, to discharge their menstrual blood.

Figure 3: Product Normally Used to Soak Menstrual Blood



Usage pattern depends on information set / asymmetry about the available products and also the personal disposable income. Information about products could be dependent on the extent of education, nature of occupation, region (rural / urban) of residence and the extent of development (developed, developing, tribal)⁴ districts to which the respondents belong.

Age and marital status could also influence the choice of products. Incisive products are menstrual cups and tampons might not be preferred by unmarried women because of cultural reasons / constraints. Hence, two regressions are performed to examine the impact of exposure and income on the nature of product. Here, menstrual cups, disposable sanitary napkins and tampons are clubbed as “high hygiene value” products and the rest as “low hygiene value”. A binary logistic regression examines the influence of exposure and income on the choice of high versus low hygiene value products. The results of these two regressions are given in Table 1:

The “Estimates” in Table 1 are the ln(odds) of “high hygiene value”. These are converted to odds by taking an exponent of the ln(odds) and they are further converted to using eq 1:

⁴ The extent of development (developed versus developing) is based on the extent of urbanization of a given district. The districts with more than 50 per cent tribal population are considered to be tribal districts.

$$\frac{\text{odds}}{(1 + \text{odds})}$$

eq 1

The probability estimates given in Table 1 (column 6) show that:

Table 1: *Determinants of Menstrual Hygiene Products Preference*

Coefficients (1)	Estimate Ln(Odds) (2)	Std. Error (3)	z-Value (4)	Exp(Estimate) Odds (5)	Probability Odds / (1 + Odds) (6)	Pr(> z) (7)
(Intercept)	-0.2295	0.3037	-0.756	0.7949	0.4429	0.449926
Income Category: Low	0.7721	0.4724	1.634	2.1643	0.6840	0.102155
Income Category: Lower-Middle	0.5478	0.2887	1.897	1.7294	0.6336	0.057795
Income Category: Upper-Middle	0.6025	0.2795	2.156	1.8267	0.6462	0.031089
Education: Illiterate	-0.4698	0.5781	-0.813	0.6251	0.3847	0.416426
Education: Literate (with or without schooling)	-1.6094	0.4433	-3.631	0.2000	0.1667	0.000283
Education: Up to 12th Grade	-0.5211	0.2168	-2.404	0.5939	0.3726	0.016202
Education: Up to Primary	-1.4790	0.3352	-4.412	0.2279	0.1856	1.02e-05
Education: Up to Secondary	-1.4150	0.2544	-5.563	0.2429	0.1954	2.66e-08
Occupation: Manual Labour (Outdoors)	1.0574	0.3932	2.689	2.8789	0.7422	0.007168
Occupation: Non- Working	0.5349	0.2165	2.471	1.7073	0.6306	0.013460
Occupation: Other work (Outdoors)	0.7023	0.2117	3.318	2.0184	0.6687	0.000906
Occupation: School- going student	0.9400	0.3577	2.628	2.5600	0.7192	0.008591
Occupation: Working (Indoors)	0.4898	0.2069	2.367	1.6320	0.6201	0.017927
Region: Urban	0.1463	0.1566	0.934	1.1575	0.5366	0.350299
Development Status: Developing	-0.1061	0.1849	-0.574	0.8993	0.4735	0.566083
Development Status: Tribal	-0.6031	0.2360	-2.555	0.5471	0.3536	0.010609
Development Status: Undefined	1.6624	1.1580	1.436	5.2719	0.8406	0.151108
Null deviance: 1317.4 on 975 degrees of freedom						
Residual deviance: 1216.7 on 958 degrees of freedom						
49 observations deleted due to missingness						
AIC: 1252.7 Number of Fisher Scoring iterations: 4						

Compared to the women in high income category, the probability of using high hygiene value products by those belonging to upper and lower middle-income group is higher. The probability of those from low-income group is more than 0.5 but the coefficient is not significant and hence, there is no statistically significant difference in the nature of products used by those from high-income group and those from low-income group. Information asymmetry is reducing at a rapid pace because of smart phones and access to mass media. Moreover, those from low-income group would also have access to the disposable sanitary napkins made available by the

government at subsidized rates. These population is also served by NGOs working for menstrual hygiene and therefore, they might have better access to high hygiene value products, especially to disposable sanitary napkins, in comparison with those who belong to middle-income group.

