BMC Public Health

RESEARCH Open Access

"I know your problems; take your bag and go home": a qualitative study using the social-ecological model to understand drivers of suboptimal school and social participation among secondary schoolgirls in Northwest Tanzania

Yovitha Sedekia[1*], Saidi Kapiga[1,2], Onike Mcharo[1], John Luwayi[1], Siwema Keya Sasi[1], Clare Tanton[3], Belen Torondel[4], Jennifer Rubli[5], Giulia Greco[6], Philip Ayieko[1,2] and Elialilia Okello[1]

Abstract

Background School attendance and completion among girls protect them from multiple sexual and reproductive health problems. However, inadequate resources for managing menstruation remains a barrier to school participation and learning in low- and middle-income countries. With the increased global focus on closing the gender gap in education, schoolgirls' voices are important in understanding drivers of suboptimal social and school participation during menstruation. This paper explores how menstruation influences social and school participation from the perspectives of schoolgirls.

Methods We conducted 40 in-depth interviews with purposively-selected secondary schoolgirls aged 13–20 years in two rural and two urban schools in Northern Tanzania from 2021 to 2022. To be eligible for participation, the schoolgirls must have reported missing school during their last menstruation. We used an in-depth interview guide to elicit girls' menstrual experiences and how such experience influenced their school and social participation. We used NVivo 12 software to code data and employed thematic analysis using the social-ecological model.

Results The respondents described the drivers of suboptimal social and school participation at the individual level (negative menstrual experience, i.e. menstrual pain and constant worries of menstrual blood leaking, and individual economic constraints); interpersonal level (the fear of menstrual status disclosure, and peer's attitude); school level (inadequate emergency pad at school, lack of private place to change, and unhygienic school WASH); and societal level socio-cultural restrictions (girls are prohibited from touching plants/vegetables, engaging in household chores/

*Correspondence:
Yovitha Sedekia
sedekiay@gmail.com

Full list of author information is available at the end of the article

religious worship, or physical contact with men during menstruation, and refusal to use conventional painkillers to relief menstrual pain).

Conclusions The findings suggest that drivers of suboptimal social and school participation among secondary schoolgirls exist at the individual, interpersonal relationship, school, and societal levels. Multi-level evidence-based multicomponent interventions to improve menstrual health at all socio-ecological levels are warranted for optimal social and school participation among schoolgirls.

Keywords Adolescents, Menstruation, Participation, School, Schoolgirls, Suboptimal, Social-ecological model, Tanzania.

Introduction

Evidence that education attendance and completion among girls functions as a "social vaccine" for multiple sexual and reproductive health outcomes is abundant [1, 2]. Each additional year that girls stay in school reduces their chances of early marriage and unwanted pregnancies, while at the same time increasing their prospects for employment, health, and overall well-being. In Sub-Saharan Africa (SSA), however, 49.3% of females compared to 44.9% of males were out of secondary school in 2022 [3]. In Tanzania, a substantial percentage of adolescents, exceeding 50%, were not enrolled in secondary school. Specifically, approximately 61% of females and 51% of males of secondary school age were out of school. Emerging evidence in the region shows that menstrual, sexual, and reproductive health (MSRH) interventions can improve schoolgirls' health and social outcomes [4–6]. However, the implementation of comprehensive school-based interventions that promote MSRH in Tanzania is inadequate. This is due to several interrelated factors, such as the science curriculum that only covers the biological functions of reproduction, the common perception that MSRH programmes are extracurricular, and the lack of prioritisation, resources, and time allocation within already-busy school schedules [7]. Additionally, while effective and promising interventions are available to address gender-related barriers in education for girls, inadequate school facilities, including a lack of water and sanitation infrastructure, still hinder school participation and learning among girls [8].

The Sustainable Development Goals (SDGs) include efforts to close the gender gap in education by 2030 [9]. In the effort to achieve SDG 4, the government of Tanzania has made considerable efforts to address this disparity. In 2014, Tanzania adopted a free education and training policy for all [10] and in 2015, the government issued Circular 5 that directed all public schools to ensure free secondary school education [11]. The secondary school enrolment rate has increased substantially since then. In 2015 and 2021, net enrolment for secondary schools increased from 24.7 to 39.0% in rural areas and from 41.4 to 67.0% in urban areas [12–14]. Despite these efforts, inadequate menstrual hygiene management, inadequate school-level WASH infrastructures and gender insensitive school environment remain barriers to girls' school participation and learning [15–17].

In the context of increased global attention to close the gender gap in education, it is crucial to understand the drivers of suboptimal social and school participation during menstruation among secondary schoolgirls. We defined suboptimal and school participation as any reduction in a person's ability to fully engage in educational or social activities due to menstruation, whether through absenteeism, decreased concentration or performance, restricted mobility, social withdrawal, or participation that is limited by physical, emotional, cultural, or environmental barriers. Few studies globally have gone beyond school attendance to examine how menstruation may impact their ability to participate [17, 18], resulting not only in a lack of understanding of this more holistic concept, but also in schoolgirls' voices missing from these key discourses. Consequently, the perspectives and lived experiences of secondary school–aged girls are notably underrepresented in the current body of literature and policy discourse addressing the determinants of reduced social engagement and educational participation during menstruation. This gap limits the development of contextually appropriate and adolescent-responsive interventions, as it overlooks the nuanced ways in which menstrual health challenges intersect with gender norms, school environments, and broader sociocultural dynamics. We conducted a qualitative study to address this knowledge gap as part of the *Par*tnering to *S*upport *S*chools to Promote Good *M*enstrual *H*ealth and *W*ell-Being (PASS-MHW) implementation research project in Northern Tanzania [19]. The project aimed to refine and pilot a scalable, comprehensive MSRH intervention within the existing Tanzanian government school settings to improve MSRH practices, perceptions, and overall school climate to ensure the psychosocial well-being and optimal school participation and performance among secondary schoolgirls [19]. In the qualitative study, collected during baseline, we aimed to understand drivers of suboptimal social and school participation during menstruation among secondary schoolgirls in

Northwest Tanzania, a setting with high dropout rates in schools.

