

Research Paper

Situation of menstrual management facilities in schools of peri-urban areas of Nepal: WASH, privacy, and healthcare

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ABSTRACT

Menstrual management (MM) facilities in schools are neglected in low- and middle-income countries. We examined the existing MM facilities, identified the deficient, and collected students' ideas in peri-urban schools of Nepal. The schools had basic MM facilities including water sanitation and hygiene (WASH) infrastructures, gender-segregated toilet facilities with taps, dustbins and running water, provision of emergency sanitary pads, etc. Out of 71 students who reported soiling of dresses with menstrual blood as a common problem, 27% went home and did not return in such situation instead of washing off at school. Forty-six per cent of students used washable absorbents, but washing and drying facilities were lacking, and students adapted by using disposable pads at school and washable at home. Out of 126 students, 106 took days off during menstruation in the past three months with an average of 2.6 days by one student. Sixty-one per cent gave the reason as pain and 39% tiredness for taking days off. Healthcare facilities were lacking in schools, hence, lack of these facilities in schools might be contributing to absenteeism. The traditionally advocated list of MM facilities for schools, largely involving WASH facilities, should be updated, including newly identified factors which were also suggested by students.

Key words: healthcare need, menstrual pain and discomfort, Nepal, school absenteeism, sick room, space for washing and drying

HIGHLIGHTS

- WASH infrastructures were available, but water supply and soap were less frequently managed.
- Reusable pads were advocated but lack of washing and drying space in schools made it less applicable
- Students developed coping strategy to use disposable pads at school and washables at home.
- A student skipped 2.6 school days in 3 months during menstruation due to health problems, but healthcare facilities were lacking.

INTRODUCTION

Menstruation is a natural part of the reproductive cycle of females and menstrual management (MM) is a necessity on a monthly basis. MM, here, is described as a combined management of menstrual hygiene and healthcare needs during menstruation. In 2012, WHO/UNICEF Joint Monitoring Programme for Drinking Water, Sanitation, and Hygiene defined menstrual hygiene management as 'women and adolescent girls using a clean menstrual management material that can be changed in privacy as often as necessary, using soap and water for washing the body as required, and having access to facilities to dispose of used menstrual management materials' (UNICEF 2019). Most girls experience their first menstruation during the age of 10–14 years old which is school going age. To maintain MM in schools, provision of gender-segregated toilet facilities, privacy, a sufficient supply of easily accessible and clean water, a mechanism of disposing of used sanitary materials in a private and culturally appropriate manner, and healthcare facilities are essential. However, providing such facilities in schools has long been a neglected issue in low- and middle-income countries (LMICs) (Sommer *et al.* 2015)

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like Nepal. While menstrual taboos affect school attendance of girls (World Vision 2021), poor MM facilities in schools compel girls to miss school or prevent them taking part in school activities including educational activities (Birdthisle *et al.* 2011; Tegegne & Sisay 2014; Sommer *et al.* 2015).

Comfortable MM is not possible without achieving Sustainable Development Goals 6.1 and 6.2, i.e., water, sanitation and hygiene (WASH) for all, paying special attention to the needs of women and girls. In Nepal, the United Nations International Children's Emergency Fund (UNICEF) together with its multi-sectoral partners, including Department of Water Supply and Sanitation, Department of Education, etc., has an initiative of integrating the WASH agenda in the education sector, popularly known as WASH in Schools (WinS) (UNICEF 2018) that delivers WASH components of MM facilities. Despite the WinS' comprehensive policy framework in Nepal, its application is identified as difficult by stakeholders due to myriads of obstacles prevalent at central, district and local level (WaterAid 2015). One of the obstacles faced by schools at local level is the access to water (WaterAid 2015). The water availability is different given whether the locality of a school is in an urban or peri-urban or rural setting. The unplanned expansion of the urban core puts immense pressure on water sources of the peri-urban landscape resulting in water scarcity (Shrestha *et al.* 2014). In addition, the peri-urban areas are poorly integrated into the city in terms of social and institutional issues and infrastructures and, hence, poor WASH facilities unsuitable for comfortable MM dominates in schools. Thus, prior to implementing WinS policies, the water availability and situation of existing facilities should be analysed in peri-urban schools.

The gap between proposed interventions and the social and cultural environment is another flaw faced at the local level for the application of policies. Sommer (2010) believes that single intervention differentially impacts girls from urban versus rural settings or girls from low- versus high-income families. Hence, the targeted interventions should be different for different socio-economic settings. Prior in-depth qualitative and ethnographic studies to understand local menstrual-related beliefs and practices and schoolgirls' views and constraints would be advantageous to identify area-specific effective interventions.

