



Original Article

Psychological, Informational, and Material Factors Impacting Girls' Menstruation-related School Absenteeism in Rural Tanzania

Michelle R. Eades-Baird^{1*} & Dan Nyaronga¹

¹ Empire State University, New York, United States.

* Author for Correspondence ORCID ID: <https://orcid.org/0000-0002-1913-5410>; Email: michelle.eadesbaird@sunyempire.edu

Article DOI: <https://doi.org/10.37284/eajes.7.4.2330>

Date Published: **ABSTRACT**

23 October 2024

Keywords:

*Menstrual Hygiene
Management (MHM),
Menstrual Pads,
Menstruation Preparation,
School Absenteeism,
WASH Facilities.*

Girls' education remains a significant challenge in sub-Saharan Africa as it is estimated that 1 in 10 adolescent girls miss school during their menstrual cycle. In Tanzania, girls must attend school regularly to be sufficiently prepared for the National Examinations that serve as gatekeepers to higher education levels and advanced careers. Our current study focuses on contextual factors that limit Tanzanian girls' school attendance during menstruation (ADM). Using descriptive and inferential statistical techniques and survey data from post-menarche adolescent girls (N = 610) in the Mara region of Tanzania, the findings revealed that psychological, physiological, informational, and material factors increase the likelihood of girls' school absenteeism during menstruation. The results from this study indicate that generalized anxiety, depression, worry about menstruation, menstruation preparation, and menstrual pad material have a direct impact on ADM. The findings from this study have implications for educational policy and school leadership.

APA CITATION

Eades-Baird, M. R. & Nyaronga, D. (2024). Psychological, Informational, and Material Factors Impacting Girls' Menstruation-related School Absenteeism in Rural Tanzania. *East African Journal of Education Studies*, 7(4), 386-398. <https://doi.org/10.37284/eajes.7.4.2330>

CHICAGO CITATION

Eades-Baird, Michelle R. and Dan Nyaronga. 2024. "Psychological, Informational, and Material Factors Impacting Girls' Menstruation-related School Absenteeism in Rural Tanzania". *East African Journal of Education Studies* 7 (4), 386-398. <https://doi.org/10.37284/eajes.7.4.2330>

HARVARD CITATION

Eades-Baird, M. R. & Nyaronga, D. (2024) "Psychological, Informational, and Material Factors Impacting Girls' Menstruation-related School Absenteeism in Rural Tanzania", *East African Journal of Education Studies*, 7(4), pp. 386-398. doi: 10.37284/eajes.7.4.2330

IEEE CITATION

M. R. Eades-Baird & D. Nyaronga "Psychological, Informational, and Material Factors Impacting Girls' Menstruation-related School Absenteeism in Rural Tanzania" *EAJES*, vol. 7, no. 4, pp. 386-398, Oct. 2024. doi: 10.37284/eajes.7.4.2330.

MLA CITATION

Eades-Baird, Michelle R. & Dan Nyaronga. "Psychological, Informational, and Material Factors Impacting Girls' Menstruation-related School Absenteeism in Rural Tanzania". *East African Journal of Education Studies*, Vol. 7, no. 4, Oct. 2024, pp. 386-398, doi:10.37284/eajes.7.4.2330

INTRODUCTION

Educational attainment is a multidimensional process impacted by social-cultural, psychological, physiological, informational, and material factors. For school-aged girls in resource-poor areas in South and Sub-Saharan Africa, educational attainment is especially difficult. One factor that greatly impacts the educational experiences of school-aged girls in these areas is menstruation. The social context of girls' lives in sub-Saharan African countries like Tanzania may translate into significant challenges after menarche, and to girls' successful participation in school (Sommer, 2009). Although studies have documented barriers to girls' school attendance, participation, and retention in schools globally (Lloyd, & Young, 2009; Mohammad et al., 2020; Montgomery et al., 2016; Sommer et al., 2015; UNESCO, 2015) including, gender-based violence (Parkes, & Heslop, 2013), cultural expectations, household responsibilities, early pregnancy and marriages, lack of female teachers, prioritization of boys' education (Lloyd, & Mensch, 2008; UNESCO, 2015), and inadequate resources (e.g., puberty guidance, sanitary materials, and safe, clean, private, and accessible water, sanitation and disposal facilities; Sommer et al., 2015), the quantifiable relationship between rural Tanzanian girls' school absenteeism during menstruation and these related factors, are mostly absent.

To address this gap, the study explores the connection between school absenteeism and demographic factors (e.g., age), socio-cultural factors (e.g., fear of mistreatment from peers during menstruation, inadequate social support, and parental prohibition to attend school, religious restrictions during menstruation, and other misconceptions, myths, and taboos), informational factors (e.g., inadequate and improper knowledge about menstruation), physiological factors (e.g., physical pain such as cramping, headache, backache, nausea, and diarrhoea), psychological factors (e.g., psychological symptoms such as depression and anxiety), and material factors (e.g., availability of resources such as commercial sanitary products, or wash facilities such as running water, doors on the latrines, disposal bins for the used sanitary pads, etc.), and WASH (Wash, Sanitation, and Hygiene) facilities factor. Thus, the purpose of this study is to

evaluate the identified contextual factors that limit rural Tanzanian girls' school attendance during menstruation (ADM), and their implications for girls' education in Tanzania.

LITERATURE REVIEW

Growing evidence suggests multiple factors at play impact low-income girls' school attendance during menstruation. Reports of school absences due to unmet menstrual needs have prompted increased attention to menstruation in research, policy, and practice. Some of these factors include demographic factors, socio-cultural factors, inadequate menarche and menstruation knowledge and support, psychological and physiological factors, and material factors including access to menstrual absorbents and adequate school WASH (Wash, Sanitation, and Hygiene) facilities.

