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Age-based patterns of menstrual hygiene practices among domestic workers in Kolkata: a correspondence analysis

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Abstract

Objective This study aimed to examine the association between age and menstrual hygiene practices of the domestic workers of Kolkata.

Methods Data were collected from 300 women domestic workers belonging to their reproductive age (15 to 44 years), residing in Kolkata and working as domestic workers. For the analysis of the collected data, the participants were classified into four age-groups – 15–19 years, 20–24 years, 25–29 years and 30–44 years. Correspondence Analysis (CA) was employed to examine interdependent associations between the age-groups and their menstrual hygiene practices.

Results Sanitary pad is mostly used by the older women i.e. age-group 30–44 years (0.389) and 24–29 years (0.584), whereas the younger women of aged between 15 and 19 and 20–24 years prefer to use old cloth pieces as menstrual absorbents. The age-group 30–44 years are the only women who change their absorbents frequently i.e. more than 3 times a day (0.623) and also practice safe method of absorbent disposal (0.586) amongst the all groups. The youngest women amongst the study participants i.e. age-group 15–19 years (0.682) are found to be more frequently washing hands with soap after changing absorbents and to clean external genitalia satisfactorily compared to the other groups.

Conclusion Age appears to be an important factor for menstrual hygiene practices. Older women maintain good hygiene and employ modern means of hygienic methods, presumably which are learned through experience and everyday situation as they go out for work. The results of this study nevertheless call for targeted awareness-raising programmes to improving menstrual hygiene practices particularly among the younger generation.

Keywords Menstrual hygiene practices, Age-groups, Correspondence analysis, Domestic workers, Kolkata

1 Introduction

According to the World Bank, globally more than 300 million women menstruate everyday [1]. However, approximately 500 million women across the world, mostly from the developing countries, do not have the access to adequate resources to manage their

menstrual hygiene [2]. As observed, poor menstrual hygiene leads to various short term health issues such as irritation, discomforts, itching, vaginal discharge and reproductive and urinary tract infections and may also lead to reproductive health complications in the long run [3, 4]. Addressing this, the World Health Organisation (hereafter WHO) and the United Nations International Children's Emergency Fund (hereafter UNICEF) initiated a Joint Monitoring Programme (JMP) in 2019 to promote Menstrual Hygiene Management (MHM) so that women and adolescent girls manage their menstrual hygiene effectively [2].

Accordingly, the Ministry of Health and Family Welfare, Government of India also initiated to raise awareness through the National Health Mission on the use of sanitary products, safe disposal of used absorbents, and washing hands and genital areas [5]. The 2019-20 National Family Health Survey (NHFS-5) estimates that 90% of urban 73% of rural women maintain their menstrual hygiene [6]. However, women from underprivileged societies and living in overcrowded areas often face difficulties in accessing sanitation facilities [7]. The situation is more severe among women employed in informal sector, such as domestic workers, to manage their menstruation effectively or to steer it with dignity [8]; though research on how they manage their menstruation as they grow older are limited. Some studies highlighted that women gain experience and naturally develop coping mechanisms and better hygiene practices over time and also adopt suitable behaviours to manage menstruation with the available resources [9, 10], whereas that adolescent girls struggle more due to the lack of information, limited access to sanitary products, and socio-economic barriers [11, 12].

The International Labour Organization (2011) defines domestic workers as "the persons hired to perform household chores and are engaged in care services in lieu of payment" [13]. Similarly, the Domestic Worker Welfare and Social Security Act 2010, Government of India defines - "Domestic worker means, a person who is employed for remuneration whether in cash or kind, in any household or similar establishments through any agency or directly, either on temporary or contract basis or permanent, part-time or full-time to do the household or allied work". Full-time domestic workers usually spend 8–12 h a day in a particular household, even more, at the employer's house to provide services. Contrarily, part-time domestic workers often work in multiple households, travelling daily from home, completing defined task at the employers' house, and having no fixed working hours [14]. This paper deals with the part-time domestic workers only.

