Razavi *et al. Reproductive Health* (2026) 23:141
https://doi.org/10.1186/s12978-026-02319-8

Reproductive Health

RESEARCH Open Access

"Healthy bodies, healthy minds": barriers and solutions to implementing a menstrual hygiene management program in South Sudan

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Abstract

Background Menstrual hygiene management (MHM) can be challenging for women and girls living in conflict-affected low- and middle-income countries, where access to menstrual products, soap, water, and private sanitation facilities is often limited. In response to these challenges, the Canadian Red Cross, in partnership with the South Sudan Red Crescent and the South Sudanese Government, implemented the Healthy Bodies Healthy Minds (HBHM) program from 2020–2023 to support MHM in South Sudan. Despite growing attention to MHM needs, few studies have examined the on-the-ground realities of implementing MHM programming in fragile settings. To address this gap, this study aimed to (i) describe the implementation of HBHM, (ii) identify barriers faced during implementation, (iii) identify potential solutions to overcome barriers, and (iv) understand the impact of the COVID-19 pandemic on program delivery.

Methods Data was collected through key informant interviews with individuals involved in program design and implementation and were analyzed via thematic analysis. A total of 14 respondents were interviewed.

Results Respondents identified several interrelated and compounding barriers, including resource constraints, logistical challenges, competing stakeholder interests/priorities, ongoing conflict, and climate change. To mitigate these barriers and improve the delivery of MHM programs, respondents recommended solutions and strategies such as extending implementation timelines, planning program activities around anticipated climate events, and strengthening inter-organizational collaboration. The COVID-19 pandemic introduced additional barriers, particularly by restricting the movement of people and goods. However, it also yielded unexpected benefits, notably expanding the project's reach beyond the target group of girls to the broader community.

Conclusions Implementation of the HBHM program was impacted by several interrelated and compounding factors including resource constraints and logistical challenges, protracted conflict, climate change, and COVID-19, however, collaboration between implementing partners and agility in the approach to program rollout supported enhanced program reach. International partnerships enabled community-level implementation, which proved especially

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effective for continued program implementation. Additionally, the shift to a more community-based model resulted in benefits to the broader community, offering another key insight that should be considered in the design of future MHM programs in South Sudan and similar contexts.

Plain English summary

Many girls in low- and middle-income countries, including those in conflict-affected areas, face challenges in managing their menstruation due to limited access to menstrual products, clean water, and safe, private spaces. When these needs are not met, girls may miss school and experience feelings of shame, anxiety, and depression. Strong menstrual hygiene management (MHM) programs in these settings are essential for supporting the health of girls.

From 2020 to 2023, the Canadian Red Cross partnered with the South Sudan Red Crescent and the South Sudanese government to implement the Healthy Bodies Healthy Minds program in Gogrial West County, South Sudan. This program aimed to support the MHM of girls in the region. We studied this program to understand the challenges it faced and how these could be overcome.

Interviews with 14 people involved in program design and management revealed several barriers to the program's implementation, including resource shortages, logistical difficulties, competing priorities among stakeholders, and climate change. To address these challenges, interviewees recommended a variety of strategies such as extending program timelines, planning activities around anticipated climate events, and strengthening collaboration between organizations. These insights can help guide the design of future MHM programs to better support girls' health and wellbeing.

Keywords Menstrual hygiene management, Conflict-affected settings, Program implementation, Public health in humanitarian contexts, COVID-19 pandemic, South Sudan

Background

There has been increasing global attention on improving menstrual hygiene management for women and girls living in low- and middle-income country (LMIC) contexts [1]. Menstrual hygiene management (MHM) refers to key elements of managing menstruation, including access to menstrual products, soap, water, private and safe spaces, and adequate menstrual waste disposal [2]. The wider literature on sexual and reproductive health explains that adolescent girls living in LMICs and fragile and conflict-affected contexts face marginalization related to MHM [3–5]. Fragile and conflict-affected contexts are characterized by severely limited institutional and governance capacities, which impair the state's ability to function effectively [6]. In such settings, girls often face restricted access to basic necessities, including menstrual hygiene products. While menstrual hygiene is a basic life necessity for adolescent girls and young women around the world, in humanitarian contexts there are fundamental gaps. The multitude of barriers to MHM for adolescent girls living in fragile and conflict-affected humanitarian contexts is well-documented, including lack of access to water and menstrual hygiene products, sanitary disposal, and safe and private changing areas [7–9]. In response to the growing need for improved MHM, several interventions have been developed and implemented in LMIC and humanitarian contexts.

