



Research article

Menstrual hygiene management practices and determinants among schoolgirls in Addis Ababa, Ethiopia: The urgency of tackling bottlenecks - Water and sanitation services

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ABSTRACT

Background: Menstrual hygiene management (MHM) service provision and improving schoolgirls' hygienic practices in schools are among the major challenges for low and middle income countries, including Ethiopia, in meeting the 2030 Sustainable Development Goals. This study was conducted to assess schoolgirls' MHM practices and what influences those practices in Addis Ababa, the capital city of Ethiopia.

Methods: A cross-sectional study was conducted on 401 adolescent schoolgirls and 98 school directors that were selected using a multistage sampling method. Pretested semi-structured interviewer-administered questionnaires and observational checklists were used to collect data. **Results:** During menstruation, about 90% of schoolgirls used commercially made disposable sanitary pads. However, only 45.9% of girls had access to emergency pads from their schools. Of the 98 directors, 79 (80.6%) responded that they had MHM provisions for schoolgirls. However, 42 (42.9%) schools had no water and soap in the pad changing rooms/toilets, and 70% lacked a covered dustbin for disposal/storage of soiled sanitary pads. Besides, more than 55% of the schools practiced open burning and dumping to dispose of used menstrual materials. More than half of the schools had no sanitary pad changing rooms, three-quarters of them lack MHM education, and only 2.5% had a bathing area. The location of schools (AOR = 5.44, 95% CI: (2.34–12.66)), health club availability (AOR = 3.14, 95% CI: (1.53, 6.42)), being informed about MHM before menarche (AOR = 2.04, 95% CI: (1.04, 4.00)), and availability of emergency sanitary pad at schools (AOR = 2.59, 95% CI: (1.36, 4.91)) were significantly associated with the status of schoolgirls menstrual hygiene practices.

Conclusions: About one-quarter of the schoolgirls had poor menstrual hygiene practices. Being a student in inner-city schools, attending a school that had a health club, being informed about MHM before menarche, and having access to emergency pads from schools were the determinant

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factors for good menstrual hygiene practices. However, most schools lack water, soap, and a covered dustbin in the pad changing rooms/toilets. Moreover, only a few schools provided MHM education and emergency pads. Improving water and sanitation services along with tailored MHM education are urgently needed to circumvent unsafe MHM practices among adolescent schoolgirls.

1. Introduction

Adolescence in schoolgirls has been recognised as a special period in their life that requires due attention, especially during menstruation [1,2]. The provision of menstrual hygiene management (MHM) services in school has implications for both reproductive health and school performance as indicated in the Sustainable Development Goals (SDGs), and is a prerequisite for the right to basic education for adolescent girls [3–5]. Unfortunately, 500 million women and girls globally lack adequate facilities for MHM, and 335 millions attend schools that do not have access to water or soap. About 20% of girls miss school due to monthly menstruation, and it is estimated that one out of every ten African school-aged girls misses 4 days every 4 weeks due to menstruation [6–8].

Good MHM practices, such as the use of sanitary napkins and washing of the genital areas with water and soap, are required during the menstruation period to boost confidence in day-to-day activities, and prevent urinary and reproductive tract infections [7]. There is growing evidence that improvements in hygiene services in schools have a positive impact on student health and well-being, enable equal learning opportunities, and positive education outcomes [9]. As a result, MHM is directly linked to SDG 6 and contributes to the achievement of other SDGs such as good health and well-being (SDG 3), quality education (SDG 4), and gender equality (SDG 5). Therefore, improvements in school MHM is an investment in health, education and gender equality. As a cross-cutting development agenda, it demands programme integration among sectors and collaboration of multiple actors.

MHM services for school girls in developing countries have many shortcomings including inadequate access to water, toilet, soap, pad changing rooms, sanitary pads for emergencies, and waste disposal infrastructure [10–12]. MHM, as in other developing countries, remains one of the most challenging issues confronting Ethiopian schoolgirls, receiving insufficient attention [7]. It is estimated that 37 million out of 39 million school-age children in Ethiopia lacked basic hygiene services [3]. The prevalence of good menstrual practices in various parts of Ethiopia are relatively low. For example figures from East Hararghe Zone [2], eastern Ethiopia [7] Nekemte town in western Ethiopia [13], northeast Ethiopia [14], northwest Ethiopia [15], and southern Ethiopia [16] were 58.3%, 66.6%, 39.9%, 33%, 24.5%, and 39.7%, respectively. This has led to increases in school dropout rate and absenteeism among schoolgirls while also affecting their well-being and health, dignity, and academic performance [14,17,18].