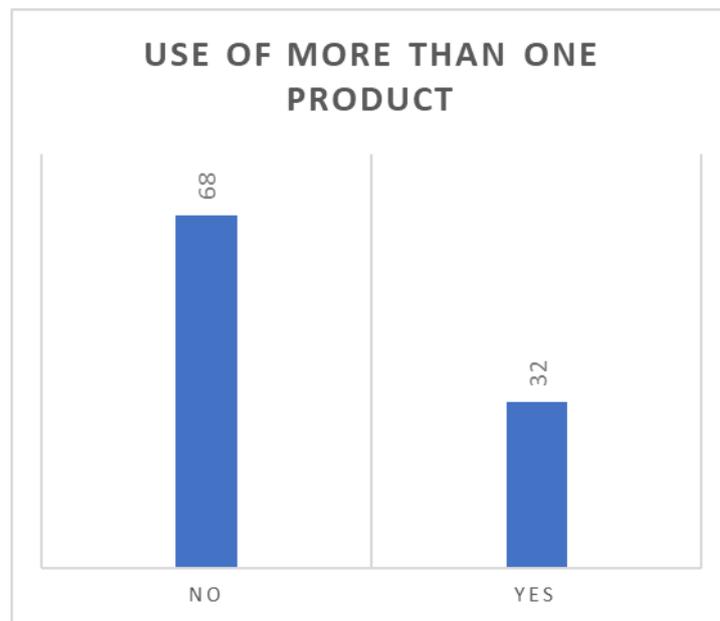
The probability estimates and the p-values (column 7) associated with the log odds of education suggest that in comparison with those who have attained higher education, the probability of using high hygiene value products for all other levels of education is low (between 0.16 to 0.37). The coefficient of the illiterate category of respondents is statistically insignificant. This indicates that there is no difference in probability of use of high hygiene value products by those who have attained higher education and those who are illiterate. The respondents who are illiterate are more likely to belong to low-income group. Therefore, they might have better access to disposable sanitary napkins, either to the ones sold at subsidized rates by the government or to those made available by NGOs. Some NGOs sell disposable sanitary napkins at subsidized rates where as some others distribute it free of cost. In either case, this reduces information asymmetry and creates awareness about disposable sanitary napkins among the deprived and vulnerable.

In comparison with college-going girls, all women in all other occupation have a very high probability (more than 0.6) of making use of high hygiene value products like disposable sanitary napkins, menstrual cups or tampons. This is because a working woman stays outdoors for longer hours compared to college-going girls. High hygiene value products not only provide comfort for longer hours but also reduces the chances of blood stains percolating to the outer clothes. Also, women who work in the environment where there are inadequate or unhygienic sanitation facilities would also prefer to use durable absorbent like a disposable sanitary napkin or tampon. Most school-going girls would have experienced menarche in past one or two years. Even today, there is a stigma associated with clothes stained with menstrual blood and school-going girls and having lesser experience of menstruation makes them more vulnerable to staining their clothes. Therefore, might prefer absorbents with a high absorbing capacity, like disposable sanitary napkins or tampons.