There is a wealth of literature that describes interventions to address menstrual hygiene management. These interventions are often grouped into two categories: hardware interventions and software interventions [10]. Examples of hardware interventions include the provision of menstrual supplies and training about their usage, or addressing gaps in water, sanitation, and hygiene (WASH) facilities, including the availability of clean water, disposal facilities, privacy, and safety [1, 10]. Software or educational interventions focus on improving accessibility to sexual and reproductive health information while providing guidance and support to women and girls [1, 10]. Examples include: (i) interventions that focus on providing knowledge about menstruation physiology and management, and (ii) interventions that tackle cultural beliefs and taboos playing a role in misinformation and unhygienic practices [10]. Around the world, MHM programs are implemented with the primary aim of addressing school or work attendance/absenteeism and psychosocial outcomes like anxiety, depression, embarrassment, shame, and withdrawal from activities. Secondary outcomes addressed through these programs include academic achievement, work productivity, and improved menstrual health knowledge and management [1].

MHM interventions have been implemented in a variety of contexts, including in many African nations [Ghana [11], Ethiopia [12], Kenya [13, 14], Malawi [15], Uganda [16–19], and Zimbabwe [20, 21], the Middle East [22, 23], South Asia [24, 25], and the Caribbean [26]. Tembo et al. [21] examined a comprehensive MHM intervention in Zimbabwe for women 16–24 years, which involved providing underwear, reusable pads or

menstrual cups, soap, a period-tracking diary, and pain medication while imparting education, support, and pain management advice. They concluded that this comprehensive approach was crucial to improving menstrual hygiene knowledge, perspectives, and routines. Nalugya et al. [19] reported on an MHM intervention in two secondary schools in Uganda, which involved five components: (i) training teachers to provide puberty education, (ii) a drama skit to tackle menstruation stigma, (iii) counselling on methods for pain relief, (iv) menstrual management kits and training on its use, and (v) water, sanitation, and hygiene improvements. The authors conducted a process evaluation of this intervention, concluding that it was feasible to implement and satisfactory to the schools and students.

Schmitt et al. [25] examined innovative MHM strategies in refugee camps in Cox's Bazar, Bangladesh. In addition to menstrual products, MHM-supportive WASH facilities were provided and involved female voices (service users) throughout the process. Facilities had more female-friendly toilets with bathing and laundering spaces. The authors found that these innovative approaches were promising, but long-term viability required continued service user engagement and adequate resources.

While MHM programs have been successful in many parts of the world, various barriers exist for their implementation, including fragmented menstrual hygiene product distribution, lack of resources and infrastructure, and lack of community consultation [9, 15]. Barriers to program uptake include lack of knowledge and misinformation on menstruation and menstrual hygiene practices, lack of privacy to tend to menstrual hygiene needs, and stigma surrounding menstruation [9, 19]. However, the MHM literature also highlights several facilitators that can support program implementation, namely: empowerment of females, community-based partnerships, and fostering a sense of community ownership over programming [19, 25, 27]. Considering these barriers and facilitators, it is essential to understand how program implementers address these challenges in the field, and whether there are any additional challenges faced in the context of implementing MHM interventions with the added layers of complexity created by the COVID-19 pandemic.

In this study, we examined the implementation of a Red Cross-led MHM intervention, the Healthy Bodies, Healthy Minds (HBHM) program in a county of South Sudan, a decidedly fragile context that has experienced a state of protracted conflict for over a decade. The next section describes this program that was implemented in South Sudan from fall 2020 to June 2023. The HBHM program was seen as especially timely due to the rapid escalation of the COVID-19 pandemic in the African continent during the program implementation period. During this time, there was an emphasis on increasing resource scarcity, fair resource allocation, and the diversion of resources to COVID-related programs [28].

Through this study we explored the nature of MHM program implementation in the unique context of protracted conflict and the global COVID-19 pandemic. Specifically we aimed to (i) understand and describe implementation of the HBHM project in Gogrial West, South Sudan, (ii) identify the barriers that program implementers faced when implementing the HBHM project; (iii) report on solutions and strategies identified by program implementers to improve program implementation and address the identified challenges; and finally (iv) to specifically understand the unique impact that the COVID-19 pandemic had on the implementation of the HBHM project.