However, the aforementioned studies on school MHM were based on interviewer administered questionnaires and did not involved the authors observing hygiene facilities such as availability of water, soap and toilets with lock/dedicated menstrual hygiene rooms. The lack of these details curtails the application of relevant improvements. Furthermore, in contrast to the present study, previous studies were conducted on a very small number of schools. The present study also addresses an information gaps relating to the MHM practices in the highly populated Addis Ababa City Administration area.

2. Materials and methods

2.1. Study design, area, and period

The quantitative cross-sectional study was conducted to assess school menstrual hygiene practices and provisions in Addis Ababa City Administration from January to March 2020. Addis Ababa is the capital city of Ethiopia with 10 sub-cities and 117 woredas (districts). Its 2020 population is estimated to be 4,793,699. The city administration area has a total of 2147 schools and more than 863,357 students. The number of kindergartens, primary, and secondary schools in 2020 were 1133, 795, and 219, respectively. Among the schools, 527 are government owned while 1620 are private schools [19].

2.2. Sample size and sampling technique

The sample size of schoolgirls selected for this study was determined by employing a single population proportion formula [20]. Because there was no prior national or local data in a similar setting on MHM practice among schoolgirls, the proportion of desired outcome (P) of 50% was used to maximise the sample size. By using $P = 0.5$, $d =$ margin of error ($d = 0.05$), and Z value at 95% confidence interval ($Z_{d2} = 1.96$), the sample size (N) was calculated as:

$$N = \frac{(Z_{d2})^2 \times P(1 - P)}{d^2}$$

And, considering a 10% anticipated non-response rate, N was calculated to be 422. We used equal allocation for inner and peripheral sub-cities in recruiting respondents. The schools were sampled using a multistage sampling method by categorising the sub-cities into inner and peripheral sub-cities. Kirkos and Akaki Kality were selected by a simple random sampling method to represent the inner and peripheral sub-cities, respectively. Finally, 30% of the schools from each sub-city were included in the study giving a total of

98 schools. The selection of schools was done by considering school levels (primary, secondary, and preparator) and ownership (governmental, private, and non-governmental organizations). The directors of the sampled schools were interviewed for MHM services access and sanitary material provision. The sampling scheme is presented in Fig. 1. Although we studied access to basic water and sanitation services in 98 schools, girls for menstrual hygiene practices assessment were recruited from 13 elementary schools, and 5 secondary and preparatory schools where the directors reported that students had adequate water, sanitation, and hygiene services access. The sample size for schoolgirls to be included in the study in each school or sub-city was proportionally allocated depending on the female students population distribution by school level and ownership in the city as a whole. The schoolgirls from each school were chosen by simple random sampling method using the attendance roster as a sampling framework.

2.3. Data collection methods

The MHM data were collected using semi-structured interviewer-administered pretested questionnaire in the local language, Amharic and an observation checklist adapted from literature, core questions and indicators for monitoring WASH in schools in the SDGs, and tools prepared by UNICEF for assessing menstrual hygiene practices [21,22]. The data collected included socio-demographic characteristics and MHM practices of the schoolgirls as well as demographic characteristics of school directors. The observation checklist noted the availability of pad changing room, water and soap in pad changing room/toilet, bathing area, and covered dustbin for MHM waste storage, emergency pad provision, MHM education, and disposal mechanism of MHM materials. This checklist was used to validate the directors response to questions on MHM facilities and materials available. Demographic information on the school directors and the school’s MHM facilities were collected by the principal investigator while data from the schoolgirls were collected by five environmental health officers who have a university bachelor degree and practical work experience in the area of MHM.