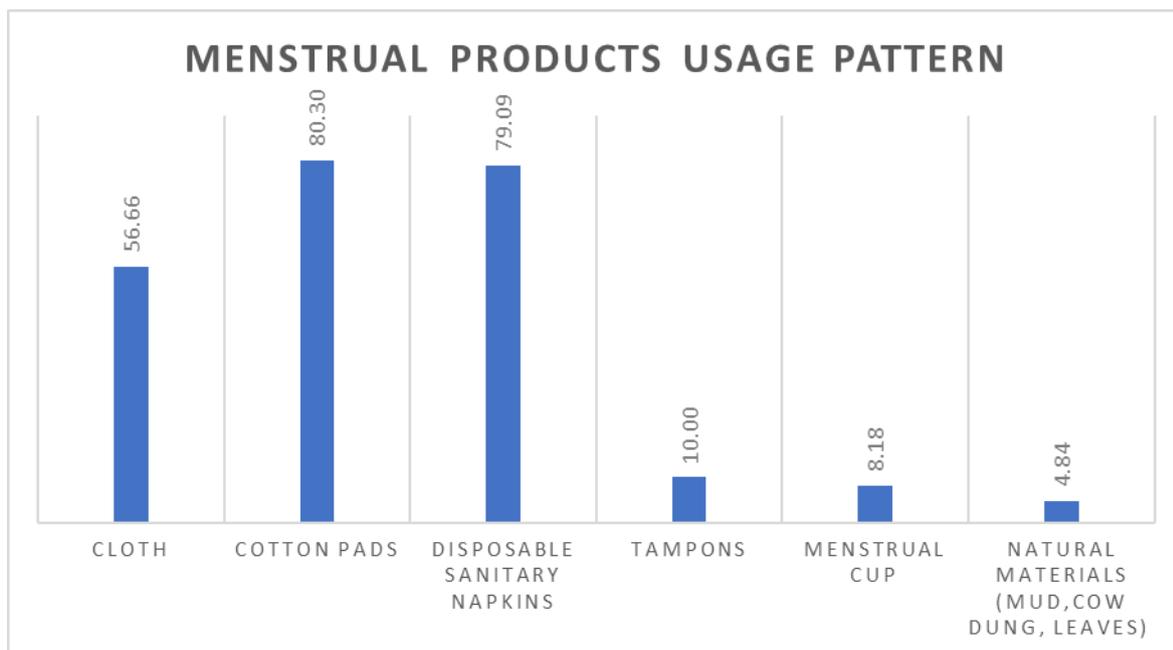
There is no statistically significant difference in the probabilities of women across regions (rural or urban) and across the extent of development of the districts (developed, developing or tribal), in terms of the hygiene value associated with the products used for soaking menstrual blood.

Despite reducing information asymmetry and increased awareness as well as availability of menstrual products, there are 0.20 per cent women, who do not use anything to soak menstrual blood (Figure 3). On the other hand, there are 32 per cent of women use more than one product (Figure 4 a) during their menstrual cycles.

A detailed examination of those 330 (32 per cent) respondents (Figure 4 b), who use more than one product, show that 80.30 per cent use cotton pads, whereas 79.09 per cent use disposable sanitary napkins. Out of these 330 women, 10 per cent use tampons, 8.18 per cent use menstrual cups and 4.84 use natural materials. Also, there are 56.66 per cent cloth users.

Figure 4: *Women using More than one Menstrual Products*

(a)



(b)

Direct Cost of Menstrual Products

Cost of products and the personal disposable income determine the budget constraints. However, the usage pattern gives insights into revealed preferences, and help in estimating the direct cost component of menstrual hygiene. Women use different products like sanitary napkins, tampons, menstrual cup, cotton pads, cloth (torn from sarees), and a few of them don't use anything as absorbent for menstrual blood.

This section describes the method of estimating direct cost of menstrual products for one cycle. An estimate of usage of disposable sanitary napkins and tampons is also given for a woman for the entire year. The structured questionnaire used to collect data on menstrual hygiene among women of Gujarat seeks information from the respondents about their daily usage of sanitary napkins or tampons for a menstrual cycle. A typical menstrual cycle is six-days long and totalling up the number of sanitary napkins / tampons used each day, gives an estimate of the usage of sanitary napkins / tampons for one cycle. The respondents are also asked to provide the details of the price of the packet and number of sanitary napkins / tampons contained in that packet. Dividing the price of the packet with total number of sanitary napkins / tampons in the packet gives an estimate of the rate per piece of a disposable sanitary napkin / tampon. This is then multiplied with the number of sanitary napkins / tampons used during the entire cycle, which gives the cost estimate of menstrual hygiene for one cycle. Table 2 provides the summary statistics on the usage and direct cost of disposable sanitary napkins / tampons:

Table 2: Summary Statistics of Usage and Direct Cost of Disposable Sanitary Napkins / Tampons

Usage / Price	Min.*	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
Day 1 Usage	0	2	2	2.4070	3	7	57
Day 2 Usage	1	2	2	2.4540	3	8	59
Day 3 Usage	0	1	2	2.0170	2	6	63
Day 4 Usage	0	1	1	1.5620	2	6	107
Day 5 Usage	0	1	1	1.1540	2	5	179
Day 6 Usage	0	0	0	0.6375	1	4	298
Disposable Sanitary Napkins / Tampons used per Cycle	1	7	9	9.5120	12	45	50
Price per Packet (Rs)	6.00	40.00	89.00	134.80	180.00	600.00	38
Disposable Sanitary Napkins / Tampons per Packet	1	7	10	18.64	30	60	46
Price per Disposable Sanitary Napkin / Tampon (Rs)	1.00	5.00	6.67	7.71	10.00	33.33	46

* A zero in this column suggests that at least one woman in the sample does not make use of disposable sanitary napkin / tampon on that day of her period. It is quite possible that one woman may not require to use it on day 1 where as some other woman might not require it on day 3.