Methods

This was a qualitative study that included key informant interviews with respondents involved in the implementation of the HBHM project.

Study settings and study population

HBHM was a three-year project that began implementation in March 2020 [28]. During the implementation period, South Sudan was ranked in the top four countries most predisposed to collapse (fragile states index[1]) and least peaceful (global peace index[2]) countries [29, 30]. Approximately 67% of the population lived at the international poverty line as inflation continued to rise [31]. As a result of the country's fragility, weak economy, and volatile state, South Sudan was in a state of humanitarian crisis [32], especially among vulnerable groups like women and children. This crisis was compounded by the effects of the COVID-19 pandemic, which severely affected the economy and contributed to further inflation [33]. In addition, significant increases in rainfall and flooding exacerbated food insecurity and population displacement. Ongoing conflict led to further internal displacement and worsening economic issues.

Due to COVID-19 travel restrictions, interviews with respondents were conducted online via Zoom from August 2022 to December 2022. We interviewed program implementers and decision-makers who provided their perspectives about decision-making and implementation of the project while highlighting the impact of COVID-19 pandemic on the program implementation.

[1] Fragile states index assesses the vulnerability of a country to collapse and is based on the CAST framework.

[2] Global peace index measures a country's peacefulness based on 23 qualitative and quantitative indicators.

Sampling

Purposive sampling was used to identify program implementers and decision-makers who had extensive experience with and/or knowledge of the project. Data collection continued until thematic saturation was reached with the 14 key informants. Selecting these information-rich cases [34] allowed us to achieve saturation of theme while capturing diverse perspectives.

Data collection

Written consent was obtained from all respondents via email prior to the interviews. Ethics approval was obtained from the Hamilton Integrated Research Ethics Board (HiREB), Canada, in accordance with the Tri-Council Policy on the Ethical Conduct for Research Involving Humans. Semi-structured interviews were conducted by SDR in English. Key informants were asked questions about the implementation of the project, key successes and barriers/challenges, the impact of COVID-19 and protracted conflict, project gaps, and recommendations to address barriers/challenges for the project. While SDR conducted the interviews, HC took notes. Interviews were audio-recorded then transcribed verbatim. Transcripts and field notes were anonymized.

Data analysis

Braun and Clarke's 6-phase approach to thematic analysis was used to analyze the data [35]. SDR and HC reviewed the transcripts, separately, to refamiliarize themselves with the data. After familiarization with the data (phase 1), initial coding focused on information that was related to the questions asked during the interviews (phase 2). SDR and HC coded two transcripts together to ensure consistent understanding and application of codes. The remaining transcripts were then split between SDR and HC and coded separately. Related categories of codes were grouped into themes during secondary coding (phases 3–5). Themes were reviewed, discussed, and refined at regular touchpoints between SDR and HC throughout the iterative coding process (phases 4–5).

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Results

We interviewed a total of 14 respondents (seven female, seven male). All respondents played a role in either program design and development and/or implementation, including eight local implementers who were either from the South Sudan Red Cross (SSRC) or from South Sudanese governmental bodies, and six technical advisors and decision-makers from the Canadian Red Cross (CRC) team based in South Sudan and in Canada.

In the following section, we describe the program development and implementation process, and report on barriers to program implementation as reported by the respondents, along with proposed solutions as recommended by the respondents. We also provide an examination of the impact of the COVID-19 pandemic on program implementation.

Development and implementation of the healthy bodies, healthy minds project

The project was initiated through a collaborative effort between CRC, SSRC, and the South Sudanese Government. Figure 1 provides a summary of key features of the project, project goals, and the main interventions that were implemented including both hardware (e.g. distribution of sanitary pads) and software interventions (e.g. education and training session on sexual and gender-based violence (SGBV) and MHM), and highlights project reach. The following section briefly describes the project development and implementation as explained by the key informants.

Delegates involved in the HBHM program engaged in a consultative process to develop the project's proposal, followed by its implementation plan (PIP), and the annual workplan. Different project committees were formed to guide the project, including the Project Steering Committee, the Project Review Team, and the Project Management Team. Their roles were as follows:

- The Project Steering Committee (PSC) was responsible for ensuring quality and accountability by providing advice on the project's strategic directions and reviewing the progress made while ensuring the Project Management Team followed work plans and met established targets.
- The Project Review Team evaluated achievements, challenges, mitigation, and approach recommendations.
- The Project Management Team was responsible for operational direction and identifying operational risks and issues, conducting activity and outcome reviews, resolving conflicts, and advocacy needs.