A study conducted in America showed that chronic absenteeism, i.e., missing 10% or 18 days of school in a year, highly affects students' academic performance (Balfanz & Byrnes 2012). High drop out in school leads to poor outcome in later life and impacts social productivity (Justice Policy Institute 2007). While WASH components of MM facilities are being disproportionately prioritized, other facilities that may have a direct relationship with school absenteeism are being overshadowed. Over the last few years, more studies have been conducted on the use of sustainable absorbents such as reusable sanitary pads (Hennegan *et al.* 2016) and many organizations are raising awareness and teaching to prepare them to make menstruation sustainable. Although less expensive compared to disposable sanitary pads, reusable sanitary pads need regular washing and drying and thus, 'a secure washing and drying space' in schools is essential. Lack of such facilities hinders frequent changing of pads, increasing the risk of reproductive tract infection (Torondel *et al.* 2018), and compelling students to skip school hours. UNICEF (2018) reported pain and discomfort as the main reasons for girls to miss schools during menstruation, indicating healthcare facilities in schools are essential to reduce absenteeism. It would be interesting to investigate the elements in schools which are aiding girls' school absenteeism even if the WASH component of MM facilities is in place.

In this study, we assessed peri-urban schools of the Kathmandu Valley and conducted structured questionnaire survey and focus group discussions (FGD) with adolescent schoolgirls. The objectives of this study were: (i) to better understand the existing MM facilities including WASH facilities in schools in peri-urban areas and (ii) to identify MM intervention solutions grounded in local context and schoolgirls' recommendations.

METHODOLOGY

Description of study areas

The Kathmandu Valley comprises Kathmandu, Bhaktapur and Lalitpur districts. The outskirts of the city areas of the Kathmandu Valley were considered as the peri-urban areas in this study. Dhadikot, Jhaukhel and Ekantkuna were selected based on population growth, land use change and water availability information (CBS 2012; Shrestha *et al.* 2014, 2018a, 2018b; Sada *et al.* 2016; Shrestha *et al.* 2017). Dhadikot of Suryabinayak municipality and Jhaukhel of Changhunarayan municipality of Bhaktapur district lie on the outskirts of Bhaktapur sub-metropolitan city and Ekantakuna lies on the outskirts of Lalitpur sub-metropolitan city. One public school in each of Dhadikot, Jhaukhel and Ekantakuna was chosen arbitrarily from the list of public schools available online.

Quantitative methods and sampling

In each of the three schools, class teachers of the 6th, 7th, 8th, 9th and 10th grades were asked to arbitrarily select a total of 60 menstruator students. Then, the selected students were provided with a self-filling structured questionnaire. The questionnaire probed for information about MM facilities in school including WASH facilities, experience of menstruation management and school absenteeism during menstruation. The questionnaires were adapted from a previous study by UNICEF (2018) on MM in Nepal.

Qualitative methods and sampling

Three focus group discussions (FGDs), one in each school, were conducted. Each FGD had six to eight students from grade 8 to 10. Considering the similar contents between the questionnaire and the FGD discussion topics, the students who had been involved in the questionnaire survey were excluded from the FGD to avoid collecting the same information twice. The issues of MM facilities, the students' views on current problems in schools and suggestions on overcoming them, etc. were discussed. The sessions were video recorded after seeking approval from the students and the teachers.

Statistical analysis

The quantitative data were entered and analysed using SPSS version 23.0. The results presented from quantitative data were in descriptive form. Generalized estimation equation (GEE) was used to identify the association between MM facilities in schools and absenteeism, represented by whether students took days off during menstruation, by controlling for the cluster within the schools. Other factors that were controlled were age and economic status of students. The results were presented in terms of adjusted odds ratio (AOR) and the statistical significance was set at a P -value of <0.05 . The qualitative data were transcribed and subjected to the narrative analysis to comprehend the current scenario.

Ethical concern

Before conducting qualitative and quantitative data collection, the participating students were informed about the purpose of this study. Parental consent and signature in the consent form were obtained before the students participated in the study. Their participation was voluntary, and they were not obliged to answer every question in the questionnaire and during the FGDs. The participants could withdraw anytime they chose to.

RESULTS AND DISCUSSION

Socio-demographic characteristics of students

Out of 60 questionnaires distributed in each school, 38 completed questionnaires from school A, 42 from school B and 46 from school C were collected in several attempts. Considering the voluntary participation, the students were not compelled to return the questionnaires. Hence, the response rate for the questionnaire survey was 70% (126/180).

The mean age of the students enrolled was 14.3 ± 1.2 years with an age range between 12 and 16 years. Most of the students' age of menarche was reported between 11 and 14 years and the mean age was 12.5 ± 1.0 years. This result is in line with that of other studies in rural Nepal: mean age of menarche was 13 years in Bajura and Achham and 12 years in Parsa (UNICEF 2018), whereas it was 12.37 years in the case of another urban area (Singh *et al.* 2019).