The last column of gives the number of non-responses for each of these details sought from the respondents. However, in case of usage for each day, it might indicate that the respondent is using multiple products and is not using either disposable sanitary napkin / tampon on that particular day, or they have simply refused to respond. The respondents who have mentioned cloth from old saree, cotton pads, natural materials like dung, mud etc., and menstrual cup are excluded while calculating the summary statistics shown in Table 2ⁱⁱ.

The first six rows of Table 2 the summary statistics of the usage of number of disposable sanitary napkins / tampons for each day of the menstrual cycle. The seventh row shows the summary statistics obtained after taking sum of the number of disposable sanitary napkins / tampons for each day of the menstrual cycle, for all six days. The average use of sanitary napkins / tampons per cycle is 9.512 (approximated to 9) pieces, the median is 9 pieces. The price of packet for disposable sanitary napkins ranges from Rs 6.00 to Rs. 600.00 with a minimum of 2 pieces per packet to a maximum of 60 pieces per packet. A packet containing 60 sometimes comes in six packs of 10 each, called the supersaver packs, preferred by women from families having more women in the menstruating age-group. Also, sanitary napkins do not have an

expiry date and the expiry date of tampons is 5 years from the date of manufacture. Hence, some women may prefer buying in bulk to make the purchase economical. An average packet contains 18.64 (approximated to 20, based on available packets sizes) sanitary napkins / tampons (the median number of sanitary napkins per packet is 10).

The price per sanitary napkin / tampon therefore, ranges as less as Re. 1 to as high as Rs 33.33, the average price is Rs 7.67 (median Rs 6.67). NGOs and government make sanitary napkins available to the women in as less as Rs 2 and Re 1 respectively. The price of commercially sold sanitary napkins and tampons are taken from amazon.in; this gives an idea about the market prices of this product and also provides information on the range of these two products available in the market. Policy formulation takes into consideration those women who cannot afford hygienic absorbents at market price. Therefore, minimum price is considered while estimating the cost of absorbents. Also, every woman has the right to make use of absorbent as per their needs. Therefore, maximum number of sanitary napkins / tampons are taken into consideration while estimating the cost. Thus, the monthly cost of sanitary napkins would be Re 1 (minimum cost) multiplied with 45 (maximum usage per cycle). **This works out to Rs 45 per month and Rs 45 multiplied with 12, that is, Rs 540 per year.**

Menstrual cup is a durable product and can be used for several years before disposing it. A menstrual cup is made from silicone and has a flexible structure that can be folded to ease the insertion into the vagina, it opens up in vagina and collects the menstrual blood; it's a cup. The cup requires to be removed at regular intervals to be emptied. The empty cup is washed and reinserted in the vagina to collect more blood. This is an environmentally friendly product, because it is reusable and is relatively easily degradable compared to the material used in disposable sanitary napkins and tampons. Therefore, women are gradually experimenting with menstrual cups, though they are not as popular in India as they are in the western world. In a sample of 1025, there are only twelve menstrual cup users. Therefore, the summary statistics generated cannot be said to be representative of the menstrual cup users but can be used to have a rough cost estimate. The price of menstrual cup is also taken from amazon.in, and it is found that the minimum price of one menstrual cup is Rs 250 and the maximum price is Rs 500. The respondents were not clear on the number of years, a menstrual cup could be used, but [van Eijk et al., 2019] show that the average life of a menstrual cup is 10 years. Thus, considering the minimum price of a menstrual cup (Rs 250) and the average life of a menstrual cup (10 year), **the yearly cost of using a menstrual cup works out to Rs. 25.**

This discussion is important from the policy formulation perspective. Scotland is the first country to have made menstrual products, free of cost [Lifestyle Desk, 2020]. Also, appropriate provisions in the budget for menstrual products could have major impact on improvement of public health.