2.4. Outcome and explanatory variables

The outcome variable was the menstrual hygiene practice status of schoolgirls (good practice or poor practice) that was determined based on the assessment of utilization of sanitary pads, sanitary pad changing frequency, the frequency and habit of cleaning external

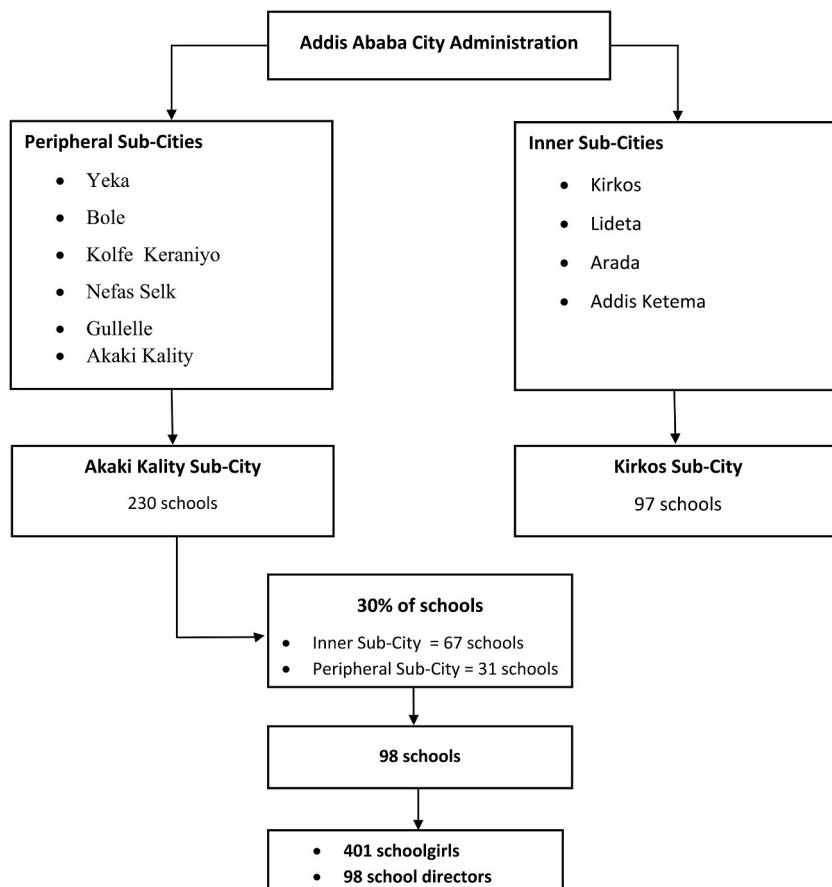


Fig. 1. Sampling scheme for the selection of schools, schoolgirls, and directors.

genitalia with water and soap, handwashing habits before and after changing sanitary pad, and disposal practices for used sanitary pad or drying of menstrual cloths. Explanatory variables were age of schoolgirls, religion of schoolgirls, school level, school ownership, location of schools, educational status of parents, occupational status of parents, availability of pad and access to changing rooms, water and soap availability in pad changing room/toilet, availability covered dustbin for MHM waste storage, health club availability within a school, Parent Teacher Associations (PTA) availability in MHM and MHM-related information access.

2.5. Operationalizing menstrual hygienic practice

The menstrual hygienic practices of the schoolgirls were evaluated using 12 questions with ‘Yes’ or ‘No’ answers. The response to each was scored as ‘1’ for ‘Yes’ and ‘0’ for ‘No’. The respondents were classified as sanitary pad users, reuseable cloth users, both disposable sanitary pad and reuseable cloth users, and those who do not use adsorbent material during menstruation. Those schoolgirls who responded that they did not use adsorbent materials during menstruation were considered as girls who had poor menstrual hygiene without further interview. Schoolgirls who used exclusively sanitary pad were exempted from the question that dealing with the habit of drying reusable clothes in sunlight. Similarly, schoolgirls who exclusively used reusable cloths were exempted from questions related to wrapping used sanitary pad with paper, and disposal practice in dustbins. The MHM practices of mixed menstrual materials were evaluated based on all questions that were applicable for sanitary pad and reusable cloth users. A similar menstrual hygiene practice evaluation approach was used by other studies in northeastern, eastern, and southern Ethiopia [1,23–25]. Respondents who scored equal to or above 50% were considered to have good menstrual hygiene practices, while lower values represented poor menstrual hygiene practices.

Table 1
Socio-demographic characteristics of schoolgirls that participated in the study in Addis Ababa, Ethiopia, 2020 (N = 401).