Respondents explained that the project's proposal, PIP and annual workplan guided the project's implementation. Concepts from the proposal were modified in the PIP during the review meetings, based on assessments done and collaborative decision-making.

> *"people in the field who will have to make all these decisions based on their assessments... basically, all*

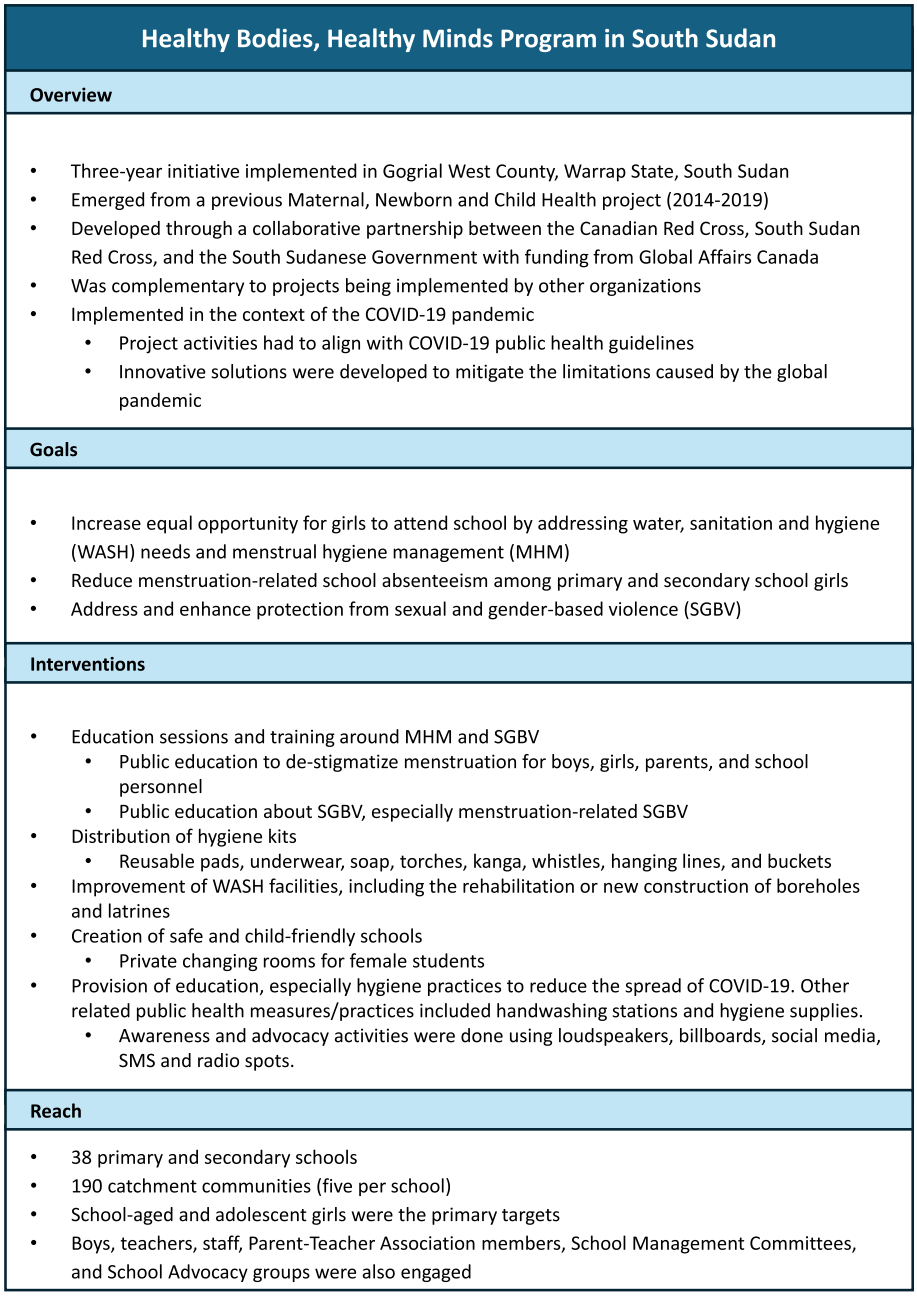

Fig. 1 Snapshot of healthy bodies, healthy minds program

the ideas in the proposal, it got fine-tuned in the PIP." – KI 10

"Based on the PIP and the annual planning… the project team always follow that planning" – KI 11