Materials and methods

Study setting

We conducted this study in two districts of Mwanza region, in Northwest Tanzania, on the southern shores of Lake Victoria: Nyamagana district in Mwanza city (urban) and Misungwi district (rural). Nyamagana and Misungwi have an estimated population of over one million people (594,834 in Nyamagana and 467,867 in Misungwi) [12]. The study area has 57 public secondary schools (30 in Nyamagana [20] and 27 in Misungwi [21]). Misungwi is among the districts with considerable secondary school dropouts [22].

Study design and participants

Between February and March 2022, we conducted in-depth interviews (IDIs) to explore the drivers of suboptimal school and social participation during menstruation among secondary schoolgirls in Northwest Tanzania. Participants were purposively selected based on their responses to the PASS study baseline questionnaire, which included items on menstrual practices and perceptions, pain management, self-efficacy in menstrual care, menstrual-related anxiety, reproductive health symptoms, MSRH knowledge, school and social participation, WASH facility improvements, and school climate. We focused on girls who reported missing school or leaving early during their last menstrual period.

To ensure diversity of experiences, we selected girls from both the second and third years of secondary school, aiming for variation in the number of school days missed and the severity of menstrual-related pain reported. Of the 93 girls who indicated school absenteeism or early departure due to menstruation, we purposively selected 40 participants: 26 from two urban schools in Nyamagana and 14 from two rural schools in Misungwi (see Table 1). At the time of the interview, 21 were in their second year and 19 in their third year of secondary education. None of the four schools had active student clubs or self-help groups. Although setting up school WASH Clubs is outlined as part of strategies to improve water, sanitation, and hygiene in schools in the National Guideline for Water, Sanitation and Hygiene for Tanzania Schools [23], not all schools have functional clubs, and even where they exist, they are limited in scope, and the menstrual health component is largely lacking [24].

Table 1 Participants who left school early and/or missed school for a day or more during the last menstruation

Participants characteristics	Urban schools *n* (%)	Rural schools *n* (%)	Total *N* (%)
Total participants	**26 (65)**	**14 (35)**	**40 (100)**
Participants' age (years)			
13	1 (2.5)	0	1 (2.5)
15	8 (20)	1 (2.5)	9 (22.5)
16	13 (32.5)	7 (17.5)	20 (50)
17	2 (5)	1 (2.5)	3 (7.5)
18	2 (5)	4 (10)	6 (15)
20	0	1 (2.5)	1 (2.5)
Total	26 (65)	14 (35)	40 (100)
Year of secondary school education			
2nd year	13 (32.5)	8 (20)	21 (52.5)
3rd year	13 (32.5)	6 (15)	19 (47.5)
Total	26 (65)	14 (35)	40 (100)
Reported age at menarche			
10–14 years	18 (45)	5 (12.5)	23 (57.5)
15–18 years	4 (10)	7 (17.5)	11 (27.5)
No information	4 (10)	2 (5)	6 (15)
Total	26 (65)	14 (35)	40 (100)
Reported missing school during their menstruation			
Missed school	26 (65)	14 (35)	40 (100)
Median days lost (IQR)	**3 (2.5–4.5)**	**3 (2–4)**	**3 (2–3)**
Total	26 (65)	14 (35)	40 (100)
Reported experiencing pain during menstruation			
Mild to severe	22 (55)	13 (32.5)	35 (87.5)
No pain	4 (10)	1 (2.5)	5 (12.5)
Total	26 (65)	14 (35)	40 (100)

Theoretical framework

The social-ecological model (SEM) guided our data analysis. Recent studies about menstruation in Uganda, Nepal, Scotland, and the United States have used the model to examine the social and physical environment of menstruation, access to menstrual resources, and state of knowledge of menstrual health, respectively [25–27]. In this analysis, we used the SEM as a theoretical framework to examine the complex interaction of individual, interpersonal relationships, school, and socio-cultural level factors in girls' suboptimal school and social participation.

Data collection and analysis

IDIs were conducted by two experienced female social scientists who received a three-day training on how to conduct the interviews, followed by two days pilot testing the tool. The IDIs topic guide contained questions around five themes: the school environment - how students interact among themselves or with teachers; the participant's menstrual experience; the participant's school and social participation during menstruation; menstrual pain and management; and menstrual-related myths, taboos, misconceptions. We developed the guide in English and then translated it into Swahili, the national language of Tanzania (Supplementary file 1). All IDIs were conducted in Swahili in person, most often in a free classroom or