Indirect Cost of Menstrual Hygiene

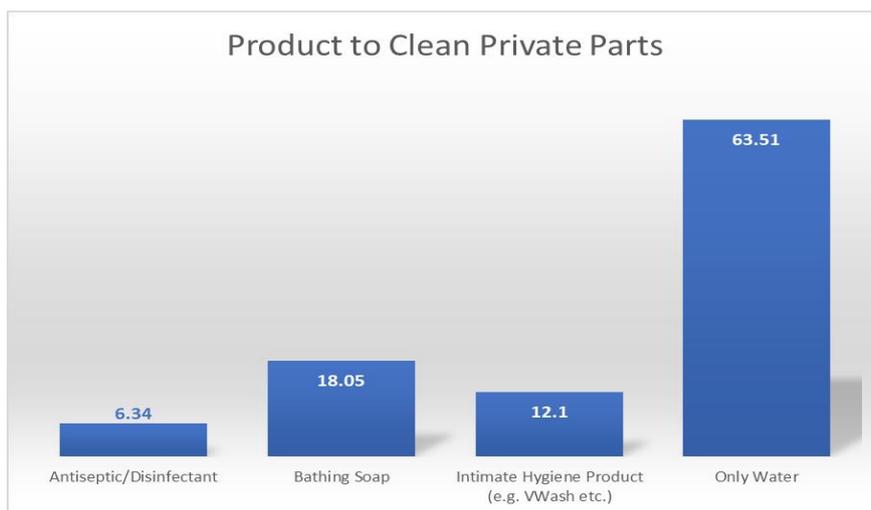
Indirect cost consists of materials used to clean private parts and materials used to wash hands after using the toilet facilities. Special care is required to be taken during menstrual cycles to ensure the cleanliness of private parts and to keep it disinfected, as well as to ensure that hands are disinfected after using the toilet. Doctors recommend that private parts be cleaned by thoroughly rinsing it with water. Different products are used by different women to clean the private parts and hands. These products include disinfectant, antiseptic, intimate hygiene product or a bathing soap for cleaning the private parts and that of using disinfectant, antiseptic, hand wash, hand sanitizer, soap, mud or ashes for washing hands. Age is likely to influence the choice of hygiene products. If a soap, disinfectant or an intimate hygiene product is used to clean the private parts, it constitutes indirect cost of menstrual hygiene.

It is also required to thoroughly clean the hands with a soap / hand wash after using the washroom during menstruation. This adds to the indirect cost of menstrual hygiene.

This section discusses the estimation of indirect cost and also attempts to estimate the yearly indirect cost of menstrual hygiene.

Figure 5(a) shows the pattern in use of the products for cleaning the private parts Figure 5 (b) shows that pattern of products used for cleaning hands after using the washroom.

Figure 5: Pattern in Products Used for Cleaning Private Parts and Those Used for Hand Wash



(a)



(b)

While a majority (63.51 per cent) respondents clean their private parts with only water, 68.78 per cent use hand wash to clean their hands after using the washroom. Only 10.73 per cent respondents use only water to clean their hands after using the wash room. Even today,

some women (0.29 per cent) use mud / sand to clean their hands after using the wash room during their menstrual cycles. Those 36.49 per cent who use either a bathing soap, a disinfectant / antiseptic or an intimate hygiene product to clean the private parts and those 88.98 per cent who use either a bathing soap, a disinfectant / antiseptic / hand sanitizer or a hand wash, were asked to give information on the price of the product used and the number of months, the product lasts. This gives an estimate of per month cost of the product used for cleaning the private parts. However, a soap, disinfectant / antiseptic or an intimate hygiene product is shared by other women members in the menstruating age-group in the family and hence the per month cost is apportioned by the number of women in the family. Similarly, the soap, hand wash or the disinfectant / antiseptic / hand sanitizer are largely shared by all the family members in a household. Therefore, the per month cost of the hand washing products is estimated and apportioned by the number of family members in the respondent's household. The summary statistics are then estimated and presented in Table 3:

One can see from Table 3 that the price of the products used to clean private parts range from Rs. 2 to Rs 1000 and these products last for as less as a week to as much as slightly more than 43 and a half months. The average price of these products is Rs. 135.10 (median price is Rs 100) and these products last for slightly more than 2 months and 3 weeks (median: 2 months). The monthly cost of these products, therefore, range from Rs. 2 to Rs 500. The average per month cost of menstrual hygiene products is Rs 62.61 (median: Rs 50). This cost apportioned by the number of female family members, who might share these products for cleaning their private parts range from Re 1 to Rs 500, the average is Rs 30.75 (median: Rs 17.50). Thus, the yearly cost ranges from Rs 12 to Rs 6000, the average yearly cost of products used to clean the private parts is Rs 369 (median: Rs 210).