Furthermore, respondents highlighted that a variety of stakeholders were involved in different stages of planning, implementation, and meetings. One participant described the key stakeholders, and their involvement as follows:

"we bring the stakeholders, the beneficiaries, the teacher representative, the ministry of education at state… Kuajok leadership, Juba leadership, SSRC leadership, country representative, the team and of course key technical team of the national society, so the WASH manager, the protection manager, the CEA coordinator, the PMER coordinator, we all sit… 5-day sitting where we discuss, this what we have, this what we do, basically we rationalize to do it." – KI 08

Respondents noted that regular reviews were done by the field and headquarters team. The field team conducted planned activities. The headquarters team coordinated, supervised, and provided approval for activities while managing the budget and resource allocation. They also ensured that project requirements were met while endeavouring to fulfil stakeholder interests. Project resources were kept at headquarters and had to be transported over long distances to the field, oftentimes with challenges.

> *"When it comes to the execution of the project. Of course, there are different colleagues who handle different tasks in the project implementation. At Kuajok level, where the project is currently implemented… a team consisting of the project coordinator… the project officers… make sure that specific activities are being implemented" – KI 01*

Barriers to MHM program implementation

Respondents identified 14 main barriers to program implementation. We grouped these barriers into five overarching categories: resources, logistics, competing interests/priorities, conflict/protracted state of crisis, and climate change.

As illustrated in Table 1, respondents emphasized that resource gaps were not only limited to lack of financial resources but also overstretched human resources. One respondent explained that:

> *"most of these schools they are really far from Kuajok area. Some of them, you have to go and spend a night… when you look at the human resource for the project that is the officers… they are really overstretched. For them to be able to reach out to these 38 schools… with all these interventions… they really really tried." – KI09*

Key informants also explained they had minimal budget flexibility, creating challenges for making resource allocation decisions in the field. This lack of flexible funding significantly constrained implementers' ability to prioritize and re-prioritize program activities as the program is being implemented. As one respondent explained, "*Resources that have been approved, cannot be reallocated to totally new areas*." – KI 08. For example, resources that were earmarked for school-based SGBV education or for construction of WASH facilities could not be re-allocated to emerging health needs as the program was being implemented.

When discussing program logistics, respondents primarily pointed to the logistics supply chain with regards to moving program resources to the implementation area. Specifically, the barriers identified in this category focused on factors that impeded or affected resource transportation, namely poor road infrastructure, which made timely movement of program resources and supplies quite difficult, as well as insufficient number of vehicles to serve all 38 schools and 190 catchment communities. One respondent noted that:

> *"limited number of cars that we have to support the implementation process… we have so many activities that need to be facilitated, at the same time it's difficult to support them" – KI03*

Next, we identified competing interests and priorities as an overarching category of barriers to implementation, which highlights the role that different stakeholders play in program implementation and that a lack of alignment between these stakeholders' needs often has a negative effect on program implementation. As demonstrated in Table 1, the donor who is largely responsible for funding the program had a certain set of requirements for program implementation and reporting, which did not align with local capacity. Additionally, government goals, school mandates, and community needs may be at odds with one another or be too numerous for the three-year HBHM program to implement successfully. Respondents explained that:

> *"the government authorities are requesting us to increase the support… looking at the resources we have currently we are unable to cover more schools than what has been planned… it is very difficult…" – KI03*
>
> *"so many NGOs also want to have activities in those schools… it's better to match some of these trainings [program activities] to avoid interrupting the school curriculum… at some point it was at a tussle because the school needs to make sure they continue the curriculum, and at the same time we need to do the program activities." – KI12*

Finally, there are two major contextual challenges that are reportedly facing program implementers in South Sudan, namely the protracted state of conflict in the region and the largescale impacts of the climate crisis. The protracted state of conflict in the region leads to insecurity with threats of violence that can sporadically erupt. Respondents explained that insecurity impacted program implementation in two ways. Firstly, causing population movement that could increase the number of service users in the program's catchment area at any given time. Secondly, creating safety issues, especially with respect to transportation of program supplies along unsafe roads. The climate crisis primarily impacted program implementation due to the increased risk of flooding in