Status of use of menstrual absorbent

Three kinds of menstrual absorbents were being used in the study area: (a) cloth material (termed as 'cloth pad' hereafter), (b) disposable sanitary pad and (c) reusable sanitary pad. Out of 126 students, 54%, 21%, 18%, 5% and 2% of students used disposable sanitary pad, a combination of disposable sanitary pad and cloth pad, cloth pad, reusable sanitary pad, and a combination of reusable and disposable sanitary pad, respectively. In urban schools of Nepal, almost all the students used disposable sanitary pads and very few prefer reusable pads at home (Singh *et al.* 2019). Conversely, in rural Nepal, 65% of the students used reusable sanitary pad and 9% used disposable sanitary pads (UNICEF 2018), indicating that the popularity of disposable sanitary pads in urban and peri-urban areas could be attributable to their easy accessibility in city areas and their affordability. Nevertheless, a majority of girls in rural areas wished to use disposable sanitary pads because of the leakage problem they faced when using cloth pads and to feel more confident to move around and take part in physical activities. Despite the advantages disposable sanitary pads have, they are harmful to the environment (Bae *et al.* 2018), with an annual generation of around 480 billion soiled pads globally (van Eijk *et al.* 2019). On the other hand, they are linked with period poverty, which is defined as the struggle many low-income women and girls face when trying to afford menstrual

products, as well as their increased economic vulnerability due to the financial burden imposed by menstrual supplies (UNFPA 2021). In the rural areas of some low-income countries, the price of a pack of pads is the price of a meal and, hence, people can either feed themselves or buy pads (GHV 2020). Thus, for a sustainable period, both in terms of environmental and financial sustainability, cost-effective, self-preparable and reusable pads should be advocated. In our study, the percentage of students wishing to use reusable sanitary pads was larger (18%) than those wishing to use cloth pads (11%). Although both kind of pad are cloth type, increased preference for reusable sanitary pads could be attributable to their ease of use and wash, small size and secure design.

Menstrual management facilities available in peri-urban schools

Water, sanitation and hygiene (WASH) facilities

All schools had gender-segregated toilet facilities. The toilet facilities in school A and B had taps, running water and buckets to collect water. All of them had enough light and functioning locks and appeared clean. However, none of the toilet facilities in school C had secure locks and enough light and were clean. All the schools had handwashing stations with several taps at a distance from the toilet facilities.

During FGD, some students revealed the problems with water and toilet facilities:

'There is not enough water supply; sometimes no water supply at all.'

'Sometimes toilet facilities are not clean. All grade students use same toilet facility.'

'Tap is inside the toilet facility too, but soap is not available. Soap is rarely available outside too.'

'Soap is provided only in one place where we wash hands.'

The peri-urban schools had WASH infrastructures and were providing basic WASH facilities for comfortable MM. However, sometimes, toilet facilities were dirty, soap and water were unavailable inside and outside of the toilet facilities. Hence, schools need to provide soap and ensure that water is running in the taps most of the time.

Service of sanitary pad provision in immediate need

The provision of sanitary pads at the time of immediate need of a menstrual absorbent is one of the MM facilities. The schools in this study managed this facility through diverse financial arrangements. Two out of three schools collected NRs. 5–10 from each menstruator girl student of grade 6–10 to buy sanitary pads. Money was recollected each time the sanitary pads were finished. Collecting money from students and providing sanitary pads when needed in school hours is a popular practice in schools in other parts of Nepal too (UNICEF 2018). But in school A, needy students could buy a sanitary pad at the cost of NRs. 5 per piece from a staff member who was assigned to make the sanitary pads available. Although the government of Nepal had announced free access to sanitary pads at school for all schoolgirls (GIZ & Government of Nepal 2019), the schools in our study were yet to receive that service. This delay in implementation of the policies could be attributable to the unstable political situation, lack of coordination between provincial and local governments, and lack of regular monitoring. As well, lack of coherence and integration between different government policies for MM facilities could be another factor for the delay. When asked about the strategies the students used to manage the sudden onset of menstruation in school, 63 students used the service provided by the school, 42 students asked for a sanitary pad from friends, 26 students bought the pads in a nearby shop, 11 students used whatever cloth piece they had, 9 students returned home and came back, and 8 students returned home and did not come back. The higher number of students in need using this service provided by the school suggested the important role this service played in averting absenteeism.

Secure space for changing and disposing sanitary pads

Provision of a secure 'space to change' and secure 'dustbin to dispose' of sanitary pads are the MM facilities related to students' privacy. None of the schools had provided a separate secure space or room for changing sanitary pads, thus, students were required to use the toilet facility. However, 47% of the students did not perceive the toilet facility as a secure space. Toilet facilities were considered as a secure space to change pads by the students at public schools in other parts of Nepal (Baral *et al.* 2017) and in schools of other regions in the world (Sommer *et al.* 2013); however, the cleanliness of toilet facilities should be maintained for safe and comfortable MM. Out of the total, 94% of students in this study reported having a

secure dustbin to dispose of pads in schools, which indicated that there was a well-established disposal system in peri-urban schools.

Menstrual management facilities lacking in schools

Provision of secure washing and drying space with soap and sufficient water supply

Recently, many organizations have been involved in raising awareness and teaching females to make reusable sanitary pads as depicted in FGD:

'Many organizations came to our village to teach reusable sanitary pad making. My mother who participated in such programs taught me to make such pads.'

'One organization had visited our school to teach us to make such sanitary pads.'