In their study of Ugandan adolescent girls, Miiro, & colleagues (2018) determined that older girls experienced a higher rate of ADM than younger ones (aOR = 2.53, 95% CI 1.08, 5.96) for those aged 15–17 vs 12–14. Lower socioeconomic status (SES) was also a contributing factor to ADM (aOR = 2.34, 95% CI 1.34, 4.11). In addition, a study by Shah, & colleagues (2022b) indicates that as school-age girls increased in age, they were much more likely to be absent from school during menstruation. Kumbeni et al. (2021) reported increased absenteeism for girls in higher grade levels, which may suggest that as they get older, girls may be less likely to ask for help with managing their menses.

Many school-age girls in resource-poor settings tend to experience inadequate social support when menstruating (Shah et al., 2022a). In addition, menstruation is subject to a code of silence in these areas, prohibiting girls from asking for assistance from teachers or friends when needed (Fennie et al., 2021; Sommer et al., 2016; Vashisht et al., 2018). Many girls fear mistreatment from their peers when menstruating due to possible leakage and grimaces caused by painful cramping (Crankshaw et al., 2020; Guya et al., 2014; Kumbeni et al., 2021; Vashisht et al., 2018). Furthermore, parents sometimes prohibit their daughters from attending school when menstruating (Chinyama et al., 2019; Edet et al., 2022; Grant et al., 2013; Vashisht et al., 2018). These factors contribute to increased

absenteeism among school-age girls, and in extreme cases, the teasing experienced as a result of menstruation can lead to girls dropping out of school entirely (Guya et al., 2014).

Studies suggest that due to misconceptions, myths, and taboos, many school-age girls in developing countries experience religious restrictions during menstruation (Edet et al., 2022; Fennie et al., 2022; Korir et al., 2018; Kumbeni et al., 2021). A study by Kumbeni, & colleagues (2021) reported that Ghanaian girls are told to refrain from bathing during menstruation, leading to school absenteeism as girls fear being teased in school. In addition, some restrictions prevent girls from utilizing public sanitation facilities when menstruating leading to increased school absenteeism. However, when girls experience adequate social support, the negative effects of menstruation on school attendance may be reduced. For example, Grant et al. (2013) reported that school-age girls living with their grandmother had increased odds of attending school when menstruating due to the MHM (Menstrual Hygiene Management) guidance provided by the grandmother. In addition, school-age girls who reported receiving homework help from their parents had lower odds of menstruation-related absenteeism (Grant et al., 2013).

According to Dolan et al. (2014), many girls begin menstruation with inadequate knowledge of how to properly manage their menses. This may be due to social norms dictating a code of silence surrounding menstruation, leading many school-age girls to develop misconceptions about the process (Chinyama et al., 2019; Dolan et al., 2014; Mason et al., 2013; Shah et al., 2022a), feeling embarrassed, afraid, ashamed, and isolated, which can lead to increased school absenteeism when menstruating (Dolan et al., 2014; Shah et al., 2022b; Sommer et al., 2016). Moreover, improper knowledge of how to manage menses may leave school-age girls feeling unprepared to attend school while menstruating (Grant et al., 2013; Vashisht et al., 2018). Fortunately, when exposed to proper puberty education, menstruation-related absences for school-age girls decline (Crankshaw et al., 2020; Dolan et al., 2014). Menstrual hygiene education teaches girls how to properly manage menses, leading to

decreased feelings of shame and insecurity (Dolan et al., 2014; Jewitt, & Ryley 2014).

According to Boyle (1997), menstruation presents psychological changes that may increase the incidence of depression in school-age girls, leading to decreased academic performance (Shehadeh, & Hamdan-Mansour, 2017) as premenstrual syndrome and premenstrual dysphoric disorder tend to be comorbid with depressive disorders. In addition, while menstruation may cause depression through physiological symptoms, many girls also experience depression because of the menstrual restrictions they experience (e.g., the disappointment from feeling left out of school activities or missing school because of their menstruation) (Fennie et al., 2021; Okello et al., 2022; van Iersel et al., 2016). Furthermore, studies have indicated that menstrual anxiety may also lead to school absenteeism, poorer performance, and subsequent school dropout for adolescent girls (Hennegan et al., 2019; Vashisht et al., 2018). For example, the study by Vashisht et al. (2018) reported between 10%-20% of school time missed by adolescent girls was due to menstrual anxiety.

As menstruation's most common physical symptoms are cramping, headaches, backaches, nausea, and diarrhoea (Grant et al., 2013; Mason et al., 2013; Miirio et al., 2018), studies indicate that menstruation-related school absenteeism is directly related to these physical symptoms that school-age girls experience during menses (Crankshaw et al., 2020; Edet et al., 2022; Jewitt, & Ryley, 2014; Kansime et al., 2020; Kumbeni et al., 2021; Miirio et al., 2018; Shah et al., 2022a; Tanton et al., 2021; van Iersel et al., 2016; Vashisht et al., 2018). For example, in a study on the impact of menstruation on Ugandan girls' school attendance, menstrual pain associated with moderate or heavy flow was significantly associated with school absenteeism (Tanton et al., 2021); in another study, the headaches, back, and abdominal pain girls experience (Miirio et al., 2018) contributed to a 28% school absenteeism rate on period-days (compared to 7% on non-period days). Other studies have also demonstrated how the severity of menstrual pain is related to the degree of school absenteeism in girls from developing countries with more severe pain leading to increased absenteeism (Fennie et al.,

2021; Grant et al., 2013). Unfortunately, and as discussed by van Iersel et al. (2016), the negative effects of menstrual pain may have the cumulative effect of reducing school-age girls' educational opportunities. Studies by Grant, & colleagues (2023) recommend the use of proper pain management for school-age girls to manage their dysmenorrhea and subsequent ADM.