Table 3: Estimation of Indirect Cost of Menstrual Hygiene

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
Cost estimation of the product to clean private parts							
Price of the product to clean private parts (Rs)	2.00	50.00	100.00	135.10	180.00	1000.00	218
How long does product to clean private parts last (months)?	0.250	1.000	2.000	2.799	3.000	43.500	215
Per month cost to clean private parts (Rs)	2.00	30.00	50.00	62.61	80.00	500.00	221
Per month cost to clean private parts, apportioned by female family members (Rs)	1.00	10.00	17.50	30.75	37.50	500.00	221
Yearly cost to clean private parts (Rs)	12.00	120.00	210.00	369.00	450.00	6000.00	221
Cost estimation of the product to wash hands							
Price of the product to wash hands (Rs)	4.00	45.00	72.00	87.62	100.00	380.00	357
How long does the product to wash hands last? (months)	0.250	1.000	1.000	1.456	2.000	9.000	354
Per month cost of the product used to wash hands (Rs)	4.50	40.00	57.00	70.85	99.00	380.00	371
Per month cost to wash hands, apportioned by total family members (Rs)	1.00	8.00	12.00	15.69	20.00	100.00	371
Yearly cost to wash hands (Rs)	12.00	96.00	144.00	188.30	240.00	1200.00	371

It may be noted that out of 376 respondents who use products like bathing soaps, disinfectants / antiseptics, intimate hygiene product to clean their private parts, only 156 have responded to the price of the product used by them, and 159 have responded to the number of months, the product lasts. The paired responses therefore, work out to 153 and the estimation given in Table 3 is based on these 153 responses who have given information on both – the price as well as on how long does the product lasts.

Table 3 also shows that the price of the products used to wash hands (after using the washroom during menstrual cycles) range from Rs. 4 to Rs 380 and these products last for as less as a week to as much as nine months. The average price of these products is Rs. 87.62 (median price is Rs 72) and these products last for slightly less than 45 days (median: 1 month). The monthly cost of these products, therefore, range from Rs. 4.50 to Rs 380. The average per month cost of menstrual hygiene products is Rs 70.85 (median: Rs 57). This cost apportioned by the total number of family members (male and female, since these products are not menstruation / women-specific), who might share these products for washing hands, range from Re 1 to Rs 100, the average is Rs 15.69 (median: Rs 12). Thus, the yearly cost ranges from Rs 12 to Rs 1200, the average yearly cost of products used to wash hands after using washroom during menstruation is Rs 188 (median: Rs 144).

It may be noted that out of 912 respondents who use products like bathing soaps, disinfectants / antiseptics, and hand sanitizers to wash their hands, 555 have responded to the price of the product used by them, and 558 have responded to the number of months, the product lasts. The paired responses therefore, work out to 541 and the estimation given in Table 3 is based on these 541 responses who have given information on both – the price as well as on how long does the product, used for washing hands, lasts.

Summary and Policy Implications

Menstruation is a public health issue and has started gaining attention of the policy makers since past few years. Choice of menstrual product involves a decision of maximizing the utility subject to budget constraints. There are other constraints like information asymmetry and availability of products that influence the choice of menstrual product. This paper describes the pattern in awareness among women about the different menstrual products available in the market, which gives an insight into the information asymmetry about menstrual hygiene products. There is a discussion on the choice of primary product /normally used product and whether the woman is using more than one product to manage menstrual blood. The socioeconomic factors influencing the choice of the product are also discussed. Then a discussion on the methodology of direct cost of menstrual products, followed by the methodology of indirect cost of menstrual hygiene is presented and the respective cost estimates are worked out.