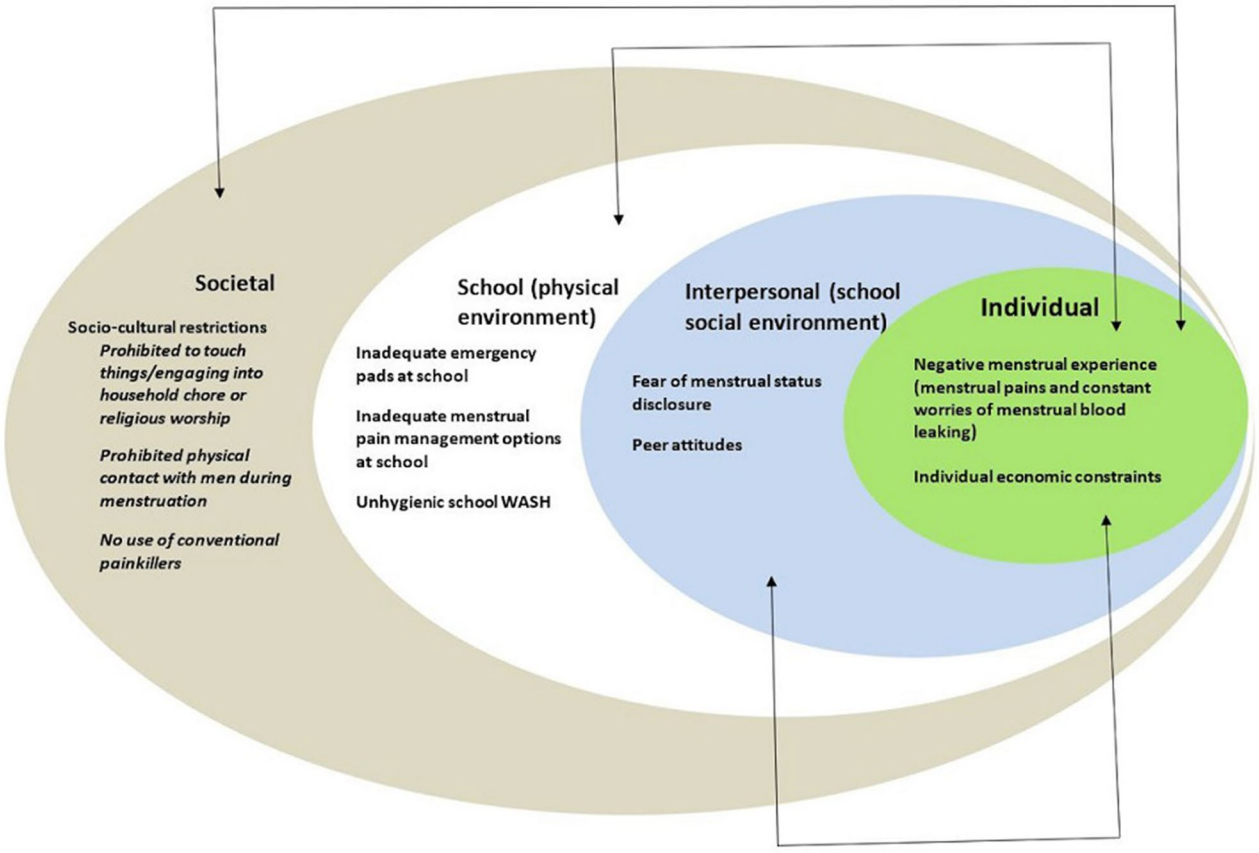

Fig. 1 Illustration of the interactions between various levels of the SEM (adapted from [25, 27])

outside the classroom within the school campus, and lasted between 45 and 90 min. Interviews were recorded using a digital voice recorder, and transcribed verbatim.

We used the NVivo 12 software (QSR – International Pty Ltd, Melbourne, Australia) to code the transcripts [28]. One person (YS) coded the data. However, before the data was coded, two team members (YS & EO) independently read the transcripts to familiarise themselves with the data and to create preliminary codes and code definitions. The two met to discuss the preliminary codes and their definitions. This informed the development of a final structured codebook. We employed a thematic analysis method for data analysis [29]. We employed grounded theory principles of constant comparison, and saturation, and analytical memo writing during data collection and analysis. Verbatim quotes included in this manuscript were translated into English.

Results

The respondents' ages ranged from 13 to 20 years, with reported age of menarche differing by area of residence (Table 1). We identified 8 common themes regarding drivers of secondary schoolgirls' suboptimal social and school participation, and organised them per each level of the SEM (Fig. 1).

Individual level

We examined personal factors that drove suboptimal school and social participation among secondary schoolgirls during their menstrual periods. We identified two broad factors on this level: *negative menstrual experience and economic constraints.*

Negative menstruation experience: We categorised the respondents' narratives about their menstrual experience into two sub-themes: menstrual pain and constant worries of menstrual blood leaking.

a) *Menstrual pain*: Due to purposive sampling of the respondents, almost all respondents in all four schools reported that they had experienced menstrual-related pain ranging from mild to severe. Respondents said that when in pain, they could not concentrate in class or interact with their colleagues at school. They could not understand what their teachers taught them, stopped writing lesson notes, could not stand up to respond to the teacher's questions, limited their movements outside the

classroom, or laid their heads on their desks during class.

"[..] If I experience menstrual pain while at school, I lean on the desk [..] It affects me because my friends continue to study and engage in school activities while I am lying [on the desk]. I cannot do anything, and I miss class sessions" **~IDI082, 2nd year of secondary school, rural.**
Many times, you find that a teacher is teaching [while you are lying on the desk] until the teacher wakes you up [..]" **~IDI0125, 2nd year of secondary school, urban.**

b) *Constant worries of menstrual blood leaking*: Many respondents mentioned that they were constantly worried about their menstrual blood leaking and staining their uniforms. They felt unprepared when their period came, and found products inadequate or inaccessible, leading them to delay changing or use poor-quality materials such as pieces of cloth or toilet paper. Those who used reusable products also feared their colleagues would find the used product in their bags. The constant worries and fear affected their concentration in class, interaction with colleagues, and freedom of movement.

"During menstruation, throughout the class session, you lose concentration because you constantly think you have probably stained your uniform and how you will get up to clean up yourself [..]".~ **IDI033, 2nd year of secondary school, urban.**

Respondents also reported to leave school early or stay at home due to menstrual pain and constant worries and fear. Some reported missing school for up to three days.

"[..] I didn't set foot at school for three days because of back pain [..] It became so painful, I could not sit, so I had to lie down" **~ IDI043, 3rd year of secondary school, urban.**

Nonetheless, a few respondents in both urban and one of the rural schools reported positive emotions about menstruation. They noted that they were excited because they had heard that menstruation symbolised womanhood and maturity.

"I felt good because someone told me that if you are a woman, you are not complete until you bleed [menstruate]" **~IDI130, 3rd year of secondary school, urban.**
Although I was in pain, I felt good because when my friends talked [about menstruation], I used to feel bad. [I thought] Why don't I see the blood? [Why don't I menstruate?] [..] My friends used to scare me, 'perhaps your mother bewitched you when you were young' I was hurt [..] So, I was happy [to reach menarche].~ **IDI015, 2nd year of secondary school, urban.**

Individual economic constraints: In all schools, many respondents reported using a combination of disposable pads or a piece of cloth during menstruation, often using disposable pads at school and cloth at home. They were uncomfortable using cloth at school due to bad odour if worn for too long without changing. Additionally, the absorbent capacity of cloth was limited, making them more prone to leaking. On top of this, poor WASH infrastructure (for washing and drying) made it challenging to maintain good hygiene, and they feared being perceived as dirty. However, good quality disposable pads remain unaffordable for many students.