Part-time domestic workers usually reside in less affluent, congested urban areas and face multiple occupational, social, and economic challenges. Being employed in private households, they perpetually lack access to clean and private sanitation facilities not only during the time of their working hours [15], but also throughout their important span of life ranging from the onset of menarche to their reproductive years and beyond [16]. Their long working hours, low income, busy schedules, and the lack of formal health benefits place them particularly at-risk. Menstruation thus for them is not merely a health issue, rather it often leads to workplace absenteeism, which further cause their wage cuts and thus eventually create obstacles, when their families are mostly dependent on their earnings [17, 18].

Under the above background, this study aimed to examine age-specific variations in menstrual hygiene practices among the part-time domestic workers aged between 15

and 44 years and living in Kolkata. The participants for the study have been selected following purposive sampling. Data from them has been collected through structured interviews and has been analysed using statistical methods. Understanding how menstrual hygiene practices differ across age groups among domestic workers may help to identify the experience-based coping strategies and the existing gaps in accessing menstrual hygiene materials. This age-based perspective may help to initiate targeted interventions and appropriate policy recommendations to improve the menstrual health of this under-studied group.

2 Materials and methods

2.1 Study area

The present research is a community-based cross-sectional study conducted in different phases from November 2018 to April 2022 in Kolkata city, West Bengal, India. The city Kolkata is currently known as the Greater Kolkata or the Kolkata Metropolitan Area expanding over 6 districts of the state namely Kolkata, North 24 Parganas, South 24 Parganas, Howrah, Hooghly and Nadia, centring the core city Kolkata. The study was conducted in North 24 Parganas district and the specific localities where our study participants live comes under the Rajarhat-Gopalpur municipality area of the Bidhannagar Municipal Corporation, Bidhannagar Subdivision. The data were collected from several municipal wards (Ward nos. 12, 13, 17, 20, 21 and 22) and the name of the localities are Adarshapally, Rabindrapally, Rajbanshipara, Ashwininagar, Promodgarh, Nabaniketan, Jyotinagar, Jagatpur, Helabattala and Hatiara.

2.2 Study participants

The total number of domestic workers working in Kolkata city is not known due to the unavailability of official record. Owing to the flexibility and uncertainty of their employment, the majority of these workers are not registered with the Worker Facilitation Centre (WFC) under the Government of West Bengal or E-*Shram* portal of the union Government. It was also difficult to estimate their total number from the areas where they live. We found many of them were not employed during the time of conducting this study. We also found them living alongside the people having other professions, which made our enumeration difficult. To meet our study objectives, we purposefully selected women part-time domestic workers considering the following inclusion and exclusion criteria:

Inclusion criteria:

- residing in the study area for at least 5 years,
- employed during the time of data collection [19, 20],
- aged between 15 and 44 years considering the reproductive age as recognised bythe report of Census of 2011, Govt. of India [21], however, as per WHO (1970) thereproductive age-range for women is 15 to 49 years [22],
- available during the time of data collection, and.
- willing to participate in the study.

Exclusion criteria:

- Pregnant and lactating women during the time of data collection, and.
- women who had experienced their menopause.

To select sample size we adopted 'Cochran's Formula for an unknown total population.

Z^2. p. q.

n= e^2.

Where: Z is the z-value for 95% confidence (1.96), p is the estimated proportion (0.5 when unknown), $q = 1\text{-}p$, and e is the margin of error (0.05).

The estimated sample size obtained after calculation was approximately 384 respondents. However, after employing the inclusion and exclusion criteria, we only could avail 300 participants from our study area. The final number of 300 participants although ensured adequate representations across age-groups for correspondence analysis and also was sufficient to apprehend the variability in menstrual hygiene practices.