Table 1 Barriers to MHM program implementation as identified by respondents

Category of barrier	Specific Barrier/Challenge	Illustrative Quotes
Resources	Limited or overstretched human resource capacity	"human resources are very little… I have to support all the 38 schools … you may find there is no possibility of reaching all these 38 schools within a week… sometimes very hard, having other responsibilities in the office, including the training." SS04
	Limited financial resources	"the project with limited amount of money, in the area where it's very difficult to work in" SS10
	Predetermined budgets/lack of budget flexibility	"you have to be guided by a predetermined budget funding which you cannot go beyond the limit" SS02
	Mismatch between expectations and available budget/capacity	"there are high expectations from the schools. As well as the communities… we are only supporting 38 schools… government authorities are requesting us to increase the support… looking at the resources we have currently, we are unable to cover more schools than what has been planned in the project." SS02
Logistics	Poor road infrastructure	"a truck actually got stuck because there are no tarmac roads here… the bad roads, you find that the cost of transportation of items becomes very high" SS05
	Limited transportation	"you have vast areas to cover… you have only two vehicles, so that clearly means that you're not able to access some of the areas" SS09
Competing Interests/Priorities	Donor implementation requirements	"[donor] needs structural design analysis for all the construction, regardless of its size, level and complexity. And not only that, structural analysis needs to be done by a qualified structural engineer from South Sudan who has certification in the engineering council… took us almost 6–8 months to find somebody who meets that criteria and then sign up all this design by that person." SS11
	Donor reporting requirements	"I think the [program monitoring evaluation and reporting] PMER capacity is very low [for reporting]" SS10
	Government goals	"government authorities are requesting us to increase the support… authorities are asking you to cover more than what you have [budget]" SS02
	School mandates	"multiple trainings… so many NGOs also want to have activities in those schools… program team said we had gone the other day and this school teacher said the actioner was already here… you could see their concerns… it's better to match some of these trainings to avoid interrupting the school curriculum… was a tussle because the school needs to make sure they continue the curriculum, and at the same time we need to do the program stuff" SS12
	Community needs	"in the community, when you're distributing sanitary pads [MHM kits for school girls]… some community members also demanding to get [kits]… you could see it's a need" SS12
Conflict/state of Protracted Conflict	Increased service users due to internal displacement	"[conflict-related] challenge we always have is the influx of IDPs (internal displaced persons) from neighbouring counties when there are some issues of conflict occurring. The IDPs will always come in, and the number will always increase, especially for the school." SS02
	Insecurity	"The roads are not safe… There were a lot of security issues along the roads" SS08
Climate Change	Flooding	"a challenge based on the fact that this is a yearly occurrence… we will be facing some sort of floods in the location… adversely affect the implementation of the project activities… with climate change, you find that, the patterns are really changing. You cannot predict for how long the rains will be there, or when they are going to stop" SS09

program areas, making timely program implementation nearly impossible at certain times during the rainy season.

> *"When it is the rainy season, it is difficult to reach some schools that are very far away so sometimes we have to wait until the water level is down so that we're able to reach those schools" – KI03*

Additional illustrative quotes are provided in Table 1.

One theme that came across strongly from the interviews is that the large majority of the identified barriers are not stand-alone barriers; they are interrelated and compound one another, making the challenges to implementation even more pronounced and impactful. For example, one respondent noted that the challenge of

insecurity, poor road infrastructure, and high costs compound to exacerbate implementation challenges,

> *"you find that the cost of transportation of items becomes very high… because of that the charges can be high compared to a normal situation…South Sudan is also in conflict, and the project area is very far so transportation of items from where the procurement was done is one of the issues. In order for these things to reach the project area sometimes there is delay. There is a delay because of these challenges of access. It is not only the security but also our bad roads " – KI 05*

Restricting movement had implications for the movement of resources from other areas experiencing active conflict to the program area. As one respondent explained, the challenge comes not only when the conflict erupts in the program implementation area, but also in other regions of the country:

> *"The conflict in other states… it does affect is in terms of delivery of the resources… if there is a conflict in the middle where the vehicle will cross to this side [project area]. This is where it would affect" – KI 04*

Another respondent explained in detail the complex interactions between a number of barriers that affected implementation:

> *"you had long term climate change that impacted peace and security in South Sudan. And female headed household are especially vulnerable to the effects of the climate change, as they mostly depend on agriculture to sustain their families … you had higher risks of the community rivalries, risk of cattle raiding that could trigger community violence. You have the displacement, the growth of the new or existing armed groups … not to mention, of course, all that was compounded by COVID." – KI 14*

Recommendations from program implementers

Respondents provided a range of recommendations for program implementation, which we classified into two categories: i) specific solutions to address the barriers they identified, or ii) overall program improvement strategies. See Table 2 for specific solutions and recommendations with illustrative quotes.