"It is smelly. If you stay with it for many hours, it emits bad smell. One should change it now and then. For example, you can wear it from morning until noon and change, depending on the blood volume [..] I felt the smell. My close friend also asked me, 'are you menstruating today?' I replied yes. She further said, 'but why is your piece of cloth full of blood until the blood has stained your clothes [..] I wear pieces of cloth [during menstruation at school] due to a lack of money to buy pads" **~IDI040, 2nd year of secondary school, urban.**
"If I use a piece of cloth [during menstruation at school], it becomes difficult to change because once I change, I won't have a place to keep it. But if I use a disposable pad, I can easily change it because there is a place to dispose of the used pads."~ **IDI131, 3rd year of secondary school, urban.**

Interpersonal relationship level (school social environment)

We examined the relationships between the teachers and students, and students with peers at school, and how they impact girls' school and social participation during menstruation. We identified two themes on this level: *the fear of menstrual status disclosure and peer attitudes.*

The fear of menstrual status disclosure In all schools, it was reported that students had a respectful and supportive relationship with their teachers. They noted that students interacted freely with their teachers on academic matters or during school physical activities and sports. Overall, it was reported that students were comfortable approaching their teachers with questions about their

studies but feared discussing menstruation, menstrual management-related support, or other sexual and reproductive health matters. Only a few menstruating girls had interacted with their teachers for menstrual-related support or conversation at school, and generally limited their discussions with teachers about menstruation due to worries regarding confidentiality. A few respondents from two separate schools reported that they would not seek menstrual support from their teachers for fear that the teacher would disclose this information to other teachers.

> *"[..] I cannot go to a male teacher to explain my menstrual problem to him…I am afraid and not sure the teacher will keep it confidential [..] It is not that a male teacher cannot keep a secret, but you who told him won't be at peace [..] you feel like you have humiliated yourself before him"* **~IDI 033, 2nd year of secondary school, urban.**
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> *"Many times, a menstruating person gets scared and afraid of the teacher.…So, due to that fear, she does not go to the teacher for fear that the teacher will inform her fellow teachers in the office"* **~IDI 089, 3rd year of secondary school, rural.**

The respondents also noted that their teachers' harshness and unapproachable behaviour, particularly those responsible for handling discipline and health matters at school, impeded a trusting relationship and made it difficult to approach such teachers for help during menstruation. Respondents felt uncomfortable interacting with or approaching them for menstrual-related issues.

> *"[..] One teacher told us that once you are menstruating, come to inform me, but the biggest challenge is that the teacher responsible for health-related matters is too harsh. Students are afraid of her. So, if someone [student] is menstruating, she becomes patient and keeps it to herself"* **~ IDI 082, 2nd year of secondary school, urban.**

In addition, respondents in all four schools reported that teachers had imposed rules restricting students' access to toilets only during break times. At other times, students had to obtain permission from teachers to use the toilets, and teachers punished students who returned late after the break, or accessed toilets outside break times without permission. Respondents noted that they and other menstruating girls often waited until the break to use the toilets to manage their menstruation because they felt uncomfortable disclosing their menstrual status to their teachers, particularly male teachers, during the permission-seeking process.

> *"[..] There is a time when a teacher says 'you should not go outside the classroom frequently'. If I am supposed to change [the absorbent materials] at two in the afternoon, I get afraid that the teacher will punish me if he sees me [outside]. And for a male teacher, you feel embarrassed to tell him that 'I am menstruating, and I want to go and change the pad' [..] It is very embarrassing"* **~ IDI 075, 2nd year of secondary school, urban.**

Furthermore, it was reported that they sometimes preferred to wait until the break to use the toilets to manage their menstruation for fear of revealing stained uniforms while seeking permission during class sessions.

> *"[..] Once a person [girl] sits at her desk, she is afraid to stand up because of the fear that if she has stained her clothes, her colleagues will laugh at her. It happens a lot. I soiled my clothes [with menstrual blood] twice, and only girls saw me. The boys did not see me. Some of the girls laughed at me, and some did not"* **~IDI131, 3rd year of secondary school, Urban.**

Peer attitudes: In all four schools, respondents reported that they interacted well with their peers, but teasing or bullying of menstruating girls by female or male students was common. Many reported that girls whose menstrual status was known, or who visibly leaked through their school uniforms, were laughed at, teased, or bullied. These social and psychological harassments negatively impacted their school and social participation, making girls feel ashamed and stay at home until their period ended.

> *"[..] Many often laugh at a menstruating person if she soiled her skirt [..] Some girls and boys release surprised sighs but do not laugh too much. They tell her to go home. Yes, it happened to me. I soiled my skirt due to the high volume of blood. Some students saw me and laughed [..]"* **~ IDI 038, 3rd year of secondary school, rural.**

In all four schools, respondents mentioned that they had offered or received practical or moral support from their female peers during menstruation. The support included checking if the menstrual blood had visibly leaked on the skirt before the girl stood up to answer a question in a classroom or leave during a break. Peers with extra products like disposable pads or handkerchiefs also offered them to those who did not have emergency menstrual products, and encouraged peers experiencing menstrual-related pain to be tolerant of the pain. Often, peers encouraged or escorted a menstruating girl to the teacher to seek emergency products if available at school, or to seek permission to go home.

"[..] There was a day I started menstruating while at school, and she [school head girl] told me to get permission from a teacher and go home to look for a piece of cloth to manage my menstruation [..]" ~ **IDI065, 2nd year of secondary school, rural.**

"[..] If a girl soils her skirt or needs a [menstrual sanitary] pad but is afraid to go to madam [a female teacher], she asks her colleague to collect an emergency pad for her [..] or a colleague can borrow her a sweater to cover herself up around the waist and then go to ask permission from the madam and go home"~ **IDI064, 2nd year of secondary school, urban.**

"[..] Sometimes you explain to your colleague how you feel [..] for example if you are experiencing menstrual cramps while there is no medicine or [menstrual sanitary] pads at school, and she only asks you to be patient [..]"~ **IDI 083, 2nd year of secondary school, rural.**

One respondent in one of the two urban schools highlighted that support from female peers who had reached menarche was strong, but this support was often lacking in pre-menarcheal girls; instead, they exposed the girls' menstrual status to boys, which resulted in bullying or teasing.