2.3 Data collection techniques

The data on menstrual hygiene practices have been taken into account in accordance to the existing validated studies [23–25]. The data were collected through structured interviews on a recall basis, emphasizing the practices followed for the maximum time from their onset of menarche and still continued at present. The question schedule was pretested through a pilot survey conducted among 20% of the total study participants (n = 60), was thoroughly cross-checked, and accordingly necessary modifications were made. It was prepared in the English language for the benefit of the research, but as English is not the native language of all the study participants, the data were collected in Bengali language, which later were transcribed in English.

The face-to-face interviews were conducted at the participants' residence (rented house or their own house). The data were collected during the evening hours and sometimes in the afternoon, after they returned home from their workplaces. During the time of conducting interviews, we ensured that participants were hassle-free, available, comfortable, and minimally disrupted to their daily routine. All the data were collected by the first author of this article to maintain uniformity and confidentiality throughout the process.

2.4 Study tool

The data collected contained two main components:

1. Socio-demographic characteristics, which comprised age of the study participants between 15 to 44 years and were collected in completed years. Age of the participants was later categorized into five-year age intervals following the standard demographic distribution format. However, for the purpose of statistical analysis, some of these categories were combined into broader age groups because of the low frequency of respondents in the higher age ranges. This regrouping ensured adequate representation within each category and facilitated meaningful statistical interpretation without distorting the overall demographic pattern [26]. Finally, the age distribution was presented in tabular form, showing both frequency and percentage for each group. The socio-demographic characteristics also included data on education, income, toilet sharing, years of working, number of households, and hours of work per day of the study participants.
2. Menstrual hygiene practices included data on the types of absorbents used, frequency of changing absorbents, washing hand, cleaning of external genital area and disposal method [23-25].

2.5 Statistical analyses

The collected data was analysed using the Statistical Package for Social Science (IBM SPSS version 20.0) programme. The socio-demographic characteristics and menstrual hygiene practices of the participants were presented as frequencies and percentages to describe their fundamental properties. Chi-square test / Fisher's exact test (for cells with low counts) was perform to examine the association between socio-economic conditions across age-groups. Correspondence analysis (CA), an advanced multivariate statistical technique that is used to analyse and visualise the relationship i.e. similarities or closeness between the categorical variables, was applied to explore the interdependent associations between age-groups and menstrual hygiene practices of the participants. In the CA analyses, age-groups were considered as row categories and hygiene practices as column categories. Furthermore, chi-square test was used in CA to assess the total explained variance. The number of dimensions extracted from the data reflected the relationships between menstrual hygiene practices and age-groups.

The overview row points provide information on how the age-groups are plotted in the biplot. The inertia value indicates how much each age- group contributes to the overall variation. The contribution of each dimension indicates how strongly the age-group is associated with that dimension. Similarly, the overview column points provide insight into how various menstrual hygienic practices relates to the dimensions. The distance between each menstrual hygienic practice (coordinate 1) and each age-group (coordinate 2) indicates their closeness and was calculated by using the Euclidean distance formula: 'Distance = $\sqrt{}$ $[(x_2\text{-}x_1)^2 + (y_2\text{-}y_1)^2]$' (where, x_1 and y_1 are the coordinates of row points; x_2 and y_2 are the coordinates of column points). In the biplot, this distance represents the level of similarity or differences between any two points. A shorter distance (lower score) indicates a closer relationship between an age-group and a specific menstrual hygiene practice. Thus, the biplot visually illustrates the proximity and association of various hygiene practices with different age-groups.

3 Results

As shown in Table 1, we categorised our participants into 4 age-groups: 15–19 years, 20 to 24 years, 25–29 years and 30–44 years who represents 12.7%, 37.3%, 31% and 19% respectively. More than half of the participants had their education up to the primary level (54%) while only 20.7% of participants studied up to the upper primary level, 19.7% could write their names, 4% were non-literates and 1.7% studied up to the secondary level. Furthermore, the data on total family income shows 9.7% earned less than 5000 per month, 60.7% earned INR 5000 to 10,000 per month and 29.7% earned more than 10,000 (INR), and. The maximum numbers of participants (65%) shared toilets with own family members, whereas, a considerable number of participants (35%) shared toilets with the members of other families. Nearly half of the participants (49.3%) had been working for 10–15 years, 42% for 5–10 years, and 8.7% for more than 15 years. A majority (68%) worked in 5 or more households, 32% in less than 5 households. Maximum number of our participants (79%) work for more than 5 h in a day and the rest of them work for up to 5 h daily.