Variables	Categories	Frequency	Percent
Age group	10–14	105	26.2
	15–16	135	33.7
	17–19	161	40.1
School level	Primary	211	52.6
	Secondary	118	29.4
	Preparatory	72	18
Owner of the facility	Government	221	55.1
	Private	162	40.4
	Non-governmental organization	18	4.5
Religion	Orthodox	253	63.1
	Muslim	57	14.2
	Protestant	52	13
	Catholic	39	9.7
Geographic location	Inner	204	50.9
	Peripheral	197	49.1
Mother's education	Illiterate	16	4
	Read and write	43	10.7
	Primary	216	53.9
	Secondary	108	26.9
Father's education	College and above	18	4.5
	Illiterate	11	2.7
	Read and write	48	12
	Primary	139	34.7
Mother's occupation	Secondary	145	36.2
	College and above	58	14.5
	Merchant	103	25.7
	Private organization employee	159	39.7
Father's occupation	Government employee	35	8.7
	Housewife	104	25.9
	Merchant	169	42.1
	Private organization employee	121	30.2
Discussion with parents on MHM	Government employee	64	16
	Farmer	47	11.7
School health club	Yes	240	59.9
	No	161	40.1
Information before menarche on MHM	Yes	339	84.5
	No	62	15.5
Offer sanitary pad for emergency	Yes	181	45.1
	No	220	54.9
Your family participates in PTA	Yes	184	45.9
	No	217	54.1
	Yes	99	24.7
	No	302	75.3

2.6. Data quality control

The questionnaire and observation checklist were first prepared in English and then translated into the Amharic, the local language in the study area, to make it easier for respondents and to avoid misinterpretation of the questions asked. To evaluate the clarity of the questionnaire and the reactions of the respondents, the data collection methods were pretested in two schools located at Lideta and Yeka sub-cities that have similar characteristics to the sampled sub-cities. The pretested Amharic (the local language) version of the questionnaire and checklist were used for data collection. The data collectors were environmental health officers who have a bachelor university degree. Furthermore, data collectors were trained for one day in a sub-city that was not selected for this study.

2.7. Data processing and analysis

After coding, the collected data were entered into a database using EPI Info 7.2.2.6 and then exported to SPSS version 22.0 for data cleaning and analysis. Bivariate and multivariate logistic regression models were used to explore their association and their independent effects on the socio-demographic characteristics of MHM practice in schoolgirls, respectively. Variables with p -values less than 0.2 in the bivariate analysis were candidates for multivariate logistic regression analysis. In the multiple logistic regression analysis, a p -value of less than 0.05 at a 95% confidence interval (CI) for the odds ratio was used for determining the statistical significance of the associations.

Table 2

The menstrual hygiene management practices of schoolgirls in Addis Ababa, Ethiopia, 2020 (N = 401).

Variables	Categories	Frequency	Percent
Use absorbent materials during menstruation	Yes	398	99.3
	No	3	0.7
Types of material used to manage menstruation	Disposable sanitary pads	358	89.3
	Tissue paper	2	0.5
	Reusable cloth	23	5.7
	Pad/reusable cloth	18	4.5
Frequency of pad change or clothes more than three times a day during menstruation	Yes	124	30.9
	No	277	69.1
Dries reusable cloth in sunlight	Yes	347	86.5
	No	54	13.5
Cleans external genitalia during menstruation	Yes	368	91.8
	No	33	8.2
How often do you clean your external genitals?	Once a day	34	8.5
	Twice a day	328	81.8
	More than twice a day	34	8.5
	I don't wash daily	5	1.2
What do you use for your external genital cleaning purpose?	Only water	308	76.8
	Soft tissue	20	5
	Soap and water	73	18.2
	Other	0	0
Take a daily bath with soap during menstruation	Yes	69	17.2
	No	332	82.8
Where do you dry your reusable sanitary pads and underwear?	Open sunlight	14	3.5
	Hidden place	17	4.2
	Other/not use reusable cloth	370	92.3
Disposes of the pads by wrapping them with paper	Yes	310	77.3
	No	91	22.7
Disposes of used sanitary pads in the dustbin	Yes	322	80.3
	No	79	19.7
Is there any feeling of discomfort in your skin/reproductive organ?	Yes	66	16.5
	No	335	83.5
What type of discomfort do you feel?	Skin burning	13	3.2
	Skin itching	42	10.5
	Urinary Infections	8	2
	Other	8	2
Do you think your privacy in school is maintained during menstruation?	Yes	120	29.9
	No	281	70.1
Why do you think your privacy is not maintained in the school?	Lack of toilets in the school	35	8.7
	Toilet proximity of both sex	47	11.7
	Lack of door for toilets	105	26.2
	Lack of water	122	30.4
	Lack of pad changing room	8	2
	Others	4	2
	Overall menstrual hygiene practice	Good practice	311
	Poor practice	90	22.4