"[..] If you talk to a post-menarche girl, she can help you. But pre-menarche one seems like it doesn't concern her and can even tell a boy and start spreading the information widely and laughing"~ **IDI087, 2nd year of secondary school, urban.**

School level (school physical environment)

We examined the school settings and identified the characteristics of these settings that impact school and social participation. We identified three themes on this level: *inadequate emergency products at school*, *inadequate menstrual pain management options at school*, *and poor school WASH facilities.*

Inadequate emergency products at school: Tanzanian schools are required to buy and stock emergency pads as part of efforts to support menstruating girls to stay in school, however, respondents in all four schools reported that emergency menstrual products were not consistently available or accessible at school. As evidenced by a respondent in one of the urban schools, those 'caught unprepared' sometimes found the emergency pad's storage room closed. Girls reported they were often instructed to go home if they sought menstrual support from teachers, regardless of whether they desired to stay at school or not.

"[..] There was a time I went to ask for a pad in vain because the teacher who had a key to the storage room was supervising an exam, and when I followed him there, he got angry [..] I needed to stay at school, but I didn't get the pad, and the teacher told me to go home"~ **IDI 087, 2nd year of secondary school, urban.**

"I feel good and happy when I'm not menstruating [..] I read and write well because our school environment is also good, but when I'm menstruating, I find it difficult to get absorbent materials [..] Since joining this school, I had never heard that the school provided pads or that a teacher had given pads to someone. It is up to you"~ **IDI 171, 2nd year of secondary school, urban.**

Inadequate menstrual pain management options at school: Although almost all respondents reported that they had experienced some level of menstrual pain or cramps, which limited their social and school participation, only a few reported to have used conventional painkillers. Several respondents reported using non-pharmacological pain management strategies such as hot water or tea, and a few performed physical exercises or used traditional medicines. One respondent reported that due to inadequate menstrual pain management options at her school, many menstruating girls who experience pain were forced to remain at home. Besides the lack of conventional painkillers at schools, it was impossible to access non-pharmacological pain management strategies such as hot water, hot tea, and other natural remedies or traditional medicine used to manage menstruation.

"[..] At home, I can put [hot] water on the part where it hurts, but I don't have any option at school. I tolerate it [the menstrual pain] [..] There is no hot water or painkillers".~ **IDI 064, 3rd year of secondary school, urban.**

In addition, in all four schools, respondents said their relatives or friends told them that menstrual pain was normal and bearable. This perceived attitude of normalising and dismissing menstrual pain shaped their pain management practices; they concealed the pain by staying at home until menstruation ended, or sought permission from their teachers and left school early.

"My mother forbade me from painkillers [..] [she said] I should leave the pain to end by itself [..] I do not do anything. I sleep on a desk [in the classroom] or sit until the pain fades away by itself"~ **IDI 078, 3rd year of secondary school, urban.**

Some respondents expressed fears that pharmacological painkillers could cause harm to their reproductive organs. Specifically, they expressed fears that such medications could damage their fallopian tubes or result in permanent impairment of their reproductive system.

> *"I do not use any [painkillers during menstruation] because I am aware that excessive drug use can have adverse effects on the reproductive organs. I am afraid of the adverse effects."*~**IDI 065, second year of secondary school, rural.**

Teachers sporadically provided students with menstrual resources like emergency pads and painkillers, and they often permitted the menstruating girls to leave school early and/or stay home during menstruation. Respondents also noted that whenever girls sought permission from their teachers due to a stomach ache, headache, or other illnesses, teachers assumed it was menstruation and allowed them to go home. In all schools, many respondents reported that they had left school early and missed classes and other social activities, with many missing one or more days of school.

> *"[..] I asked permission from a male teacher. I told him I had a stomach ache [..] When you ask permission due to a stomach ache, the teacher says, "I know your problems; take your bag and go home" [**I**: How many days did you not attend school?] [..] three [..]"*~ **IDI 056, 3rd year of secondary school, urban.**
>
> *"[..] the teachers always say, If the pain is severe, just go home' [..]"*~ **IDI 015, 2nd year of secondary school, urban.**
>
> *"[..] I left at noon and went home. I asked permission by saying I had a stomach ache even though I was not sick. I was afraid of staining [my uniform]. I normally don't come to school for at least two days [during menstruation] because, during those two days, I experience severe pain [..]"*~ **IDI 171, 3rd year of secondary school, urban.**

School WASH: Respondents reported that the toilets were not only insufficient in number, but they were always dirty. The school with the largest population of students had 12 cubicles, while the medium-sized school had seven, and the smallest had five. Almost all the respondents in three of the four schools described how their toilets were dirty, unsafe for menstrual management, lacked disposal facilities, privacy due to lack of doors or locks, and changing rooms. In all schools, many respondents reported a lack of water in the toilets and soap for handwashing. They cited the state of school WASH as one of the main reasons for choosing not to attend or leave school early during menstruation.

> *"No, the environment is not conducive for me. You find that the toilet is dirty, or you enter and find that your colleague has placed a pad above there [pointing to the upper top of the building], no water, or there is one toilet only with water, and you want to change the pad, but find someone else inside that toilet. So, I am not comfortable when I am at school [..]"*~ **IDI 043, 3rd year of secondary school, urban.**
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> *"[..] When you're on your period, you don't have access to clean water to clean yourself, and you may not have time to change your clothes or pads. Sometimes, there is no water for washing, and the toilets may be dirty and have broken doors or no rocks. It makes me feel uncomfortable and unhappy to stay at school [..]"***IDI082, 2nd year of secondary school, rural.**
>
> *"[..] I like to go and change [menstrual absorbent materials] at home because our school toilets are dirty"*~ **IDI093, 2nd year of secondary school, rural.**

Societal level

This fourth level describes social norms, particularly taboos, myths, and misconceptions that encourage stigma and isolation as acceptable during menstruation and impact school and social participation. We identified one broad theme on this level: *socio-cultural restrictions.*

Socio-cultural restrictions: Most respondents reported that they had heard or experienced socio-cultural restrictions during menstruation. We categorised their narratives into three sub-themes: prohibited from touching plants or vegetables or engaging in household chores or religious worship, prohibited from physical contact with men during menstruation, and restricted use of conventional painkillers for menstrual pain.

a) *Prohibited to touch plants or vegetables or engage in household chores or religious worship*: Many participants reported being advised by female relatives or peers—including mothers, grandmothers, aunties, and friends—that menstruating women should refrain from picking vegetables or food plants, or from passing through gardens. It was commonly believed that such actions would cause the plants to wither or rot. While several participants recognised these prohibitions as cultural myths, others expressed continued belief in them. One participant recounted a personal experience in which she picked vegetables during menstruation, after

which the plants subsequently dried out, reinforcing her perception of the belief's validity.