Specific solutions to address identified barriers

Resource constraints/limitations Respondents suggested three main strategies to overcome the resource limitations barrier. While dedicating more financial resources is a common request of program implementers, our respondents identified other creative ways to address resource constraints, including longer implementation timelines, improving human resources capacity, and starting the human resource recruitment process earlier. For example, respondents specifically explained that a longer implementation timeline could be a strategy to maximize the impact of resources, particularly if budget increases were not possible. One respondent noted that much of the HBHM project activities required behavioural changes/modifications and thus would benefit from an extended project timeline to support that process.

> *"If we have a project, instead of saying we are going to spend 2 million in one year, let's do it in 3, 4, 5 years and then do the processes annually to get the opportunity for lessons learned… behaviour change, learning and then changing, it takes [time], it is a process." – KI 08*

Competing interests and priorities of different actors Respondents' recommendations focused on the challenges associated with meeting donor's reporting requirements. They explained that one way to mitigate this challenge could be to leverage staff capacity in Canada to support local program implementers in South Sudan. The Canada-based staff could use their expertise and understanding of the donor requirements and donor landscape to support the local partners in thoroughly addressing donors' reporting requirements, which can at times be complex and elaborate.

Climate crisis and increased flooding Program implementers suggested workarounds to plan project implementation timelines around anticipated climate events. For example, prioritizing implementation activities during the dry season when the roads are expected to be intact and passable by car.

Overall program improvement strategies

Building upon the targeted solutions identified above, respondents recommended four overarching strategies to improve future program implementation: developing and/or strengthening partnerships, flexible funding, adding complementary programs to support communities—including plans for sustainability after project close, and strengthening overall emergency preparedness through the development of contingency plans.

Respondents repeatedly mentioned that leveraging and/or improving partnerships and collaborations with other organizations could address a number of identified barriers. As one respondent noted: "*The challenges of South Sudan, to me, it cannot be implemented by one partner. It's something that we really need to reinforce*

Table 2 Solutions and recommendations from program implementers for improvement

Category	Specific Solution/Recommendation	Illustrative Quotes
Resources	Longer implementation time	"To have a proper impact, you should have an increase of time… 4 or 5 years if there is enough budget to cover for three or four years. It would really leave an everlasting impact on the beneficiaries and the community" – SS02 "…about 5 years, you implement for 2 years, you review, so where are we, what did we do, are these still the needs, can we divert to other sections, can we broaden it, what can we do… it is a big cultural impart to shift imaging. They soon forget about the other issues, protection… we all know human beings… take a while to learn and then change so… behaviour change, learning and then changing, it takes [time], it is a process" SS09
	Improve HR capacity	"There is a need for HR capacity building at the National Society to make sure they can… get the right people and recruitment processes" – SS12
	Start the recruitment process early	"in regard to human resources, that is the recruitment… whenever we know a proposal has gone through, and we are in the stage of signing the MOU [*memorandum of understanding*] with the National Society [*local Red Cross society, ie. South Sudan Red Cross*]… don't really need to wait till the MOU is signed for us now to start all these other processes… We can request the National Society to start all these other processes that we, normally, know takes time" – SS09
Competing Interests/Priorities	Improve reporting capacity	"we could do the reporting from headquarters [*in Canada*]… make sure that you have a good reporting capacity in the field… I think we need to build that capacity a bit more in the field so that we are really able to communicate the result that we achieve" – SS13
Climate change	Prioritize flood-prone areas during dry season	"ensure that for the implementation of all the projects, the first priority is being given to the far to reach areas which previously was not the case" -SS09 "seasonal calendars help us focus and see which months, for example, when they have rains what do we need to do and maybe where we have, like the dry spells. These are times when we know we can have access, so we try to prioritize." – SS01
Limitations outside of project's scope	Flexible funds	flexible funds that can be able to support survivors of SGBV, not only project side but also other areas "Gender-based violence referral system… [for] services you are not able to offer… [you would] refer to other partners… [However] they [partners] are not able to offer comprehensive services… sending a survivor… they come back… [survivor] was not able to get any sort of help" SS09 "Flexible funding, it doesn't mean it is not going to use the proper auditing mechanism, proper finance management. It means that you are able to address the real challenges." SS08
Other Recommendations for overall program improvement		
Logistics	Offer tangible solutions to complement education	"we can also try to see how best to offer or to introduce a part of economic support to these families… offering economic empowerment training, life skills training, and even supporting them to attend vocational training that can be able to uplift them." SS09
	Sustainability plans	"… after the project phazes out, what will the girls be doing? Would they be able to afford the sanitary towels? No, they still will not be able to afford it. But what if we offer some sort of a training how they will be able to make it locally. So, this is something else that we can be able to explore or try to venture into in order to have some sort of sustainability for the project" – SS09 "I was kind of wondering if we had incorporated… an availability component from the very beginning of the project through promoting local entrepreneurs, maybe providing them with some seed money, and to see if they can produce these products in South Sudan" – SS11