This table highlights that most of the participants are young adults with low education level and low to moderate income, working on multiple households for long hours,

Table 1 Socio- demographic characteristics (*N* = 300)

Single-response variable	Category	Frequency	Percentage
Age-groups (Years)	15–19	38	12.7
	20–24	112	37.3
	25–29	93	31
	30 and above	57	19
Education level of study participants	Non -literate	12	4
	Can sign only	59	19.7
	Primary education	162	54
	Upper primary education	62	20.7
	Secondary education	5	1.7
Total family income (monthly/INR)	Less than 5000	29	9.7
	5000-10,000	182	60.7
	More than10,000	89	29.7
Toilet sharing	Shares with family members	195	65
	Shares with other families	105	35
Years of working (Approx.)			
	5 to10 years	126	42
	11 to15 years	148	49.3
	More than 15 years	26	8.7
No. of households	Less than 5 households	96	32
	5 and more households	204	68
Working hours/ Day	Up to 5 h	63	21
	More than 5 h	237	79

Source: Authors

Table 2 Menstrual hygiene practices (*N* = 300)

Single-response variable	Category	Frequency	Percentage
Uses of absorbent	Sanitary pads	187	62.3
	Cloth pieces	113	37.7
Changes of absorbent	3 or more times daily	57	19
	less than 3 times daily	243	81
Washing of hand after the use of absorbents	With soap	34	11.3
	Without soap (water only)	266	88.7
Cleaning of external genital area	2 or more times daily i.e. Satisfactorily	15	5
	Less than two times daily i.e. not satisfactorily.	285	95
Method of disposal of used absorbents	Safe disposal i.e. disposed in a dustbin	35	11.7
	Unsafe disposal i.e. throw in the open places	265	88.3

Source: Authors

sharing sanitation facilities with other families, which might affect their menstrual hygiene practices.

Table 2 asserts that the maximum number (62.3%) of the study participants use sanitary pads as their menstruation absorbent and 37.7% of them use old cloth pieces. Maximum (81%) of them change absorbent less than 3 times daily during their menstrual cycle, whereas 19% change it more than 3 times daily. In the maximum cases (88.7%), participants wash hands with only water after use of absorbent, and only 11.3% use soap. Moreover, 95% clean their external genitalia less than 2 times daily, whereas, only 5% clean 2 or more times daily. Most of them (88.3%) dispose absorbents in open places while some (11.7%) use dustbins.

Table 3 Association between age-groups and socioeconomic conditions

Variables	Age-groups (in years)				Fisher's Exact / χ2 value, df and *p*
	15–19	20–24	25–29	30–44	
Education level of study participants					
Non -literate	1 (0.3)	7 (2.3)	0 (0)	4 (1.3)	Fisher's Exact Test value = 59.529 df = 12 *p* = 0.00
Can sign only	12 (4)	23 (7.7)	24 (8)	0 (0)	
Primary education	10 (3.3)	56 (18.7)	46 (15.3)	50 (16.7)	
Upper primary education	15 (5)	25 (8.3)	19 (6.3)	3 (1)	
Secondary education	0 (0)	1 (0.3)	4 (1.3)	0 (0)	
Total family income (Monthly/INR)					
Less than 5000	0 (0)	14 (4.7)	13(4.3)	2 (0.7)	Fisher's Exact Test value = 17.431 df = 6, *p* = 0.00
5000-10,000	19 (6.3)	67 (22.3)	60 (20)	36 (12)	
More than 10,000	19 (6.3)	31 (10.3)	20(6.7)	19 (6.3)	
Toilet sharing					
Toilet shared with own family members	29 (9.7)	82(27.3)	61 (20.3)	23 (7.7)	χ2 = 20.698 df = 3 *p* = 0.00
Toilet shared with other family	9 (3.0)	30 (10)	32 (10.7)	34 (11.3)	