2.8. Ethical considerations

The study was conducted after obtaining an ethical clearance letter from the Ethiopian Institute of Water Resources of Addis Ababa University Ethical Review Committee (Ref. No. EIWR/ERC/05/19, dated: December 02, 2019). Data were collected after getting verbal informed consent from the study participants and the parents of those participants whose ages were less than 18 years. Privacy and confidentiality were maintained throughout the study period by excluding personal identifiers during data collection.

3. Results

3.1. Socio-demographic characteristics of schoolgirls

A total of 401 schoolgirls completed the interview and responded to all questions, giving a 95% response rate. About 74% of the study participants were within the age group of 15–19 years (Table 1). Most of the participants were from government-owned schools (55.1%) and primary schools (52.6%), where 63.1% were Orthodox Christians. About 4% of mothers and 3% of fathers of the participating schoolgirls were illiterate. More than half (53.9%) of the mothers and 34.7% of their fathers had primary education, while above 50% of the fathers had secondary and higher education levels. One hundred four (25.9%) of the respondents' mothers were housewives whereas 159 (39.7%) and 35 (8.7%) were employed in private organizations and government departments, respectively.

Table 3

Socio-demographic characteristics of the schoolgirls and their menstrual hygiene management practice in Addis Ababa, Ethiopia, 2020 (N = 401).

Variables	Categories	Menstrual hygiene practice		COR (95%CI)	AOR (95%CI)
		Good (n = 311)	Poor (n = 90)		
Age group	10–14	79	26	1	1
	15–16	102	33	1.4 (0.63–3.32)	1.35 (0.41–4.39)
	17–19	130	31	1.35 (0.41–4.39)	0.93 (0.36–2.40)
School level	Primary	159	52	1	1
	Secondary	94	24	0.93 (0.37–2.34)	1.519 (0.42–5.44)
	Preparatory	58	14	1.52 (0.42–5.44)	1.64 (0.61–4.44)
Owner of the facility	Private	121	41	1	1
	Government	174	47	1.01 (0.52–1.94)	0.33 (0.05–2.10)
	Non-governmental organization	16	2	0.33 (0.052–2.10)	0.33 (0.05–1.99)
Religion	Orthodox	204	49	1	1
	Muslim	43	14	1.39 (0.60–3.22)	1.36 (0.57–3.25)
	Catholic	25	14	4.48 (1.75–11.45)	0.98 (0.34–2.92)
	Protestant	39	13	1.36 (0.57–3.25)	0.30 (0.10–0.96) ^a
Geographic location	Inner	169	35	1	1
	Peripheral	142	55	5.44 (2.34–12.66)	5.44 (2.34–12.66) ^a
Mother's education	Illiterate	8	8	1	1
	Read and write	21	22	0.79 (0.19–3.24)	0.142 (0.02–1.18)
	Primary	174	42	0.18 (0.05–0.73)	0.18 (0.03–1.21)
	Secondary	92	16	0.19 (0.04–0.82)	0.79 (0.15–4.07)
Father's education	College and above	16	2	0.14 (0.02–1.00)	0.76 (1.14–4.17)
	Illiterate	5	6	1	1
	Read and write	35	13	0.81 (0.13–5.11)	0.31 (0.04–2.67)
	Primary	110	29	0.60 (0.10–3.70)	0.39 (0.09–1.7)
Mother's occupation	Secondary	107	38	1.28 (0.20–8.36)	0.52 (0.14–1.88)
	College and above	54	4	0.31 (0.04–2.67)	0.24 (0.07–0.81) ^a
	Merchant	80	23	1	1
	Private employee	127	32	1.01 (0.46–2.21)	0.51 (0.20–1.34)
Father's occupation	Government employee	30	5	0.95 (0.26–3.45)	0.51 (0.18–1.43)
	Housewife	74	30	0.51 (0.20–1.34)	0.54 (0.13–2.33)
	Merchant	133	36	1	1
	Private employee	99	22	0.69 (0.30–1.59)	0.88 (0.28–2.77)
Discussion with parents on MHM	Government employee	50	14	0.74 (0.28–1.95)	1.27 (0.40–4.03)
	Farmer	29	18	0.88 (0.28–2.77)	1.19 (0.33–4.30)
	Yes	190	50	1	1
	No	121	40	1.73 (0.92–3.25)	1.73 (0.92–3.25)
School health club	Yes	276	63	1	1
	No	35	27	3.14 (1.53–6.42)	3.14 (1.53–6.42) ^a
Information before menarche	Yes	151	30	1	1
	No	160	60	2.04 (1.04–4.00)	2.04 (1.04–4.00) ^a
Offer sanitary pad for emergency	Yes	159	25	1	1
	No	152	65	2.59 (1.36–4.91)	2.59 (1.36–4.91) ^a
Your family participates in the PTA	Yes	84	15	1	1
	No	227	75	1.74 (0.82–3.69)	1.74 (0.82–3.69)