Forty-six per cent of students, in this study, used reusable absorbents (reusable sanitary pad/cloth pad) either in combination with disposable pads or alone. Hence, nearly half of the students were using washable absorbents. Considering the necessity of regularly changing the absorbent, 'a secure washing and drying space' in school is essential for the groups using washable absorbents. However, none of the schools in this study has such a facility. When students were asked about the reasons for not washing washable absorbents in school, 65% said that a secure space for washing and drying was not available, 59% answered there was no secure space for drying, 39% blamed the lack of soap and 16% blamed the lack of sufficient water. Such a facility was unavailable in schools of other parts of Nepal as well (UNICEF 2018).

In the absence of a secure space for washing and drying, the washable absorbent users have adapted different strategies such as combining the use of washable absorbent with disposable absorbent. Around 21 and 2% of the students in this study were using cloth pad and disposable sanitary pad in combination and reusable and disposable sanitary pad in combination, respectively. FGDs also revealed that although students normally use washable absorbent at home, they use disposable sanitary pads at schools:

'We were taught to make reusable sanitary pads. But it is difficult to use during school hours. So, I use disposable pad at school and reusable at home.'

'I use cloth pad. I change pad in school and keep the used pad in a plastic bag and bring back home for wash.'

'I use disposable sanitary pad while going to school from home. When changing at school, I throw that pad and use cloth pad which I do not further change in school.'

'Many of the students use sanitary pad when they have to come to school even if they use cloth pad at home.'

In Uganda, students were provided with reusable sanitary pads allowing better school attendance but the related challenges such as space for washing and drying the reusable pads were not addressed (Hennegan *et al.* 2017). In Nepal, there are several government and private organizations teaching girls to prepare reusable pads for promoting an affordable period, but girls face challenges using them in school hours. Hence, this study recommends that the promotion of reusable sanitary pads should be combined/coordinated with the policies/strategies that could address the associated challenges in schools, such as provision of washing and drying space.

In general, girls were significantly anxious about soiling outer garments and being embarrassed in school (Hennegan *et al.* 2017). In our study, 71 (57%) students out of 126 reported soiling of their school dress as a common problem during menstruation and 55 (43%) students had not experienced such problem. Figure 1 shows the proportion of students applying several strategies when their dresses became soiled during menstruation in school. Out of 71 students, 27% of the students went home and did not return to school when the problem occurred (Figure 1). During FGDs, students shared their experiences when they choose going home as a strategy in such a situation:

'If we must go home before lunchtime, we come back to school. But if we go home after lunch we do not come back usually.'
'If you have a spare dress at home, you can change and come back to school. But if you do not have, then we do not come back to school.'

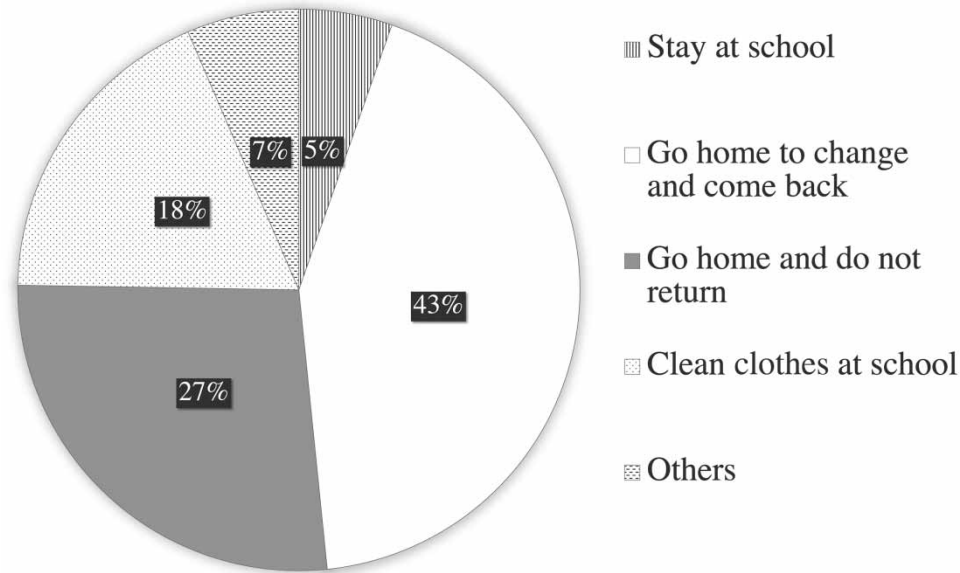


Figure 1 | Percentage of students (N = 71) following different management strategies when dress becomes soiled with menstrual blood during school hours.

These findings highlighted the fact that the considerable proportion of students went home and did not return when their dresses are soiled during menstruation. Hence, soiling the outer garment during menstruation has been indirectly linked with absenteeism in these schools, which can be easily averted if ‘a secure washing and drying’ facility was available in schools. Therefore, our study recommends including ‘secure washing and drying space’ under WASH agenda for schools, giving it enough importance to avert absenteeism.