Source: Authors

Table 4 Summary of correspondence analysis of menstrual hygienic practices across the Age-groups

Dimension	Inertia (Variance explained %	Chi-Square	*P*-value
1	0.039 (84.8%)	68.797	0.000
2	0.006 (13%)		
3	0.001(2.2%)		
Total	0.046 (100%)		

Source: Authors

This table shows the prevalence of traditional and modern practices of menstrual hygiene and also provides the foundation for the correspondence analysis across the age-groups.

The Table 3 shows the significant differences between age-groups and socioeconomic characteristics among the participants. The youngest ones (15–19 years) have lower educational levels, low income, and share toilets with their own family members. The participants of 20–24 and 25–29 years age-group show relatively better education attainment and higher economic strength. The older participants (30–44) have primary level of education and stable income, but they are more likely to share sanitation facilities with other families. It is observed that these age-groups belong to different socio-economic conditions, and these factors might influence their menstrual health outcomes.

The Table 4 shows that Dimension 1 explains 84.8% of the total variation and represents the shift from traditional to modern menstrual absorbent and disposal practices. Dimension 2 explains 13% of the variation and reflects differences in external genital cleaning practices. Together, these two dimensions account for 97.8% of the variation, providing a strong basis for interpreting menstrual hygiene patterns across the age groups. The significant chi-square value ($p = 0.000$) indicates a strong association between age groups and menstrual hygiene practices.

As shown in Table 5, participants aged 20–24 years demonstrate the highest proportion of positive menstrual hygiene practices across both dimensions. Dimension 1

Table 5 Overview of the Age-groups and menstrual hygiene practices

Variables	Dimension 1	Dimension 2
Age-group (Years)		
15–19	0.644	-0.499
20–24	0.138	0.326
25–29	0.088	-0.088
30–44	-0.845	-0.164
Menstrual hygiene practices		
Sanitary pad	-0.460	-0.107
Cloth pieces	0.761	0.177
Changes absorbent less than 3 times in a day	0.282	0.158
Changes absorbent 3 or more times in a day	-1.203	-0.674
Washing hands with soap	1.125	-0.983
Washing hands without soap	-0.144	0.126
Cleaning of external genitalia satisfactorily	1.136	-1.522
Cleaning genitalia not satisfactorily	-0.060	0.080
Practices safe disposal	-0.728	0.411
Not practices safe disposal	0.096	-0.054

Source: Authors

Table 6 Distance between Age-groups and menstrual hygienic practices

Variables	Age-group 15–19	Age-group 20–24	Age-group 25–29	Age-group 30–44
Sanitary pad	1.172	0.738	0.548	0.389
Cloth pieces	0.686	0.641	0.723	1.642
Changes absorbent less than 3 times in a day	0.750	0.221	0.313	1.172
Changes absorbent 3 or more times in a day	1.855	1.672	1.417	0.623
Washing hands with soap	0.682	1.639	1.369	2.133
Washing hands without soap	1.005	0.345	0.315	0.758
Cleaning of external genitalia satisfactorily	1.135	2.101	1.776	2.401
Cleaning external genitalia not satisfactorily	0.912	0.315	0.223	0.823
Practices safe disposal	1.646	0.871	0.956	0.586
Not practices safe disposal	0.705	0.382	0.034	0.947

Source: Authors

represents the shift from traditional to modern absorbent and disposal practices, while Dimension 2 reflects variations in genital cleaning behaviours among the age-groups. The 30–44 years group shows a strong negative score on Dimension 1 (-0.845), indicating better and more consistent hygienic practices. In contrast, the 15–19 years group shows a mixed pattern, while the 25–29 years group remains close to the average, suggesting no distinct behavioural pattern.