COR: crude odds ratio; AOR: adjusted odds ratio; CI: confidence interval.

^a Statistically significant at p-value ≤ 0.05 .

Merchant (42.1%) and private organization employment (30.2%) were the main occupations of the fathers of the study participants while farmers accounted for 11.7%.

Among the 401 schoolgirls who participated in the study, 84.5% had access to a school health club, and 59.9% had a discussion with parents on MHM. However, less than half (45.1%) of the schoolgirls were pre-informed about MHM before menarche and more than half (54.1%) of the students had no access to emergency sanitary pad in the school (Table 1).

3.2. Menstrual hygiene management practices of schoolgirls

Regarding menstrual hygiene practices, 398 (99.3%) schoolgirls used absorbent materials during menstruation, of these 358 (89.3%) used disposable sanitary pads, and 23 (5.7%) reusable clothes (Table 2). About 80% of the girls disposed of soiled sanitary pads/clothes in the dustbin. Only 124 (30.9%) practiced pad or cloth change more than three times a day during menstruation. Moreover, less than one-fifth (18.2%) of the participants used water and soap to clean their external genital. About 70% of the schoolgirls reported a lack of privacy in schools to practice safe MHM of which lack of water (30.4%) and toilet doors (26.2%) were the main reasons. The detailed menstrual hygiene management practices of the schoolgirls are presented below (Table 2).

3.3. Factors associated with menstrual hygiene practice

In multivariate logistic regression analysis, geographic location, school health club, information before menarche, and offer of a sanitary pad for an emergency were significantly associated with the menstrual hygiene practice of schoolgirls (Table 3). The prevalence of good menstrual hygiene practice among schoolgirls belonging to the inner part of the city was more than 5 times that of the schoolgirls from the peripheral part (AOR = 5.44, 95% CI: (2.34–12.66)). Girls from schools that had health clubs were 3.14 times (AOR = 3.14, 95% CI: (1.53, 6.42)) more likely to practice good menstrual hygiene than those from schools with no health clubs. Similarly, the prevalence of good menstrual hygiene practice among schoolgirls who had information about MHM before starting menarche was 2.04 times (AOR = 2.04, 95% CI: (1.04, 4.00)) that of their counterparts. Furthermore, good menstrual hygiene practice was 2.59 more prevalent among schoolgirls from schools that provided emergency sanitary pad than those schoolgirls with no such provision (AOR = 2.59, 95% CI: (1.36–4.91)).

3.4. School menstrual hygiene management services provision

All 98 school directors who were invited to participate in the study completed the interview. Of these, 58 (59.2%) and 40 (40.8%) were females and males, respectively (Table 4). Sixty-seven directors were from the inner sub-city whereas 31 were from the peripheral sub-city. The directors were recruited from 62 primary, 34 secondary, and 8 preparatory schools. Fifty-three schools (54.1%) were private while 45 (45.9%) public.