"They always say that a woman who is menstruating should not pick vegetables because they can shrink or dry up [..] Yes, one day I went to pick vegetables and had not told people at home that I was menstruating [..], later on, it became whitish, shrunk, and dried up"~ **IDI S038**, **3rd year of secondary school**, **rural.**

Several respondents mentioned hearing that if menstruating women fetched water, it would contaminate the water source. Additionally, menstruating women were considered unclean for cooking, and some individuals even avoided consuming food prepared by women on their periods. Some respondents were prohibited from performing household work such as cooking or fetching water by older women, such as grandmothers.

Yes, I heard that in one of the tribes in Tanzania, a menstruating girl is forbidden to fetch water from a well because people feel that her menstrual-absorbent materials can fall into the well, pollute the water, and turn the water into red [colour]. Also, my grandmother forbade me from cooking during my periods because she said during such periods, I become unclean [for cooking], so I do not cook during menstruation"~ **IDI 065**, **2nd year of secondary school**, **rural.**

Religious restrictions included menstruating women being considered unclean and therefore unable to worship in a mosque or fast during Ramadan, and to avoid fasting or worship gatherings. In addition, several respondents in the urban schools said they had heard that if a child was touched or carried by a menstruating woman, the child developed facial rashes, rendering physical contact with children during menstruation was unacceptable in some families.

"I heard that you should not carry a newborn baby when you are menstruating because the baby will develop rashes"~ **IDI 171**, **3rd year of secondary school**, **urban.**

b) Prohibited physical contact with men during menstruation: In all schools, a few respondents mentioned that when they got their first period, they were told by women in their families to avoid physical contact with men, as it could lead to sex and possibly result in unplanned or unwanted pregnancies. The respondents provided no further details on why one becomes fertile during menstruation.

"I have heard. My sisters advised and told me that during menstruation or a day after the menstruation period, you should not stay close to a boy or sleep [have sex] with a man [..] they told me that if you do so, you conceive"~ **IDI 104**, **3rd year of secondary school**, **urban.**

However, no respondent specifically mentioned limiting their interaction with male classmates at school during menstruation to avoid sex. In addition, a few respondents added that their relatives advised them to avoid sex or had heard that a menstruating person should avoid sexual intercourse during menstruation to prevent an unplanned pregnancy and avoid infertility for both men and women. However, the respondents did not elaborate on the reasons behind the belief that engaging in sexual intercourse during menstruation could lead to infertility.

"They say you should not have sex during menstruation [..] you can get pregnant, and you can also cause infertility"~ **IDI 038**, **3rd year of secondary school**, **rural.**

c) No conventional painkillers for menstrual pain. In all schools, many respondents reported not using conventional analgesics to manage menstruation because their female family members prohibited their usage. A respondent reported having heard that women who used conventional painkillers experienced irregular menstruation or problems in their reproductive systems but did not specify.

"[..] My mother told me that I should not take any medicine [..] she did not tell me any side effect, she said if I have a stomach ache, I must tolerate it [..] she said, 'Do not dare to take any kind of medicine' [..]"~ **IDI 130**, **3rd year of secondary school**, **urban.**

Respondents held contrasting views about the impact of the social norms on social and school participation. Some respondents believed the myths were old-fashioned and had no negative impact because society no longer practiced them. However, most of the respondents noted that the socio-cultural restrictions due to myths or misconceptions encouraged stigma and isolation, which, in turn, limited menstruating women's social interactions and participation in various activities.

"You feel like you are dirty and not supposed to menstruate [..] I felt awkward when my grandmother told me not to touch her clothes and asked myself how can my hand make her clothes dirty. Therefore,

you can feel lonely and isolated"~ **IDI 015, 2nd year of secondary school, urban.**

Discussion

This paper reports qualitative findings related to drivers of suboptimal school and social participation among schoolgirls using the social-ecological model [30]. The reported individual-level drivers included negative menstrual experiences (menstrual pain and constant worries of menstrual blood leaking) and economic constraint. The drivers contributed to constant worries, social isolation, and difficulty concentrating in class. The interpersonal level drivers were the fear of menstrual status disclosure and peer attitudes. Respondents noted that they avoided discussing menstrual-related issues with teachers or seeking support from girls who had not started menstruation. At the school level, they pointed out inadequate emergency pads, inadequate menstrual pain management options, and unhygienic, unsuitable school WASH facilities. The drivers contributed to teacher support that, while well-intentioned, led to schoolgirls leaving school early to go home. Lastly, at the societal level, they reported socio-cultural restrictions, including the prohibition of touching plants or vegetables or engaging in household chores or religious worship or physical contact with men that encouraged stigma and isolation from household chores, social and school participation, and no conventional painkillers for menstrual pain.

Menstrual pain was a key driver of suboptimal school participation for girls. Difficulty managing menstrual pain limits an individual's ability to participate in social activities and concentrate in studies at school [31, 32], and socio-cultural restrictions complicate pain management [32, 33]. Mothers, teachers, aunts, or peers were reported to advise girls not to use conventional analgesics to relieve menstrual pain because they are perceived as harmful to the body and could cause permanent infertility [32]. In Uganda, non-pharmacological pain relief methods such as exercises were popular and effective, according to the study by Kansiime and others [34]. However, in our study, teachers had to allow girls to go home because schools were hardly equipped with alternative pain management options such as warmer water or herbs. In Africa, fear of infertility is common among women and men [35], partly due to the value of children in African countries to maintain family lineage [36] and for the children and parents in nuclear families to rely on each other socially and economically [37]. Given the high reported prevalence of menstrual pain, and its impact on ability to participate fully in school and social life, it is therefore crucial that interventions address these misconceptions around painkillers [32].