Health care facilities

In our study, 11 students took hours off due to menstruation and out of them 9 students listed pain and tiredness as main reasons. Out of 126 students, 106 students (84%) took days off from school in the past three months due to menstruation, whereas this percentage was only 12.5% in urban schools in Nepal (Singh *et al.* 2019). On average, a student took 2.6 days off in three months with most of the students taking 2 days off, in our study. Table 1 shows the proportion of students providing different reasons for taking days off in school during menstruation. Health problems were top among all the reasons to take days off: pain was reported by 61% of students and tiredness by 39%.

Table 1 | Reasons for taking days off in school during menstruation

Reasons for taking day off	Frequency (N = 67 ^a)	%
Pain	41	61
Worried about blood stain in cloth	35	52
Tiredness	26	39
No facilities (toilet facility, water, etc.) at school for MM	12	18
Family suggestion	5	7
No secure bin to throw sanitary pad in school	5	7
Because there is no space for pad changing in school	5	7
Teased by school friends	4	6
School does not provide sanitary pad when needed	4	6
Family did not allow	3	4

^aOut of 106 students, only 67 students responded to these questions.

During FGDs, most of the students enlisted health complications such as stomach ache, weakness, tiredness, back pain and heavy bleeding as the common problems during menstruation. A UNICEF report (2018) mentioned that menstrual pain was the most common reason given by girls who missed school in rural Nepal. Pain and discomfort were among the main reasons of school absenteeism reported by other studies in Nepal as well (Dhakal *et al.* 2018; Rajbhandari *et al.* 2018). In schools in Uganda, menstrual cramping was considered as a main reason for school absences and disengagement for themselves and others in schools (Hennegan *et al.* 2017). Dysmenorrhoea, painful menses, is a common problem among adolescent girls and has an enormous impact on school attendance and the ability to concentrate on studies (Wong 2011; Ling *et al.* 2019). Conclusively, we can say that healthcare needs are as important as hygiene and privacy needs for a girl during menstruation. However, our observation and informal discussions with teachers revealed that none of the schools had a separate sick room. If students needed to rest, they use other rooms for some time, such as library, staff room or other empty rooms. FGDs revealed that the schools did not provide medicine for pain relief and easing of menstrual discomfort. Students brought medicines by themselves or asked permission from teachers to return home when pain starts or do not come to school at all during menstruation:

‘Sometimes we take medicine at home and come to school, but pain starts again in school, and we have to take leave and go home.’

‘We asked with teachers (for medicine). Some students bring by themselves.’

‘We have one friend who usually has severe pain during menstruation, and she cannot come to school.’

‘School does not provide medicines.’

‘Once my friend had similar problem. I have asked for medicine with teacher, but he did not give the medicine and suggested her to go home.’

Our findings suggested that health problems and unmet healthcare needs during menstruation were probably responsible for school absenteeism. Girls’ school and class absence and poor academic performance have been linked with menstruation and menstrual pain in other parts of the world (Lilliwati *et al.* 2007; Sanni 2019). Simple approaches, such as provision of a sick room with a few beds and medicine supply can meet students’ short-term urgency to relieve pain, discomfort and tiredness and can reduce absenteeism, but the establishment of sick rooms and provision of medicines are not practised in the schools of our study and in schools in other parts of Nepal (UNICEF 2018). To date, healthcare interventions have received little attention (Hennegan *et al.* 2017) and have never been enlisted as a facility required for comfortable MM in school policies and strategies. Hence, this study suggests a detailed study to analyse the relationship between lack of healthcare facilities in school and students’ absenteeism in order to lay a foundation to formulate evidence-based policies.

Relationship between absenteeism and MM facilities in schools

Table 2 shows the associations between MM facilities in schools and student absenteeism. The included MM facilities in the analysis were provision of sanitary pad in need, separate secure place to change sanitary pad and stained cloth, and different reasons that prevented students from washing and drying washable absorbents in schools. The results showed that the likelihood of absenteeism was significantly higher among the students who responded that they could not wash their washable absorbent because washing space was unavailable at school compared to those who responded ‘no’ to this reason (AOR = 5.53, 95% CI, 1.31–23.28, P -value = 0.02). None of the other factors showed significant associations with absenteeism. However, not being able to wash washable absorbent due to the unavailability of water (AOR = 1.39) and due to the unavailability of separate space for drying (AOR = 3.25) showed a trend. Since WASH facilities were considered as largely available and healthcare facilities as completely unavailable in the schools in previous sections, they were excluded from the analysis. However, due to the occurrence of model run error, health-related problems and many other important factors of absenteeism could not be added into the model. This situation could probably indicate data insufficiency or a poor performance model or incomplete model. Hence, the results are interpreted here as suggestive of the existence of a relationship between the lack of ‘washing and drying’ facilities in schools and student absenteeism during menstruation.