Table 6 presents the distances between different age-groups and practices, with smaller values indicating closer or stronger association to a particular practice. The distance help to visualise which age-groups are more closely associated with specific hygiene practice, accompanying correspondence analysis. Older participants (30–44 years) were more closely associated with the use of sanitary pads (1.172) and safe disposal of absorbents (1.646), showing better menstrual hygiene pattern. In contrast, the younger participants age-groups between 15 and 19 and 20–24 years were more associated to using cloth pieces (0.686 and 0.641) and changing absorbents less frequently (1.855 and 1.672). Smaller distance values reflect stronger association to the particular practice, while larger distances indicate weaker association. Washing hands without soap (1.005) was

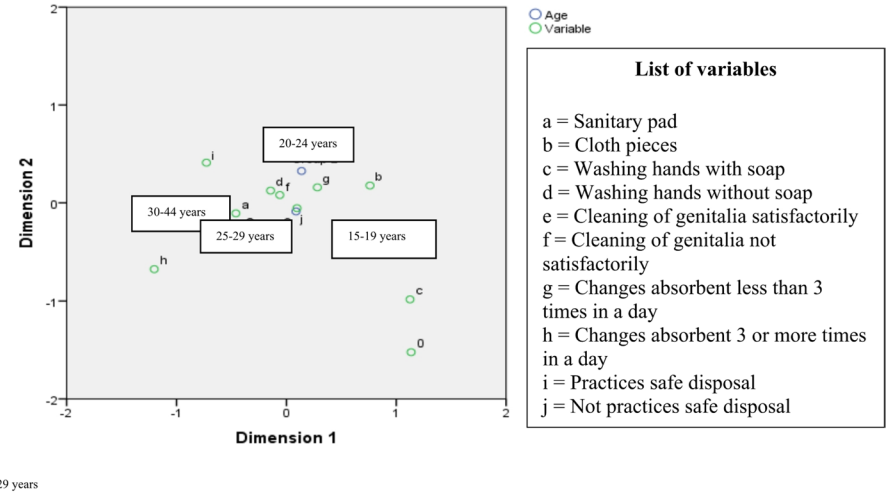

Fig. 1 Biplot Dimension

common among the 15–19 years age-groups, while cleaning of genital area satisfactorily was poor across all age-groups. The 20–24 years age-groups participants showed less awareness about changing absorbents regularly. The oldest group demonstrated more hygienic behaviour overall.

The biplot (Fig. 1) illustrates the relationship between age-groups and menstrual hygienic practices across two primary dimensions. Age-group 15–19 years is positioned towards the positive side of dimension 1 and slightly negative on dimension 2, showing proximity to variables such as washing hands with soap and not practicing safe disposal of menstrual absorbents. This indicates a mixed pattern of hygiene behaviour among the youngest group. Furthermore, the age-group 20–24 years lies centrally in the plot and is located close to variables such as washing hands without soap, cleaning genitalia satisfactorily and changing absorbents when completely wet. The age-group 25–29 years slightly left of the origin, is nearer to practices such as cleaning of genitalia not satisfactorily and changing less than 3 times daily. In contrast, age group 30–44 years is on the negative side of dimension 1 and near the practices of using sanitary pads and changing absorbents 3 or more times in day. This group shows the most favourable menstrual hygienic practices; Overall, the plot reveals a gradual improvement in menstrual hygiene behaviour with increasing age, with dimension 1 representing a shift from traditional to modern practices and dimension 2 reflecting the variability in responsiveness and cleanliness, and the positive and negative sides indicating higher or lower association to these practices.

4 Discussion

Using correspondence analysis, this study examined age-specific practices of menstrual hygiene management among the domestic workers of Kolkata. The correspondence analysis helped to visualise the patterns of association between age-groups and hygiene practices and provided deeper insight into the influencing factors.