Studies have indicated that school-age girls in resource-poor settings commonly use old clothes, paper, cotton, wool pieces, leaves, tissues, toilet paper, and even just underwear to manage menstrual bleeding (Foster, & Montgomery, 2021; Sommer, & Sahin, 2013). These traditional methods of managing menstrual bleeding are typically endorsed as adequate by parents, even though most school-age girls prefer to use commercial-made menstrual pads (Dolan et al., 2014). According to Mohammed, & colleagues (2020), they found that school ADM was associated with girls being provided with a regular allowance to purchase menstrual care products including factory-made sanitary pads. For girls in most third-world countries, who are required to walk long distances to school, the use of cloth is unreliable and even leads to friction burns on their inner thighs, leading to the avoidance of school when menstruating (Chinyama et al., 2019; Dolan et al., 2014).

Furthermore, the use of a piece of cloth as a menstrual absorbent is associated with increased school absenteeism due to fear of leakage and fear of giving off an odour (Crankshaw et al., 2020; Jewitt, & Ryley, 2014; Kumbeni et al., 2021; Mason et al., 2013; Shah et al., 2022a; Vashisht et al., 2018). Other studies by Dolan et al. (2014) and Kumbeni et al. (2020) reported that even pieces of cloth are scarce in resource-poor settings, leading many girls to share with others and/or wear damp, dirty clothes all day. This may contribute to skin irritations and pelvic infections, affecting school attendance and reproductive health (Dolan et al., 2014). Due to a lack of adequate menstrual materials, studies by Jewitt, & Ryley (2014) estimated that in Kenya, adolescent menstruating girls miss approximately 3.5 million learning days (combined) per month. Studies indicate that school attendance for girls who have access to and use commercial menstrual products is much higher (Edet et al., 2022; Kumbeni

et al., 2021; Shah et al., 2022b; Vashisht et al., 2018); however, poor families sometimes view commercial sanitary products as unnecessary (Dolan et al., 2014).

Several studies have reported inadequate WASH facilities for school-age girls in low-income countries (Crankshaw et al., 2020; Dolan et al., 2014; Grant et al., 2013; Sommer et al., 2016). Schools in these areas tend to lack adequate facilities for school-age girls to manage their menses, making school attendance during menstruation exceedingly difficult (Crankshaw et al., 2020; Dolan et al., 2014; Grant et al., 2013; Guya et al., 2014; Kansiime et al., 2020; Kumbeni et al., 2020; Shah et al., 2022a; Vashisht et al., 2018). School-age girls have reported the following WASH facility factors as impacting their attendance, including the lack of: doors on the latrines, functional handwashing stations, soap, pad disposal bins, running water, clean latrines, and gender-specific washrooms (Chinyama et al., 2019; Foster, & Montgomery, 2021; Guya et al., 2014; Kumbeni et al., 2021; Shah et al., 2022a; Sommer, & Sahin, 2013; Vashisht et al., 2018). More specifically, insufficient WASH facilities can cause menstruating girls to miss four consecutive days of school each month (Vashisht et al., 2018). Menstruation-related absences are much higher in schools with same-sex latrines (Fennie et al., 2022; Guya et al., 2014). This may be due to the fear of being 'found out' (Dolan et al., 2014). Even when schools have proper access to water, it is usually at a distance from the latrine stall, decreasing the privacy for school-age girls to wash themselves (Mason et al., 2013; Sommer, & Sahin, 2013). Studies suggest that to improve attendance for menstruating girls, schools need to provide provisions for menstrual management, including more adequate WASH facilities (Dolan et al., 2014; Guya et al., 2014; Jewitt, & Ryley, 2014).

The body of research on girls' menstruation experiences and ADM in resource-poor countries indicates that there are many factors at play. These factors include knowledge about menstruation, social support, symptom management, access to sanitary pads, and appropriate WASH facilities at school. In this study, we will examine these factors and their influence on girls' school attendance in rural Tanzania. Finally, we will develop a model to

better understand which factors have the greatest impact on school attendance. These findings will provide a basis from which we will make recommendations that may prove to address these concerns and improve girls' school attendance.

METHODOLOGY

The study employed a quantitative design which was selected due to the data being collected via survey and analyzed for trends. The dataset came from adolescent girls in rural Tanzania and its dissemination was undertaken with the help of the Buhare Community Development Training Institute (CDTI), a government-owned institution under the Ministry of Community Development, Gender, and Children in the Mara region of Tanzania. The Mara Region is located in the northern part of mainland Tanzania bordering Uganda and Kenya. The mainstays of the rural Mara Region are fishing, cattle raising, crop farming, gold mining, and tourism. The Buhare CDTI obtained authorization from the government of Tanzania to conduct the survey. Through informed consent, authorization was obtained from participants and their parents (for those who were underage; 13-17 years old). The questionnaire included 83 items that included: demographic information (e.g., age, level of education), preparation for menarche (e.g., menarche knowledge and awareness), menstruation-related school outcomes (ADM), psychological and socio-cultural characteristics (e.g., anxiety, depression, perceived social support, and religiosity) and physiological factors. The questionnaire was written in Kiswahili (the local language in Tanzania) and later translated into English by the Buhare CDTI. Analysis of the secondary data set was approved by the authors' University Institutional Review Board (IRB).