The experiences shared by the respondents regarding the individual economic constraints shed light on the challenges faced by many menstruating girls in using disposable pads regularly, as well as affording other menstrual necessities such as extra soap or water, analgesics, foods, or transport, and the subsequent impact on their school and social participation. The preference for using disposable pads at school is understandable due to the stigma and discomfort associated with using a piece of cloth. The fear of being perceived as dirty by their peers due to the potential bad smell issue adds an emotional and psychological burden to an already-challenging situation. In addition, the lack of proper WASH infrastructure further complicates the problem, making it difficult for the schoolgirls to manage menstruation at school. Our findings are similar to those reported by Ssemata A et al., 2023 in Uganda, where a few schools encouraged their students to carry disposable pads due to a lack of space to hang reusable pads after washing, and to avoid stigma among their fellow female students [27]. In a recent study by Method et al. (2024) [38], about 43% of schoolgirls in Kilimanjaro district, Tanzania, said the main reason for not using disposable pads was their prohibitive cost. It is crucial to address the underlying individual economic factors contributing to the inability to access essential menstrual products and other resources. Therefore, there is a need for comprehensive support systems to ensure that all schoolgirls have access to affordable and reliable menstrual resources. Initiatives to create a supportive and understanding environment within schools to eliminate the stigma associated with menstruation and provide the necessary facilities for proper menstrual management are needed. Addressing these challenges is essential to optimise schoolgirls' social and school participation. In the Tanzanian context, at the school level, it is crucial to consider strengthening the emergency pads programme [24], thus integrating with and supporting existing national policy. Furthermore, providing menstrual education to both girls and boys could help reduce stigma and increase awareness, thus providing a more supportive environment for girls. At the community level, government subsidies, such as removing value-added taxes on menstrual products or creating community-based programmes that provide free or low-cost products, and involving local women's groups in educational or distribution initiatives, could also help ensure and broaden access to these essential products. In 2021, India launched a menstrual product scheme that aimed to deliver pads at highly subsidised prices in 152 districts across 20 states to over 15 million adolescent girls aged 10–19 years [39].

The need to keep menstruation confidential and private, with the undercurrent of shame and contamination, underpinned the girls' fear of menstrual status disclosure

and peer attitudes. The fear that their peers would laugh, tease, or bully menstruating girls was high, and this resulted in the girls avoiding discussing menstrual-related issues or seeking support from pre-menarcheal girls. The most anxious group were those getting their period for the first time. In sub-Saharan Africa, the socio-cultural restrictions and taboos surrounding MSRH issues place more pressure on girls and women to maintain secrecy at school, work, or home [27, 33, 40–42]. In many African cultures, reproductive health issues, including menstruation, are private matters not supposed to be discussed, particularly by men, and when discussed in public, there is bullying and teasing of the girls or women [17, 18, 42]. Further, menstruation is perceived as disgusting, impure, and shameful in case of any failure to maintain hygiene, tolerate pain, and keep it confidential (for example, avoid visible leaks) [18, 33, 42]. Period shaming is not unique to African cultures, and studies by Inthaphatha et al. (2023), McHugh et al. (2020), and Buckley et al. (2023) have reported similar findings in the Lao People's Democratic Republic and Melbourne, Australia, respectively [43–45]. For example, about 19% of male students admitted that they had shamed girls during their menstruation at least once [43]. Melbourne-based menstruating Muslim women reported that they had no choice but to opt out of praying and fasting in Ramadan, unlike pregnant and breastfeeding women who retained choice in the matter [44]. These perceptions normalise and precipitate discrimination, exclusion, and stigma [40]. Other cultures perceive menstruation as an entrance for witchcraft, a belief tangled with fertility issues. This perception likewise compels menstruating women and girls to keep menstruation a secret, while also forcing menstruating women and girls to find disposal methods inaccessible to others (burning, burying, or throwing in pit latrines), who may use the materials to impair their fertility or in witchcraft [27]. To create conditions that encourage schoolgirls' full and active participation, more efforts in interventions to help demystify taboos around menstruation are needed, especially at the societal level of the SEM. Interventions intending to improve menstrual health must include men, boys and cultural leaders to address restrictions and taboos rooted in the patriarchal system. Access to accurate information to understand menstruation and its management, often impeded by the taboos and stigma surrounding the menstruation topic, is also of paramount importance.

The options for managing menstruation depend on the particular context and intersecting situational factors. In Tanzania, guidelines for capitation grants for girls in secondary schools allocated 10% for medicine and other expenses related to female students, but did not explicitly mention menstrual health [11]. The grant amount was TZS 10,000/- and 25,000/- per pupil per year for primary and secondary school, respectively. The mechanism for buying, stocking, and distributing disposable pads was left at the discretion of individual school administration. However, since the grant is meant not just for pads but for the first aid kit and other school supplies, some schools do not prioritise buying emergency pads or painkillers, and the grant is neither timely disbursed nor fully received [11, 23]. Unfortunately, the grant is inadequate to meet the basic school supplies [11], and even when some emergency pads and conventional painkillers are available, girls face access issues. Teachers interrogate girls seeking emergency pads or painkillers at school in ways that they feel judged or mocked for not preparing themselves before coming to school. In addition, whilst science lessons include menstruation, practical information on menstrual management is not part of the curriculum [23]. Further, unhygienic and inadequate WASH infrastructure and usage restrictions pose further challenges to menstruating girls.