Seventy-nine (80.6%) of school directors responded that they had MHM provisions for their schoolgirls. However, 42 (42.9%) of schools had no water and soap in pad changing rooms/toilets during the visit, while 70% of schools had no covered dustbins for menstrual hygiene waste material storage. Besides, more than 55% of the schools practiced open burning (36.7%) and open dumping (18.4%) of soiled menstrual hygiene materials (Table 5). Only two schools had bathing service provisions and 25% of the schools had regular MHM education (Fig. 2).

4. Discussion

Investigation of MHM-related challenges in low and middle income countries has primarily focused on identifying gaps and barriers to the proper practice of MHM among schoolgirls where there are limited cultural and resource conditions. This study assessed the MHM provision and practices of adolescent schoolgirls in Addis Ababa. The results showed that 398 (99.3%) use some sort of absorbent materials. A total of 358 (89.3%) used commercial disposable sanitary pads which is better than the figures reported from East Hararge Zone of Ethiopia (66.1%) and Ghana, tano district (50%) [2,25]. This may be because Addis Ababa is the capital city of

Table 4
Demographic characteristics of school directors (N = 98).

Variables	Categories	Frequency	Percent
Gender	Female	58	59.2
	Male	40	40.8
Educational status	Bachelor degree	62	63.3
	Masters degree	36	36.7
Geographic location	Inner	67	68.4
	Peripheral	31	31.6
School level	Primary school	62	63.2
	Secondary school	34	34.7
	Preparatory school	8	8.1
School ownership	Private	53	54.1
	Public	45	45.9

Table 5
MHM services provision in schools in Addis Ababa, Ethiopia, 2020 (N = 98).

Variables	Categories	Frequency	Percent
Menstrual hygiene service provision	Yes	79	80.6
	No	19	19.4
Water and soap provisions in pad changing room/toilet during the visit	Water and soap	17	17.3
	Only water	33	33.7
	Only soap	6	6.1
	No water and soap	42	42.9
Covered dustbins for MHM waste storage	Yes	29	30
	No	69	70
Disposal mechanism of MHM materials	Incineration	6	6.1
	Municipal waste collector	38	38.8
	Open burning	36	36.7
	Open dumping	18	18.4

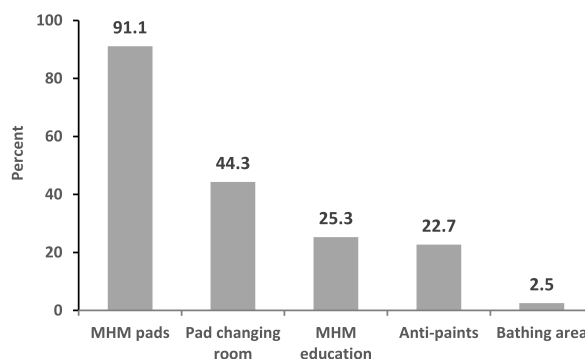


Fig. 2. Provision of school MHM services in schools in Addis Ababa, Ethiopia in 2020 (N = 98).

Ethiopia where diversified income is available to buy sanitary pads and better market access than other areas of the country. The provision of sanitary pads in Addis Ababa schools (91.1%) was found to be better than the study reported from Masvingo district in Zimbabwe where only 25% of the schools had backup sanitary pads for emergency use [26]. This study also showed a better result for MHM practices than a study undertaken in northern parts of Ethiopia where their clothes were stained with blood as they did not use sanitary pads [1].

Though the good MHM practice by schoolgirls in Addis Ababa is 75%, this figure is higher than in the studies conducted in other parts of Ethiopia, e.g. 35.4% in Habru Town [1], 39.7%, in southern Ethiopia [16], 53.9% in urban areas of northeastern Ethiopia [17], 57.0% in Adama City in Ethiopia [27], 68% in eastern Ethiopia [4], and other countries such as 47.5% West Bengal in India [28] and 50.8% in Ghana [7]. As Addis Ababa is the capital city, access to information, water and sanitation services, and availability of commercial sanitary pad access, in addition to well-informed families and school teachers may explain the higher prevalence of good MHM practice than in other parts of the country. Besides, the studies conducted both in West Bengal (India) and Ghana (Tano) were in rural areas where more bottlenecks for good menstrual practice could exist than in a capital city such as Addis Ababa. However, there is still room for improvement as the Addis Ababa figure was found to be less than that of the acceptable practice reported in a study conducted in Egypt, 90% [22].