Within the first section of the survey, baseline demographic information was collected including age, relationship status, level of education, age at menarche, whether or not education on safe menstruation was provided, and from whom they received menarche education. Menarche preparation was assessed using seven items (White, 2013) which had an acceptable reliability ($\alpha = .790$). The menstruation-related school outcomes construct was developed to collect data on school attendance

during menstruation. The Beck Clinical Anxiety Inventory (Beck et al., 1988), was used to investigate participants' levels of anxiety which had acceptable reliability ($\alpha = .720$). To measure the girls' depression levels, the 20-item Center for Epidemiologic Studies Depression measure (Radloff, 1977) was used which had a high reliability ($\alpha = .876$). To assess participants' physiological factors (e.g., menstruation symptoms), and material factors (e.g., sanitary pad usage and preference), and availability of WASH facilities at home and school, 13 survey questions were developed and included in the survey. To gather information on the girls' social support, the Multidimensional Scale of Perceived Social Support (Zimet et al., 1988) which had a high reliability ($\alpha = .884$), was used. The final construct, religiosity, was derived from the 5-item Duke University Religion Index (DUREL) (Koenig, & Büssing, 2010) which had low reliability ($\alpha = .630$).

Data Analysis

All descriptive and inferential statistical analyses were performed using Statistical Package for Social Sciences (SPSS v.29). Before the analysis, the researchers checked the assumptions, the nature of the variables, frequencies, outliers, and re-coded the variables. The point-biserial correlation and Chi-square correlation analyses were conducted for select independent variables with the highest likelihood of being significantly associated with school absenteeism during menstruation. Correlation between the independent variables was assessed to test multi-collinearity. For logistic regression, the independent variables were entered into the stepwise multivariable logistic regression model. Multivariable logistic regression analysis was performed using the likelihood-ratio method to control for potential confounding variables. Model fitness was tested with the Hosmer-Lemeshow goodness-of-fit test and omnibus tests of model coefficients. Finally, the strength of association was measured by both crude and adjusted odds ratios with a 95% confidence interval (CI) for exposure variables and the outcome variable, absent during menstruation (ADM). The statistical significance level was declared at p -value < 0.05 . We chose the logistic regression model because it's ideal for education literature and studies that involve

dichotomous outcomes, in this case, absent during menstruation (ADM) or present during menstruation (PDM).

RESULTS

At the time of this study, one hundred percent (100%) of the female respondents ($N = 610$) were post-menarche with an average age of 14.8 years old. In this sample, 60.7% of the girls were in Primary School (Standards 5 and 6), 38.4% in Secondary

School (Forms 1-4), and 0.8% were in Advanced Secondary School (Forms 5 and 6; *see Table 1*). When asked about the number of days missed from school due to menstruation, 24.4% reported missing 1-6 days within the past two months. The socio-demographic factor that was significantly associated with missed school days during menstruation included age ($p=.043$), but not grade level ($p=.056$) or age at menarche ($p=.244$).

Table 1: ADM According to Demographic Factors

Parameters		School Attendance (last two months)				Correlation coefficient, p-value
		In School		Missed		
		N	(%)	N	(%)	
Age (years)	12	24	63.2	14	2.3	.082, p=.043
	13	84	85.7	14	2.3	
	14	135	75.0	45	7.4	
	15	73	84.9	13	2.1	
	16	64	75.3	21	3.5	
	17	41	63.1	24	4.0	
	18	29	67.4	14	2.3	
	19	7	63.6	11	.7	
Grade level	Std 6	110	18.1	37	6.1	12.088, p=.060
	Std 7	178	29.2	45	7.4	
	Form 1	40	6.6	8	1.3	
	Form 2	27	4.4	8	1.3	
	Form 3	31	5.1	13	2.1	
	Form 4	70	11.5	37	6.1	
	Form 5	0	.0	0	.0	
	Form 6	5	.8	0	.0	
Age at Menarche (Years)	11	57	9.4	11	1.8	6.050, p=.195
	12	64	10.6	28	4.6	
	13	178	29.5	50	8.3	
	14-15	147	24.3	55	9.1	
	16-17	10	1.7	4	.7	

Menarche Preparation

The majority of the girls in this study reported that they felt prepared before their first menstrual period (78.1%), knew what to do (61.7%), knew what was happening to their bodies (59.6%), knew how to use sanitary pads when they first experienced menstruation (53.8%), and received education on safe menstruation (97.4%) (*see Table 2*). Menarche preparedness was inversely associated with missing school during menstruation, but it wasn't significant

($p=.452$; *see Table 3*). However, Chi-square analysis of each item of the Menarche Preparedness construct revealed that not knowing how to use sanitary pads was significantly correlated with absenteeism ($p=.025$). The girls reported that they learned about menstruation at home from mothers, aunts, and grandmothers (49.2%), teachers (33.6%), and others, including medical attendants, friends, and the media (17.2%). The menarche information sources were significantly associated with school absenteeism ($p=.023$).

Table 2:ADM According to Informational Factors

Parameters		School (last two months)				X ² , p-value
		In School		Missed		
		N	(%)	N	(%)	
I knew how to use the sanitary pads when I first experienced menstruation	I agree strongly	204	34.2	67	11.2	14.428, p=.025
	I agree	39	6.5	11	1.8	
	I am not sure	56	9.4	26	4.4	
	I disagree	86	14.4	20	3.4	
	I strongly disagree	61	10.2	21	3.5	
Menarche Information Source	Mother	184	32.3	47	8.3	13.091, p=.023
	Aunt	18	3.2	11	1.9	
	Grandmother	14	2.5	6	1.1	
	Friend	30	5.3	12	2.1	
	Teacher	153	26.9	38	6.7	
	Other	35	6.2	21	3.7	

Sociocultural, Emotional, and Religious Factors

Perceived social support was found to be weakly, negatively, and significantly associated with ADM (*p*=.045) (see Table 3). Anxiety (*p*<.001) and depression (*p*<.001) were both weakly, positively, and significantly associated with ADM. The Duke

University Religion Index items underwent dimension reduction via principal component analysis (PCA) which resulted in the identification of two subscales - *personal faith* and *religious practices*. Neither of these subscales was found to be significantly associated with ADM.