The findings from our study show that many girls from urban schools reported having early menarche. Worldwide, evidence suggests a downward trend in the age at menarche, irrespective of socio-economic status, ethnicity or race [46–48]. In high-income countries, the age at menarche decreased from more than 16 years in the 1800s to below 13 years in the 1980s [49]. Studies have shown that SSA is experiencing a similar trend [50], with a slight variation between urban and rural settings [51, 52]. In urban areas, girls experience menarche at an earlier age than those in rural areas [51, 52], partly due to differences in physical activities and diet between the two settings [53]. Girls in urban areas tend to have a more sedentary lifestyle [54, 55] and tend to consume more calorie-dense and processed foods [56], which may lead to the early onset of menarche [48, 53]. On the contrary, girls in rural areas tend to have a more physically demanding lifestyle [54, 55], and consume less processed and calorie-dense food, which may contribute to a later onset of menarche [48, 53]. We hypothesise that these two factors may explain the difference in the age of menarche between rural and urban adolescents in our study.

Our findings show interactions between two or more SEM levels, at the individual and interpersonal or school or societal, and between school and interpersonal levels. Similar to other research in LMICs that employed the SEM [25, 27, 57], our findings suggest that there is a need for multi-level evidence-based hardware (menstrual products and improved WASH facilities) and software (education) interventions [40] for optimal school and social participation among menstruating schoolgirls.

Our study had two important strengths. First, it is a qualitative study that provided the girls with an opportunity to add their voices to how menstruation impedes their participation in school. This information should be

used to develop targeted menstrual interventions that are approved by and developed in conjunction with adolescent girls. Second, the use of younger, female researchers experienced in adolescents' research significantly increased girls' comfort when speaking about menstruation despite the deep-rooted socio-cultural restrictions about discussing the topic [17]. However, our findings should be interpreted in light of the following limitation: our study drew data from a limited number of schools and girls who reported missing school during their last menstrual period, and thus, the results may not be generalisable to other settings. However, regardless of area of residence, socio-cultural restrictions and limited access to menstrual resources are drivers of girls' suboptimal school and social participation [17, 58]. In addition, the paper reports data from interviews conducted with girls, which focused on understanding their perspectives on individual, interpersonal and societal-related barriers to school attendance and participation during menstruation. A review of menstrual health policy in Tanzania was not part of the data analysed for this paper, and neither did the participants report information about the policy during the in-depth interviews.

Conclusion

This study suggests that drivers of suboptimal school and social participation among secondary schoolgirls in Mwanza Tanzania exist and interact at the individual, interpersonal relationship, school, and societal levels. It is crucial to provide education and accurate information to prepare girls for menarche and dispel negative socio-cultural beliefs about menstruation practices. An improved physical and social environment would additionally contribute to improving both menstrual management among girls and interactions with their peers and teachers. Therefore, multi-level evidence-based menstrual interventions are warranted to improve menstrual health at all socio-ecological levels and lead to schoolgirls' optimal social and school participation.

Abbreviations

DHSC	Department of Health and Social Care
FCDO	Foreign Commonwealth and Development Office
IDIs	In-depth interviews
LMICs	Lower-middle-income countries
LSHTM	London School of Hygiene & Tropical Medicine
MITU	Mwanza Intervention Trials Unit
MHM	Menstrual Hygiene Management
MRC	Medical Research Council
MSHR	Menstrual, Sexual, and Reproductive Health
NIMR	National Institute for Medical Research
PASS MHW	Partnering to Support Schools to Promote Good Menstrual Health and Well-Being
SDGs	Sustainable Development Goals
SEM	Socio-ecological Model
SSA	Sub-Saharan Africa
WHO	World Health Organization

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12889-025-23101-8.

Supplementary Material 1: Supplementary file 1: Semi-structured topic guide (English version)

Acknowledgements

We are grateful to all study participants for taking part in the study. We thank the Ministry of Health, Community, Development, Gender and Elderly; Ministry of Education, and Nyamagana and Misungwi districts authorities for supporting this study. We acknowledge MITU's finance and administration staff for their administrative support of the study.

Author contributions

SK, CT, CB, JR, GG, PA and EO conceptualised the PASS MHW study. EO was the Principal Investigator and CT, CB, JR, GG, PA, were co-investigators. SKS coordinated the data collection and transcription. OM and JL collected and transcribed the data. YS and EO held analytical discussions and conceptualised the paper. YS conducted formal detailed data analysis and wrote the first draft of the paper. All authors reviewed, edited, and approved the final version.

Funding

This research was jointly funded by the UK Medical Research Council (MRC) and the Foreign Commonwealth and Development Office (FCDO) under the MRC/FCDO Concordat agreement, together with the Department of Health and Social Care (DHSC). Grant Ref: MR/T040297/1.

Data availability

To maintain and protect the respondents' anonymity and confidentiality, interview transcripts and/or audio will not be made available to the public. However, anonymised data tables can be made available upon request to the MITU scientific director who is also a co-investigator of this study at MITU on the following contact information: Dr. Saidi Kapiga; Email address: Saidi.Kapiga@lshtm.ac.uk; Telephone: +255 28 2,500,019.

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. The study protocol, tools and consent received approvals from the LSHTM ethical review board (LSHTM Ethics Ref: 22 854) and the independent Tanzanian national ethics committee (Ref: NIMR/HQ/R.8a/Vol.IX/3647). All participants provided written informed consent. Headteachers provided overall consent on behalf of adolescents aged below the age of 18 years before they assented. The research team informed each participant of the aim of the study and the interview procedures. We anonymised personal data in all transcripts and reports. There were no payments for participation, but the respondents received transport fare compensation only.

Consent for publication

Not applicable. We anonymised all individual details.

Competing interests

The authors declare no competing interests.

Author details

[1]Mwanza Intervention Trials Unit, National Institute for Medical Research, Mwanza, Tanzania
[2]Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK
[3]Department of Global Health and Development, London School of Hygiene and Tropical Medicine, London, UK
[4]Department of Disease Control, London School of Hygiene and Tropical Medicine [LSHTM], London, UK
[5]Monitoring and Evaluation, Femme International, Moshi, Tanzania
[6]Global Health and Development, London School of Hygiene and Tropical Medicine, London, UK

Received: 29 July 2024 / Accepted: 8 May 2025
Published online: 28 May 2025

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