Among the 98 schools, 79 (80.6%) of them had at least one type of MHM service provision. However, menstrual hygiene education, which is fundamental to promote adherence to safe practices was provided only in 25.3% of the schools in Addis Ababa. This figure is lower than a similar study undertaken in South Wollo area of Ethiopia, where 92% of respondents had received education about MHM [29]. In Zimbabwe's Masvingo district, 92% of the girls were given lessons about MHM, which is also much better than in Addis Ababa [26]. What we have reported on the school MHM services provision was collected from school directors while the study in South Wollo was collected from schoolgirls. However, the Addis Ababa school result was much better than the study in Uganda which reported only 7.1% of the students had menstrual hygiene education provisions [30].

Among the 98 schools, 44.3% had a pad changing room for MHM. However, only 21.5% had water with soap and only 18.2% of the schoolgirls reported that they used water and soap to clean external genitalia. Although low, the figures are somewhat better than those from a similar study in Kenya schools which showed that 13% had water in latrines for menstruating girls, and only 2% had soap availability [21]. On the contrary, in our study availability of soap was lower than the Bahir Dar city of northern Ethiopia [15,31]. Water, sanitation and hygiene services are essential to promote safe MHM practices among schoolgirls. Therefore, concerted effort is needed to improve practice in this regard to meet the targets of SDG 6 by 2030.

Our finding indicates that 70% of schoolgirls have no privacy in schools to manage their menstrual hygiene among which 26.2% noted the absence of toilet doors. Lack of privacy is one of the burning issues in low and middle income countries curtailing

improvements in practice of MHM. Due to the taboo nature of menstruation in Ethiopia and other parts of Africa, lack of privacy lead to poor menstrual hygiene practice that could expose to diseases. Besides, it may increase school absenteeism due to poor facilities to manage menstruation at school.

The students in the school which have a health club and from the central part of Addis Ababa city were more likely to perform good menstrual hygiene practices than other parts of the study area. Those schools may be working intensively on menstruation and hygiene management awareness which can promote safe menstrual hygiene practices [2]. Again, students in the peripheral part of the city may come from rural families where support for menstrual hygiene materials could be low due to their family background. Maternal education has an influence on girl's menstrual hygiene practice. Children of parents with college and higher-level education showed good menstrual hygiene practice, and this result is also supported by studies in the north-eastern part of the country [24]. This may be because students may easily discuss menstruation with their parents and at the same time may have greater access to money for the purchase of sanitary pads.

Students who received menstrual hygiene information prior to menarche and were given emergency pads had a significant association with good menstrual hygiene management. The studies in schools in Ambo town showed a similar results to this study in that students that have information before menarche have significantly good MHM practice than those girls with no information [32,33]. MHM education intervention in addition to the academic teaching may help promote good MHM practices that also fosters school health and education performance.

5. Conclusions

About three-fourth of schoolgirls have good menstrual hygiene management practices and most utilize commercially made sanitary pads. However, most schools lack basic water supply, sanitation and hygiene facilities and materials which are essential to ensure safe MHM practices among adolescent schoolgirls. Moreover, only a few schools provided MHM education and emergency commercial-made sanitary pads for girls. The geographic location of schools, health club availability, information before menarche, and offering sanitary pads for an emergency were significantly associated with the good MHM practice among schoolgirls. Improving water and sanitation services along with tailored MHM education are needed to circumvent the gaps in MHM practices among schoolgirls. These recommendations align with efforts to achieve the goals of SDG6.

Author contribution statement

Abayneh Melaku: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Taffere Addis: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Bezatu Mengistie: Conceived and designed the experiments; Analyzed and interpreted the data; Wrote the paper.

Girum Gebremeskel Kanno, Metadel Adane, Mary Kelly-Quinn, Sisay Ketema, Teklu Hailu, Dinaol Bedada and Argaw Ambelu: Analyzed and interpreted the data; Wrote the paper.

Data availability statement

Data will be made available on request.

Additional information

Supplementary content related to this article has been published online at [URL].

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Abbreviations

JMP	Joint Monitoring Programme
MoE	Ministry of Education
MHM	Menstrual Hygiene Management
PTA	Parent Teacher Association
WASH	Water, Sanitation and Hygiene

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2023.e15893>.

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