Table 3: ADM According to Informational, Psychological, and Socio-cultural Factors

Predictor Variables	Pearson Correlation	Significance (2-tailed)
Perceived Menarche Preparation	-.036	<i>p</i> =.390
Anxiety	.309	<i>p</i> <.001
Depression	.280	<i>p</i> <.001
Social Support	-.085	<i>p</i> =.045
Religion		
Religiosity	.019	<i>p</i> =.651
Frequency of religious practices	.045	<i>p</i> =.279

Physiological Factors and Menstruation-related Preferences

In this study, 39.8% of the girls reported experiencing excessive pain and discomfort and 26% reported that fear of bleeding and staining of clothes due to lack of sanitary pads was a strong reason to not attend school during menstruation. These reasons (*p*=.001) as well as worrying about their menstruation (*p*<.001), were both positively and significantly associated with school absenteeism

during menstruation (see Table 4). While menstruating, specific medical challenges and access to sanitary pads were not significantly associated with school absenteeism. However, challenges related to access, use, and storage of sanitary pads (*p*=.020) as well as the availability of a safe place to change pads at school (*p*=.023) and the type of pad material (*p*=.022) were positively and significantly associated with school absenteeism during menstruation.

Table 4: ADM According to Physiological Factors and Menstruation-related Preferences

Parameters		School Absenteeism (last two months)				X ² , p-value
		No		Yes		
		N	%	N	%	
What is a strong reason not to attend school during menstruation?	Excessive pain and discomfort	161	27.8	70	12.1	22.391 p=.001
	Lack of running water at school	76	13.1	11	1.9	
	Lack of a place to change	50	8.6	31	5.3	
	Fear of bleeding and staining clothes	119	20.5	34	5.9	
	Teachers' advice to stay at home	5	.9	0	.0	
	Parents' advice to stay at home	6	1.0	0	.0	
	Personal reason	14	2.4	3	.5	
Does menstruation affect you or worry you and interfere with your school attendance?	Yes	99	113	212	99	146.764 p<.001
	No	362	36	398	362	
What specific medical challenge do you experience and feel during menstruation?	Menstrual cramps / excessive bleeding	276	67.5	111	27.1	4.620 p=.202
	Desire for sex	3	.7	2	.5	
	Prolonged period	2	.5	0	.0	
	None	14	3.4	1	.2	
Do you get sanitary pads easily here?	Yes	277	46.2	77	12.9	2.144 p=.086
	No	179	29.9	66	11.0	
For personal use, I use...	Factory made	342	57.5	95	16.0	11.409 p=.022
	Old clothes	32	5.4	22	3.7	
	Home-made cotton balls	19	3.2	5	.8	
	Nothing, just underwear	55	9.2	23	3.9	
	Other	2	.3	0	.0	
What challenges are you experiencing with access, use, and storage of sanitary pads?	We don't have pad disposal facilities	73	19.8	31	8.4	17.925 p=.020
	Sanitary pads are too difficult to find	24	6.5	3	.8	
	Sanitary pads are too difficult to use	55	14.9	30	8.2	
	We don't have (clean) water	21	5.7	11	3.0	
	Sanitary pads are very uncomfortable	31	8.4	16	4.3	
	Sanitary pads don't last long	9	2.4	5	1.4	
	No problem with sanitary pads	25	6.8	0	.0	
Is there a safe place to change sanitary pads at school?	Yes	208	34.3	52	8.6	7.541 p=.023
	No	184	30.4	79	13.0	
	Unsure	65	10.7	18	3.0	

A Predictive Model of ADM

Using stepwise multiple logistic regression, a predictive model for ADM was created. Before performing the analysis, the multicollinearity of the independent variables was checked. The fitness of the model was assessed by checking the significance of the Hosmer-Lemeshow statistic which was $p=.184$. Using the Cox-Snell statistic, the model correctly predicted ADM in 27.9% of the cases. After adjusting for covariates, menstrual pad material, anxiety, depression, worry about

menstruation, and menarche preparation were found to predict ADM (Table 5). Girls who didn't wear a factory-made menstrual pad were .370 times more likely to miss school (95% CI [0.205, 0.667]). Anxious girls were 1.4 times more likely to miss school (95% CI [1.117, 1.849]) while girls who were depressed were 1.5 times more likely to miss school (95% CI [1.186, 1.922]) during menstruation. Girls who reported worrying about menstruating had 0.077 times higher odds (95% CI [0.58, 0.14]) of ADM, while menarche preparedness reduced the odds of missing school by .746 (95% CI [.568, .979]).

Table 5: Predictive Model for ADM.

	B	S.E.	Wald	df	Sig.	Exp(B)	95% CI for EXP(B)	
							Lower	Upper
Menstrual pad material	-.994	.301	10.941	1	<.001	.370	.205	.667
Anxiety	.363	.129	7.964	1	.005	1.437	1.117	1.849
Depression	.412	.123	11.182	1	<.001	1.510	1.186	1.922
Menstruation-related worry	2.559	.282	82.273	1	<.001	.077	.045	.135
Menarche Preparedness	-.294	.139	4.465	1	.035	.746	.568	.979
Constant	3.331	.490	46.273	1	<.001	27.975		

The Girls' Suggestions

When asked about their suggestions to help improve menstrual challenges, the girls in this study highlighted three areas that would be helpful (see Table 6). The number one suggestion was for the government to provide free reusable menstrual pads (29.7%). Some girls (15.6%) suggested that the availability of budget-friendly reusable sanitary pads

would help them manage their menses better. In addition, education on the menstrual cycle and proper use of sanitary pads was cited as a way to improve their menstrual experiences (15.6%). Along with the above suggestions, they also mentioned that the availability of safe changing rooms (6.9%) and the availability of clean water and soap (6.6%) for managing their menses at school should be made a priority.