The details on explicit cost are elicited through administering the questionnaire to menstruating girls / women in the age group of 14-49 years. The questions were designed after taking insights from gynaecologists and women doctors, and from the review of literature. Since, soon after pilot testing the questionnaire, COVID-19 pandemic outbreak, a mixed method approach of data collection had to be adopted: online self-administered questionnaires, questionnaires administered over phone calls and WhatsApp video calls by trained field investigators, and face-to-face administration of questionnaires by trained investigators. RDS sampling had to be adopted for self-administered online questionnaire, whereas multi-stage sampling could be retained eventually when trained investigators started to administer the questionnaires.

The findings of this study are:

A majority of the respondents are aware about cotton pads, disposable sanitary napkins and cloth from old sarees, in the given order. Though there is awareness about tampons and menstrual cups too. The respondents are also aware about the sanitary napkins made available by the Government at subsidized rates.

The usage pattern shows that the disposable sanitary napkins is the most preferred absorbent for those using only one product. On examining the influence of socioeconomic characteristics on choice of absorbent, using a binary logistic regression, it is revealed that:

Middle-income group (both – lower and upper) prefer high hygiene value products compared to the low and high-income group respondents. Disposable sanitary napkins, tampons and menstrual cups are categorized as high hygiene value products, all others as low hygiene value products.

There is direct relation between level of education and preference for high value products.

All the working women and school-going girls prefer high hygiene value products, as compared to college-going girls.

The region (rural / urban) or the extent of development status of the district (developed / developing / tribal) does not influence the choice of the product.

Out of 1025 respondents, 32 per cent use more than one product during their menstrual cycles. The most preferred product of women, who use more than one product during their menstrual cycles, is cotton pads, followed by disposable sanitary napkins.

The average yearly cost of using disposable sanitary napkins / tampons and that for menstrual cup is given in Table 4. The indirect cost, which is obtained by summing up the average yearly cost of using disinfectant / antiseptic / intimate hygiene product / bathing soap for cleaning the private parts and that of using disinfectant / antiseptic / hand wash / hand sanitizer / soap for washing hands.

Table 4: Average Yearly Cost of Disposable Sanitary Napkins / Tampons, and Menstrual Cups

Product	Minimum Direct Cost (Rs)	Minimum Indirect Cost (Rs)	Total Cost (Rs)
Disposable Sanitary Napkins / Tampons	540.00	24.00	564.00
Menstrual Cups	25.00	24.00	49.00

The yearly average cost of using disposable sanitary napkins / tampons works out to Rs 564 whereas that of using a menstrual cup works out to Rs 49.

An estimation on total yearly cost of menstrual products multiplied with the number of women in the menstruating age-group would provide insights into the total expenditure required to be incurred by the government, if menstrual products are made available free of cost. The government may think of some cut off criteria like women belonging to families living below the poverty line, for distributing fixed number of sanitary napkins per cycle, free of cost. The government can also spread awareness and distribute menstrual cups, a reusable and easy to clean product, to the said category of women. Awareness about making use of menstrual cup can also be planned by the government.

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ⁱ It may be noted that the term “cotton pads” is used for a variety of products: the pad made from medicated cotton are also known as cotton pads (Figure 2 a). It may be noted that while, some disposable sanitary napkins, which are made from compressed cotton, are commonly known as cotton pads (Figure 2 b) and the ones shown in Figure 2 (c) are also cotton pads. While the ones in Figure 2 (a and b) are disposable, the one (c) is reusable. All these categories of cotton pads are included for the option “cotton pads” in examining the product awareness. Period panties is relatively less popular and is used normally for light discharge. Pantliners are also used when the discharge is not heavy. Therefore, these two products are not included while examining the awareness about menstrual products.

ⁱⁱ The respondents who are using cotton pads are excluded because as shown in Figure 2, there are two types of disposable cotton pads and one type of reusable cotton pad. Moreover, the type of cotton pad shown in Figure 2 (a) are also available as raw as well as medicated cotton. Thus, estimating the cost of using cotton pad required more detailing. Some respondents had mentioned the cost of cotton pads where as some did not. This made it difficult to differentiate between those who are using cotton pads as in Figure 2 (a) or as in Figure 2 (b). Following up with all the cotton pad users was not possible because of time constraint and therefore, the estimation was not possible.