Existing researches examining the age-group wise menstrual hygiene practices are limited, as most of them focus either on the adolescent girls or on the women in their reproductive age taken as a whole, without differentiating the practices across the small age-specific groups. Our study attempted to fill this gap by illuminating on how the

menstrual hygiene practices differ with age under certain social circumstances. Additionally, domestic workers, living in low socio-economic conditions and often facing limited access to menstrual materials and sanitation facilities, represent a section of women whose menstrual hygiene experiences deserve focussed attention. In the absence of comparable studies on domestic workers, our findings are interpreted in relation to studies on adolescent girls and reproductive-age women.

As observed in our study, more than half of the study participants have received only primary level of education, many of them lack having formal education, and most of their monthly family income is less than 10,000 (INR) per month. These socioeconomic constraints likely restricted their level of awareness for menstrual hygiene and affordability of menstrual materials. Additionally, privacy is challenged for some women who share toilets with other families and opportunities to change menstrual absorbents become restricted at the workplace for all of them, eventually influence their menstrual hygiene practices.

One remarkable finding of this study is that older domestic workers prefer to use sanitary pads, whereas younger participants rely more on old cloth. There are mixed evidences in the earlier researches. Some studies conducted in India [27–29] and outside [30–34] reported high use of sanitary pads among adolescent girls, whereas some other studies [25, 35, 36] outlined the reliance of adolescent girls on the use of old cloth. Our finding further contrasts with the NFHS-5, which reports high use of sanitary pads among 15–24 year-olds in the general Indian population [6]. However, it is to be noted that the NFHS sample takes into consideration the middle and high income groups as well who could afford sanitary pads, whereas our study participants live in low socioeconomic condition with financial constraints. Despite this, we found older participants using sanitary pads more frequently than the younger ones, perhaps because of the fact that the former have greater financial independence and stronger decision-making power compared to the latter.

In terms of changing menstrual absorbents three or more times daily was also more common among older participants. In this case also, mixed results have been exhibited in earlier researches. Whereas, several studies conducted across India and some other countries such as Nepal, Pakistan and Nigeria show that adolescents often change their absorbents fewer than three times a day [23, 30, 35, 36], contrasting pictures are revealed in some other studies [27, 28, 31, 37]. In case of our study, factors such as long working hours, multiple workplaces, and shared sanitation facilities might have limited the opportunity of the participants to change absorbents as and when required.

Our other results show, youngest domestic workers wash hands with soap and water after the use of menstrual absorbents and also wash their external genitalia more frequently compared to the other study groups. These results align with the studies conducted in some states of India and outside the country where adolescents demonstrating good external hygiene behaviour [30, 37–42]. Heavier workloads and the constant pressure of completing domestic chores might restrict the older participants from doing the same. However, a few studies from Maharashtra and Nigeria show poor genital hygiene among adolescents [27, 36], reflecting variability across regions.

In terms of disposal of menstrual absorbents, younger participants found to be practicing unsafe method, whilst the oldest age group showed a close association with the safe disposal practice. In this case also, whereas some studies reflected upon the safe

disposal among adolescents [30, 34, 36, 37], other studies found their such practices to be unsafe [35, 43]. The limited access to toilets in house and workplaces might have led our younger study participants to be disposing their menstrual absorbents in unsafe manner.

As revealed, older domestic workers demonstrate better menstrual hygiene by using sanitary pads, changing absorbents regularly and disposing them safely. Though they lag behind in the practices related to washing of hands and external genitalia, it may be reasoned that considering the kind of work they are involved in, they hardly get the scope to do so. The improvement of menstrual hygiene with age may be attributed to increased financial independence, greater autonomy in decision-making, and more experiential knowledge gained over time. The socioeconomic differences in terms of education, income, and toilet-sharing might cause strong variation across age groups.

Living in low socio-economic condition, working in multiple households, and staying away from home for long hours, even during their menstruation period, might have compelled the study participants to adopt certain practices that allow them to continue their work without taking breaks or holidays. These practices mostly learned from everyday experiences are the places where the older domestic workers excel the younger ones.