Table 2 | Association between absenteeism and MM facilities in schools

Factors	N = 92	AOR	P-value	95% Confidence interval	
				Lower	Upper
<i>'I didn't wash washable absorbent in school because there was no separate space to wash.'</i>					
No	33	1			
Yes	59	5.53	0.02	1.31	23.28
<i>'I didn't wash washable absorbent in school because there was no water to wash.'</i>					
No	74	1			
Yes	18	1.39	0.82	0.09	22.65
<i>'I didn't wash washable absorbent in school because there was no separate space to dry.'</i>					
No	39	1			
Yes	53	3.25	0.19	0.55	19.31
<i>'I didn't wash washable absorbent in school because there was no soap.'</i>					
No	54	1			
Yes	38	0.48	0.46	0.07	3.35
<i>'School provides sanitary pad in need.'</i>					
Yes	74	1			
No	18	0.80	0.79	0.15	4.26
<i>'School has separate secure place to change sanitary pad or stained cloth.'</i>					
Yes	42	1			
No	50	0.983	0.980	0.249	3.885

Adjusted for age and economic status; AOR, adjusted odds ratio.

Suggestions and recommendations grounded in students' experiences and constraints

Students' suggestions and recommendations were collected to gather their experiences and difficulties related to menstruation. The suggestions received were categorized into several topics: WASH, MM in emergency, MM for privacy, healthcare needs, MM information, and support (Figure 2). The major suggestions regarding WASH facilities are provision of good water supply, soap and regular cleaning of toilet facilities. Fifty-one per cent of students suggested free sanitary pads and recommended their constant supply. Provision of a private room for changing pads, secure space for washing and drying cloths, a sick room, and prearrangement of common spare dresses were some unique suggestions. Since the support from teachers was integral to the interventions' effectiveness (Hennegan *et al.* 2017), the received recommendations of emotional support from teachers, especially from female teachers, should be given due attention.

CONCLUSIONS

This study was conducted in peri-urban schools of the Kathmandu Valley, Nepal, to find the status of MM facilities and to identify possible interventions grounded in schoolgirls' recommendations. Our findings showed that the schools had WASH infrastructures such as gender-segregated toilet facilities with taps and running water, secure dustbins for sanitary disposal, handwashing stations, etc. However, some managerial gaps such as unavailability of soap, questionable cleanliness of toilet facilities, etc. should be improved. All the schools managed to provide sanitary pads during emergencies with students' financial support. While some students were less satisfied, this facility has largely averted absenteeism. Although the cleanliness of toilet facilities sometimes hindered students from using it, most of them perceived it as a secure place for changing menstrual absorbent.

Nearly half of the students were using washable absorbents, but the students could not wash them in school because secure space for washing and drying was unavailable. To cope with the situation, they used disposable sanitary pads in school hours which could be disposed of easily and used washable pads at home. Soiling of dresses with menstrual blood was the main reason to take days off during menstruation for 52% of the students. During such time, a considerable number of students

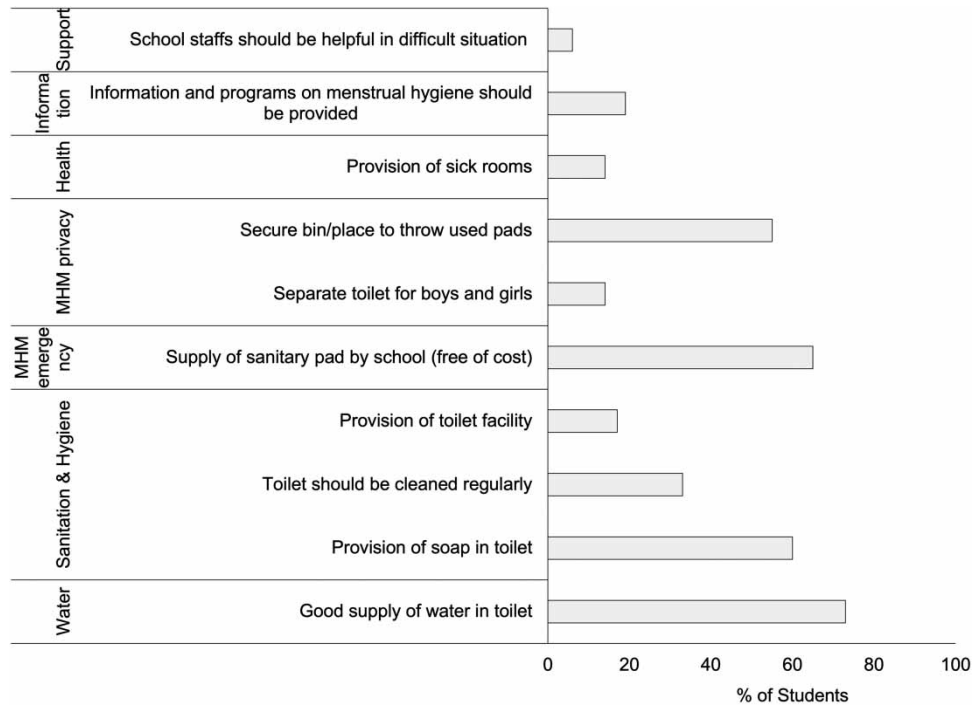


Figure 2 | Students' suggestions ($N = 126$) on menstrual hygiene management facilities in school and percentage of students providing the suggestions.

went home and did not return to school. These findings highlighted the fact that unavailability of 'a secure washing and drying space' might be encouraging school absenteeism and, hence, provision of such a facility may significantly improve students' attendance. Another important facility lacking in schools were healthcare facilities such as a sick room and medicine supplies. On average, a menstruating student skipped 2.6 school days in three months due to menstruation and the major reasons for this were pain and tiredness. These unmet healthcare needs are directly impacting students' attendance. Provision of sick rooms with a few beds and medicine for pain relief and discomfort management may reduce absenteeism. In addition to improvement of management aspects of existing WASH infrastructures, provision of sick rooms, spare dresses, washing and drying rooms, and emotional support from teachers were some key recommendations provided by the students.