Table 6: Girls' Suggestions for Priorities to Help Girls and Women During Menstruation

Suggestion	Frequency (n)	Percent
Availability of cheaper reusable sanitary pads	95	18.4
Availability of proper disposal facilities for sanitary pads in schools	28	5.4
Availability of free government distributed reusable sanitary pads in school	181	35.1
Availability of a safe changing room for sanitary pads (e.g., toilets) in schools	42	8.1
Educating girls on menstrual cycle and proper use of sanitary pads	103	20.0
Availability of clean water and soap in the changing rooms in schools	40	7.8
Campaign to stop isolating girls and stigmatizing menstruation	16	3.1
Availability of pain killers for girls in school during menstruation	11	2.1
Total	516	100.0

DISCUSSION

In our study, menstruation was determined to be associated with reduced school attendance in rural Tanzania. Material factors (e.g., factory-made vs. homemade menstrual pads), psychological factors (e.g., anxiety, depression, and worry about menstruation), and informational factors (e.g., menarche preparation) were found to predict ADM. These findings suggest several key target areas that require attention if school ADM is to be improved.

The girls in our study indicated that there are significant material-related factors that impact their school attendance and their menstruation experience. Our predictive model, it indicates that girls who use factory-made menstrual pads are less likely to miss school during menstruation which is in agreement with many previous studies on menstrual absorbents and ADM (Crankshaw et al., 2020; Edet et al., 2022; Jewitt, & Ryley, 2014; Kumbeni et al., 2021; Mason et al., 2013; Mohammed et al., 2020; Shah et al., 2022a; Vashisht et al., 2018). When asked about specific challenges related to menstrual pads, 40.9% of the girls mentioned that it was difficult to obtain them, 23.1% reported that pads were too difficult to use, and 28.2% reported concerns about the lack of pad disposal bins. When asked about a safe place to change their pad, 42.9% reported that there was a safe place to change their pad at school, which means that over half of Tanzanian girls living in rural locations do not have a safe place to take care of their menstrual needs. In addition, 39.9% of the girls in this study reported that excessive pain and discomfort were reasons not to go to school while menstruating. Improved access to factory-made reusable or disposable menstrual pads is a key area needing improvement. By increasing the availability and reducing the cost of factory-made absorbents, girls would be more likely to use them instead of homemade absorbents thereby reducing school avoidance.

Consistent with previous studies (Hennegan et al., 2019; Vashisht et al., 2018), menstrual anxiety was positively and significantly associated with school ADM. Furthermore, consistent with previous studies (Fennie et al., 2021; Okello et al., 2022; van Iersel et al., 2016), depression was positively and significantly associated with ADM. When put into

the predictive model, the girls who were worried about their menstruation were more likely to be absent from school during their menses. However, contrary to previous studies (Edet et al., 2022; Fennie et al., 2022; Kumbeni et al., 2021), our findings did not show religion as playing a significant role in ADM in rural Tanzania.

Although the majority of the girls in this study felt they had adequate menarche preparation before their first menstrual period, those who didn't were more likely to miss school during menstruation. In agreement with previous studies (Crankshaw et al., 2020; Dolan et al., 2014; Grant et al., 2013; Vashisht et al., 2018) the lack of menarche knowledge and preparation were significantly associated with missing school during menstruation.

Limitations

Several limitations of the present study must be acknowledged. First, our reliance on secondary data limited the generalizability of our findings to adolescent girls in rural Tanzania who were invited to participate in this study. This study's participant sample may prevent the generalization of our findings to adolescent girls in other parts of the world. To enhance the breadth of our understanding, future studies should aim to include participants from urban areas of Tanzania and compare the experiences of girls across different socio-economic spectrums. Second, the self-reported dichotomous items, 'Do you get sanitary pads easily here?' and 'Does menstruation affect you or worry you and interfere with your school attendance?' are narrowly defined in scope and may not be generalized further or beyond the targeted population. Future research could benefit from a broader range of items and scale, thus offering deeper insights into this challenging, but fascinating topic on ADM. Lastly, all measures in the present study were collected via self-report, with all of its associated limitations (e.g., socially desirable responses), and therefore we are only addressing individual perceptions of correlates of school absenteeism. To mitigate these limitations, future studies could employ semi-structured interviews that allow for a combination of standardized questions and open-ended discussions, enabling participants to provide more nuanced insights.

CONCLUSION

This study's findings revealed the importance of understanding the quality of menstrual knowledge, the impact on mental health, the worry girls experience during menstruation, and the type of pad material. By addressing these concerns regarding menstrual health, girls' school attendance and participation, educational attainment can be improved. In addition, sufficient access to factory-made pads and sufficient school WASH facility improvements (clean washrooms, private latrine stalls, availability of water and soap, and discreet disposal bins for used menstrual pads) should be discussed with community members, ministries of health, and school personnel to establish improved WASH facility programs. Furthermore, our findings suggest that improved menstrual education for mothers and grandmothers be provided so they can better support the older girls who may be less likely to ask for assistance. While there is a lack of evidence of the effectiveness of individual MHM interventions on school attendance, we propose a comprehensive and multifaceted intervention strategy which will enable health ministry and school administrators to enact policies that improve girls' education in rural Tanzania and beyond.