5 Limitations and strengths

As it is a cross-sectional study, we recorded behaviours at one point in time, limiting the ability to assess changes over time; a longitudinal study could provide better insights. The use of purposive, non-probability sampling might have introduced selection bias. The unequal age-distribution might also have affected the analysis. The findings are specific to domestic workers of Kolkata, thus generalized interpretations might not be applicable to other populations.

Strengths of this study include the use of a validated structured questionnaire, focus on a vulnerable and under-studied group, and detailed analysis of age-based differences in menstrual hygiene practices, which so far have been overlooked in academic researches. The findings provide evidences to call for targeted health education, workplace interventions, and policy measures. Future researches might explore longitudinal changes in menstrual hygiene practices, taking into consideration a wider population, and may identify the occupational and socio-economic determinants that influence menstrual hygiene management.

6 Conclusion

This study underscores the improvement of overall menstrual hygiene practices among the part-time domestic workers of Kolkata with their advancing age. Practices such as changing absorbents when feeling discomfort, use of sanitary pads or cloth pieces, and methods of disposal vary across age groups, while the practice of washing hands with soap and water after the use of absorbents shows minimal variation. Further, the practice satisfactory cleaning of external genitalia was not observed among many participants. Overall, older participants demonstrate better hygiene management by adopting modern practices over time. This age-related improvement is likely due to the accumulated experience, self-awareness, and coping strategies developed through the management of menstruation at personal level and also at the workplace. Middle age-groups exhibit transitional hygiene behaviours but younger age-groups show poorer practices.

Therefore, targeted menstrual health education is essential to promote hygienic behaviours among young domestic workers. Further, policymakers should integrate the domestic workers into existing urban health and sanitation programmes to improve their menstrual hygiene. Collaborative action is required between local governments and NGOs, and women organisations to increase access of affordable sanitary products through community-based systems, particularly for younger workers. Employers need to be generous to provide privacy and disposal facilities at workplaces. Incorporating menstrual hygiene provisions in the Domestic Workers Welfare and Social Security Act (2010) initiated by the Government of India would perhaps protect their health rights.

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Data availability
The dataset used and analysed for the purpose of writing this article is available from the authors on reasonable request.

Declarations

Ethics approval and consent to participate
The authors of the article did not obtain ethical approval from the Institutional Human Ethics Committee of Vidyasagar University to conduct this research. However, the research was conducted in view of the following considerations: (1) Ethical standard: This research was conducted involving human participants adhering to the Helsinki Declaration, 2024. The data for the research has been collected only through interviewing the study participants. The data collection methods neither involved bodily measurements nor the collection of samples for clinical laboratory tests. No medical risk for the participants was thus entailed. The research was conducted also following the ethical considerations as stipulated by the Indian Council of Medical Research (ICMR) National Ethical Guidelines (2017) for Biomedical and Health research involving humans as study participants. The research conducted was also in accordance with the ethical expectations for social science research promoted by the Indian Council of Social Science Research (ICSSR). (2) Informed Consent: All participants were informed about the purpose and nature of the study and informed consent was obtained from them prior to their participation, in the presence of a witness. Furthermore, the informed consent was taken either from the parents or from the legal guardians of the participants, who were non-literate and also below the age of 19 at the time of conducting the study. (3) Confidentiality: Individual identity of the participants have been kept strictly confidential. Personal identifiers were removed during data handling and analysis. Data have been stored securely and can be accessed only by the authors of this article. (4) Voluntary Participation: Participation was completely voluntary and all participants were made aware that they could withdraw from the study at any point of time, without any negative consequences upon them.

Consent for publication
The study participants gave their verbal consents to the authors that they have no objection if the findings of the study are published.

Competing interests
The authors declare no competing interests.

Actions for participants with poor menstrual hygiene
Participants having substandard menstrual hygiene practices were provided with brief advice and educational guidance during the interviews.

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