Many of the interventions for comfortable MM in schools have prioritized WASH facilities worldwide. However, our findings in peri-urban schools indicated the presence of WASH infrastructures in schools, while they revealed that 'secure washing and drying space' and 'healthcare facility' as facilities are related to school absenteeism, these facilities were lacking in the schools. We recommend a policy update and advocate enlisting these newly identified MM facilities in addition to the traditional ones. Further, this study has opened avenues for large-scale studies covering private schools and including teachers' views in urban, peri-urban and rural areas that could be helpful to further identify and validate the facilities essential for comfortable MM in schools and to reduce school absenteeism.

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DATA AVAILABILITY STATEMENT

Data cannot be made publicly available; readers should contact the corresponding author for details.

REFERENCES

- Bae, J., Kwon, H. & Kim, J. 2018 Safety evaluation of absorbent hygiene pads: a review on assessment framework and test methods. *Sustainability* **10** (11), 4146.
- Balfanz, R. & Byrnes, V. 2012 *The Importance of Being in School: A Report on Absenteeism in the Nation's Public Schools*. Johns Hopkins University, Center for Social Organization of School, Baltimore, MD, USA. Available from: https://new.every1graduates.org/wp-content/uploads/2012/05/FINALChronicAbsenteeismReport_May16.pdf.
- Baral, K., Paudel, G., Gautam, P., Rana, S., Khadka, R., Bajgain, R. P. & Pathak, R. K. 2017 Mixed method approach for determining use, effectiveness, and technical soundness of the sanitary pad incinerators in the schools of Nepalgunj sub metropolitan city. *International Journal of Medical Science and Public Health* **6** (9), 1432–1436. doi:10.5455/ijmsph.2017.0718221072017.
- Birdthisle, I., Dickson, K., Freeman, M. & Javidi, L. 2011 *What Impact Does the Provision of Separate Toilet Facilities for Girls at Schools Have on Their Primary and Secondary School Enrolment, Attendance, and Completion? A Systematic Review of the Evidence*. EPPI-Centre, Social Science Research Unit, Institute of Education, University of London, London, UK.
- CBS 2012 *National Population and Housing Census 2011*. Central Bureau of Statistics, Kathmandu, Nepal.
- Dhakal, S. B., Sah, N., Shrestha, S. & Ahmad, T. 2018 Analysis of menstrual hygiene practices in Nepal: the role of WASH in school programme for girl's education. In: *41st WEDC International Conference*. Egerton University, Nakuru, Kenya.
- GHV 2020 *Advocacy for Affordability*. Available from: <https://gatesopenresearch.org/documents/4-134> (accessed 18 August 2021).
- GIZ and Government of Nepal 2019 *Nepal's Menstrual Movement*. GIZ, Germany & Support to Health Sector Program, Nepal. Available from: https://health.bmz.de/events/News/Nepals_menstrual_movement/giz_Nepal_s_Menstrual_Movement_Report_lowres_new.pdf.
- Hennegan, J., Dolan, C., Wu, M., Scott, L. & Montgomery, P. 2016 Schoolgirls' experience and appraisal of menstrual absorbents in rural Uganda: a cross-sectional evaluation of reusable sanitary pads. *Reproductive Health* **13**, 143. <https://doi.org/10.1186/s12978-016-0260-7>.
- Hennegan, J., Dolan, C., Steinfield, L. & Montgomery, P. 2017 A qualitative understanding of the effects of reusable sanitary pads and puberty education: implications for future research and practice. *Reproductive Health* **14**, 78. doi:10.1186/s12978-017-0339-9.
- Justice Policy Institute 2007 *Education and Public Safety*. Justice Policy Institute, Washington, DC, USA. Available from: http://www.justicepolicy.org/images/upload/07-08_rep_educationandpublicsafety_ps-ac.pdf.
- Lilliwati, I., Verna, L. K. M. & Khairai, O. 2007 Dysmenorrhoea and its effects on school activities among adolescent girls in a rural school in Selangor, Malaysia. *Medicine and Health* **2** (1), 42–27.
- Ling, C., Lu, T., Shengyu, G., Atipatsa, C. K. & Huilan, X. 2019 Primary dysmenorrhea and self-care strategies among Chinese college girls: a cross-sectional study. *BMJ Open* **9** (9), e026813. doi: 10.1136/bmjopen-2018-026813.
- Rajbhandari, A. K., Sagtani, A. K., Krishna Bahadur, G. C. & Dhaubanjari, R. 2018 Menstrual hygiene among adolescent school girls of Bhaktapur, Nepal. *Nepal Medical College Journal* **20** (4), 133–138.
- Sada, R., Shukla, A., Shrestha, A. & Melsen, A. 2016 Growing urbanization, changing climate, and adaptation in peri-urban Kathmandu: emerging shapes of water and livelihood security. In: *Water Security in Peri-Urban South Asia. Adapting to Climate Change and Urbanization* (Narain, V. & Prakash, A., eds). Oxford University Press, New Delhi, India, pp. 147–186.
- Sanni, K. T. 2019 The influence of menstruation on the academic achievement of senior secondary school biology students in Irewole local government, Osun State, Nigeria. *International Journal of Academic Pedagogical Research* **3** (4), 11–16.
- Shrestha, A., Sada, R. & Meisen, L. 2014 Adapting to peri-urban water insecurity induced by urbanization and climate change. *Hydro Nepal* **14**, 43–48.
- Shrestha, S., Aihara, Y., Bhattarai, A. P., Bista, N., Rajbhandari, S., Kondo, N., Kazama, F., Nishida, K. & Shindo, J. 2017 Dynamics of domestic water consumption in the urban area of the Kathmandu Valley: situation analysis pre and post 2015 Gorkha Earthquake. *Water* **9**, 222.
- Shrestha, A., Roth, D. & Joshi, D. 2018a Socio-environmental dynamics and emerging groundwater dependencies in peri-urban Kathmandu Valley, Nepal. *Water Alternatives* **11** (3), 770–794.
- Shrestha, A., Roth, D. & Joshi, D. 2018b Flows of change: dynamic water rights and water access in peri-urban Kathmandu. *Ecology and Society* **23** (2), 42.
- Singh, N., Sherpa, A., Pandey, S. & Pradhan, A. 2019 Menstrual hygiene: practice and challenges among adolescent girls of a private school of urban Nepal. *Asian Journal of Medical Sciences* **10** (4), 39–43.
- Sommer, M. 2010 Putting menstrual hygiene management on to the school water and sanitation agenda. *Waterlines* **29** (4), 268–278.
- Sommer, M., Kjellén, M. & Pensulo, C. 2013 Girls' and women's unmet needs for menstrual hygiene management (MHM): the interactions between MHM and sanitation systems in low-income countries. *Journal of Water, Sanitation and Hygiene for Development* **3** (3), 283–297. <https://doi.org/10.2166/washdev.2013.101>.
- Sommer, M., Sahin, M., Bathanson, C. & Parker, R. G. 2015 Comfortably, safely and without shame: defining menstrual hygiene management as a public health issue. *American Journal of Public Health* **105**, 1302–1311.
- Tegegne, T. K. & Sisay, M. M. 2014 Menstrual hygiene management and school absenteeism among female adolescent students in Northeast Ethiopia. *BMC Public Health* **14**, 1118.
- Torondel, B., Sinha, S., Mohanty, J. R., Swain, T., Sahoo, P., Panda, B., Nayak, A., Bara, M., Bilung, B., Cumming, O., Panigrahi, P. & Das, P. 2018 Association between unhygienic menstrual management practices and prevalence of lower reproductive tract infections: a hospital-based cross-sectional study in Odisha, India. *BMC Infectious Disease* **18** (1), 473.