Declaration of Interest Statement

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 article.

Funding Statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

- Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*, 56(6): 893–897. <https://doi.org/10.1037//0022-006x.56.6.893>
- Boyle, G. J. (1997). Effects of menstrual cycle moods and symptoms on academic performance: A study of senior secondary school students. *British Journal of Educational Psychology*, 67(1): 37–49. <https://doi.org/10.1111/j.2044-8279.1997.tb01225.x>
- Chinyama, J., Chipungu, J., Rudd, C., Mwale, M., Verstraete, L., Sikamo, C., Mutale, W., Chilengi, R., & Sharma, A. (2019). Menstrual hygiene management in rural schools of Zambia: A descriptive study of knowledge, experiences and challenges faced by schoolgirls. *BMC Public Health*, 19(1): 16. <https://doi.org/10.1186/s12889-018-6360-2>
- Crankshaw, T. L., Strauss, M., & Gumede, B. (2020). Menstrual health management and schooling experience amongst female learners in Gauteng, South Africa: A mixed method study. *Reproductive Health*, 17(1): 48. <https://doi.org/10.1186/s12978-020-0896-1>
- Dolan, C. S., Ryus, C. R., Dopson, S., Montgomery, P., & Scott, L. (2014). A blind spot in girls' education: Menarche and its webs of exclusion in Ghana. *Journal of International Development*, 26(5): 643–657. <https://doi.org/10.1002/jid.2917>
- Edet, O. B., Bassey, P. E. M., Esienumoh, E. E., & Ndep, A. O. (2022). Missing school during period: Perspectives of adolescent schoolgirls in Cross River State, Nigeria. *The Pan African Medical Journal*, 42(65). <https://doi.org/10.11604/pamj.2022.42.65.28244>
- Fennie, T., Moletsane, M., & Padmanabhanunni, A. (2021). Adolescents' experiences of menarche and menstruation in disadvantaged schools in South Africa: A qualitative exploration. *Health Education*, 121(4): 408–419. <https://doi.org/10.1108/HE-12-2020-0122>
- Fennie, T., Moletsane, M., & Padmanabhanunni, A. (2022). Adolescent girls' perceptions and cultural beliefs about menstruation and menstrual practices: A scoping review. *African Journal of Reproductive Health*, 26(2): 88–105. <https://doi.org/10.29063/ajrh2022/v26i2.-9>
- Foster, J., & Montgomery, P. (2021). A study of environmentally friendly menstrual absorbents in the context of social change for adolescent girls in low- and middle-income countries. *International Journal of Environmental*

- Research and Public Health*, 18: 9766-9774. <https://doi.org/10.3390/ijerph18189766>
- Grant, M., Lloyd, C., & Mensch, B. (2013). Menstruation and school absenteeism: Evidence from Rural Malawi. *Comparative Education Review*, 57(2): 260–284. <https://doi.org/10.1086/669121>
- Guya, E., Mayo, A. W., & Kimwaga, R. (2014). Menstrual hygiene management in secondary schools in Tanzania. *International Journal of Science and Technology*, 1(1): 27-39.
- Hennegan, J., Dolan, C., Wu, M., Scott, L., & Montgomery, P. (2016). Measuring the prevalence and impact of poor menstrual hygiene management: A quantitative survey of schoolgirls in rural Uganda. *BMJ Open*, 6(12). <https://doi.org/10.1136/bmjopen-2016-012596>
- Hennegan, Julie, Alexandra K. Shannon, Jennifer Rubli, Kellogg J. Schwab, & G. J. Melendez-Torres. (2019). Women's and Girls' Experiences of Menstruation in Low- and Middle-Income Countries: A Systematic Review and Qualitative Metasynthesis. *PLoS Medicine* 16(5): e1002803. <https://doi.org/10.1371/journal.pmed.1002803>
- Jewitt, S., & Ryley, H. (2014). It's a girl thing: Menstruation, school attendance, spatial mobility and wider gender inequalities in Kenya. *Geoforum*, 56: 137– 147. <https://doi.org/10.1016/j.geoforum.2014.07.006>
- Kansiime, C., Hytti, L., Nalugya, R., Nakuya, K., Namirembe, P., Nakalema, S., Neema, S., Tanton, C., Alezuyo, C., Namuli Musoke, S., Torondel, B., Francis, S. C., Ross, D. A., Bonell, C., Seeley, J., & Weiss, H. A. (2020). Menstrual health intervention and school attendance in Uganda (MENISCUS-2): A pilot intervention study. *BMJ Open*, 10(2). <https://doi.org/10.1136/bmjopen-2019-031182>
- Koenig, H. G., & Bussing, A. (2010). The Duke University religion index (DUREL): A five-item measure for use in epidemiological studies. *Religions*, 1, 78- 85. <http://dx.doi.org/10.3390/rel1010078>
- Korir, E., Okwarea, F., Okumbe, G. (2018). Menstrual hygiene management practices among primary school girls from a pastoralist community in Kenya: A cross-sectional survey. *The Pan African Medical Journal*, 31(222). <https://doi.org/10.11604/pamj.2018.31.222.13521>
- Kumbeni, M. T., Otupiri, E & Ziba, F. A. (2020). Menstrual hygiene among adolescent girls in junior high schools in rural northern Ghana. *The Pan African Medical Journal*, 37(190). <https://doi.org/10.11604/pamj.2020.37.190.19015>
- Kumbeni, M. T., Ziba, F. A., Apenkwa, J., & Otupiri, E. (2021). Prevalence and factors associated with menstruation-related school absenteeism among adolescent girls in rural northern Ghana. *BMC Women's Health*, 21, 279. <https://doi.org/10.1186/s12905-021-01418-x>
- Mason, L., Nyothach, E., Alexander, K., Odhiambo, F. O., Eleveld, A., Vulule, J., Rheingans, R., Laserson, K. F., Mohammed, A., & Phillips-Howard, P. A. (2013). 'We keep it secret so no one should know' - A qualitative study to explore young schoolgirls attitudes and experiences with menstruation in rural Western Kenya. *PloS One*, 8(11). <https://doi.org/10.1371/journal.pone.0079132>
- Miir, G., Rutakumwa, R., Nakiyingi-Miir, J., Nakuya, K., Musoke, S., Namakula, J., Francis, S., Torondel, B., Gibson, L., Ross, D., & Weiss, H.A. (2018). Menstrual health and school absenteeism among adolescent girls in Uganda (MENISCUS): A feasibility study. *BMC Women's Health*, 18(4). <https://doi.org/10.1186/s12905-017-0502-z>
- Mohammad, S., Larsen-Reindorf, R. E., & Awal, I. (2020). Menstrual hygiene management and school absenteeism among adolescents in Ghana: Results from a school-based cross-sectional study in a rural community. *International Journal of Reproductive Medicine*, 2000. <https://doi.org/10.1155/2020/6872491>
- Okello, E., Rubli, J., Torondel, B., Makata, K., Ayieko, P., Kapiga, S., Greco, G., & Renju, J.