- UNFPA 2021 *Menstruation and Human Rights: Frequently Asked Question*. Available from: <https://www.unfpa.org/menstruationfaq#Period%20Poverty> (accessed 20 August 2021).
- UNICEF 2018 *Analysis of Menstrual Hygiene Practices in Nepal: The Role of WASH in Schools Programme for Girls' Education 2016*. UNICEF, Nepal.
- UNICEF 2019 *Guide to Menstrual Hygiene Materials*. Available from: <https://www.unicef.org/media/91346/file/UNICEF-Guide-menstrual-hygiene-materials-2019.pdf> (accessed 18 August 2021).
- van Eijk, A. M., Zulaika, G., Lenchner, M., Mason, L., Sivakami, M., Nyothach, E., Unger, H., Laserson, K. & Phillips-Howard, P. A. 2019 Menstrual cup use, leakage, acceptability, safety, and availability: a systematic review and meta-analysis. *Lancet Public Health* **4**, e376–e393. [https://doi.org/10.1016/S2468-2667\(19\)30111-2](https://doi.org/10.1016/S2468-2667(19)30111-2).
- WaterAid 2015 *WaterAid School WASH Research: Nepal Country Report*. WaterAid, Nepal.
- Wong, L. P. 2011 Attitudes towards dysmenorrhoea, impact and treatment seeking among adolescent girls: a rural school-based survey. *The Australian Journal of Rural Health* **19** (4), 218–223. doi: 10.1111/j.1440-1584.2011.01213.x.
- World Vision 2021 *Factors That Trigger Girls' Absenteeism in School*. An analysis from Menstrual Health and Hygiene Management Study in Nepal. Available from: https://reliefweb.int/sites/reliefweb.int/files/resources/Factors%20for%20Girls%20Missing%20School_final.pdf (accessed 20 August 2021).

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