- (2022). Co-development and piloting of a menstrual, sexual and reproductive health intervention to improve social and psychological outcomes among secondary schoolgirls in Northern Tanzania: The PASS MHW study protocol. *BMJ Open*, 12(2). <https://doi.org/10.1136/bmjopen-2021-054860>
- Parkes, J. & Heslop, J; (2013) Stop violence against girls at school: A cross-country analysis of change in Ghana, Kenya and Mozambique. University College London. Accessed on October 14, 202024 at: <https://discovery.ucl.ac.uk/id/eprint/10023454/>
- Radloff, L.S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1(3). <https://doi.org/10.1177/014662167700100306>
- Shah, V., Phillips-Howard, P., Hennegan, J., Cavill, S., Sonko, B., Sinjanka, E., Camara Trawally, N., Kanteh, A., Mendy, F., Bah, A. B., Saar, M., Ross, I., Schmidt, W., & Torondel, B. (2022a). Puberty health intervention to improve menstrual health and school attendance among adolescent girls in the Gambia: Study methodology of a cluster-randomized controlled trial in rural Gambia (MEGAMBO TRIAL). *Emerging Themes in Epidemiology*, 19(1), 1–6. <https://doi.org/10.1186/s12982-022-00114-x>
- Shah, V., Nabwera, H., Sonko, B., Bajo, F., Faal, F., Saidykhani, M., Jallow, Y., Keita, O., Schmidt, W.-P., & Torondel, B. (2022b). Effects of menstrual health and hygiene on school absenteeism and drop-out among adolescent girls in rural Gambia. *International Journal of Environmental Research and Public Health*, 19(6). <https://doi.org/10.3390/ijerph19063337>
- Shehadeh, J. H., & Hamdan-Mansour, A. M. (2018). Prevalence and association of premenstrual syndrome and premenstrual dysphoric disorder with academic performance among female university students. *Perspectives in Psychiatric Care*, 54(2): 176-184. <https://doi.org/10.1111/ppc.12219>
- Sommer, M., Caruso, B. A., Sahin, M., Calderon, T., Cavill, S., Mahon, T., & Phillips-Howard, P. A. (2016). A time for global action: Addressing girls' menstrual hygiene management needs in schools. *PLoS Medicine*, 13(2). <https://doi.org/10.1371/journal.pmed.1001962>
- Sommer, M., & Sahin, M. (2013). Overcoming the taboo: Advancing the global agenda for menstrual hygiene management for schoolgirls. *American Journal of Public Health*, 103(9): 1556–1559. <https://doi.org/10.2105/AJPH.2013.301374>
- Tanton, C., Nakuya, K., Kansime, C., Hytti, L., Torondel, B., Francis, S. C., Namirembe, P., Nakalema, S., Nalugya, R., Musoke, S. N., Neema, S., Ross, D. A., Bonell, C., Seeley, J., & Weiss, H. A. (2021). Menstrual characteristics, menstrual anxiety and school attendance among adolescents in Uganda: A longitudinal study. *BMC Women's Health*, 21(1). <https://doi.org/10.1186/s12905-021-01544-6>
- United Nations Educational, Scientific, and Cultural Organization (UNESCO). (2015). EFA Global Monitoring Report.
- van Iersel, K. C., Kiesner, J., Pastore, M., & Scholte, R. H. J. (2016). The impact of menstrual cycle-related physical symptoms on daily activities and psychological wellness among adolescent girls. *Journal of Adolescence*, 49(1): 81–90. <https://doi.org/10.1016/j.adolescence.2016.03.007>
- Vashisht, A., Pathak, R., Agarwalla, R., Patavegar, B. N., & Panda, M. (2018). School absenteeism during menstruation amongst adolescent girls in Delhi, India. *Journal of Family and Community Medicine*, 25(3): 163-168. https://doi.org/10.4103/jfcm.JFCM_161_17
- White, L. R. (2013). The function of ethnicity, income level, and menstrual taboos in postmenarcheal adolescents' understanding of menarche and menstruation. *Sex Roles*, 68(1-2): 65–76. <https://doi.org/10.1007/s11199-012-0166-y>
- Zimet, G.D., Dahlem, N.W., Zimet, S.G. & Farley, G.K. (1988). The multidimensional scale of perceived social support. *Journal of Personality Assessment*, 52: 30-41.