Table 2 (continued)

Category	Specific Solution/Recommendation	Illustrative Quotes
Emergency Preparedness	Contingency plan	"it's spending more time on the analysis and on the exercises with all the stakeholders… those kinds of risk scenarios, risk mitigations… those kind of protocols… clearly designed" – SS10
	Build local capacity	"I think one big thing is just to make sure that you have a very strong local team… I think we need to build that capacity a bit more in the field." SS13

and work collaboratively, a partnership," – KI 08. Collaborations and strengthening partnerships were hailed as a way to address challenges related to resources and viewed as a way to potentially mitigate security concerns:

> *"These are things sometimes we can also try to sit together with different actors, who are also on ground to see how can we be able to leverage on the resources that we have." – KI 01*
> *"Challenges on the logistical… we can have more collaboration. For example, there are more avenues on how we can ship items…they should explore convoys… we have all these organizations going to the same area… there is assured security. If we couldn't do it in convoy, it [would] cost 20,000–30,000 to ship a vehicle to Kuajok as cargo. And the vehicle we got at 11,000 CHF, and you see, it doesn't make sense" – KI 12*

Flexible funding was proposed as an overarching strategy to allow programs to better address community needs as they emerge throughout the implementation process, "*Flexible funding, it doesn't mean it is not going to use the proper auditing mechanism, proper finance management. It means that you are able to address the real challenges*." – KI 08.

Next, the respondents expressed concern regarding the sustainability of the program activities following the end of the three-year funding period. They explained that there is a need to develop sustainability plans to support communities following the project close, and to engage in this planning process at the start of the project, rather than scrambling to include some level of sustainability near the end of the implementation:

> *"… after the project phases out, what will the girls be doing? Would they be able to afford the sanitary towels? No, they still will not be able to afford it. But what if we offer some sort of training now they will be able to make it locally. So, this is something else that we can be able to explore or try to venture into in order to have some sort of sustainability for the project" – KI 09*
> *"I was kind of wondering if we had incorporated… an availability component from the very beginning of the project through promoting local entrepreneurs, maybe providing them with some seed money, and to see if they can produce these products [sanitary pads] in South Sudan" – KI 11*

Similarly, respondents consistently noted the challenging economic context of South Sudan. They felt that, although the program aimed to take a holistic approach in addressing education, WASH, SBGV, and MHM, the program participants and the community could benefit from complementary programs to support program uptake and enhance longer-term impact:

> *"we can also try to see how best to offer or to introduce a part of economic support to these families… offering economic empowerment training, life skills training, and even supporting them to attend vocational training that can be able to uplift them." – KI 09*

Finally, respondents noted that emergency preparedness was weak in South Sudan, particularly considering the contextual nature of the country as being particularly fragile, in a protracted state of conflict, and vulnerable to the impacts of the climate crisis. They recommended contingency planning to better prepare for future crises and to plan and prioritize ways to mitigate the impacts of the aforementioned contextual factors:

> *"spend more time on the risk register, on the contingency plan… it's spending more time on the analysis and on the exercises with all the stakeholders… those kinds of risk scenarios, risk mitigations… so that you have those kind of protocols clearly designed" – KI 14*

Spotlight on the impact of COVID-19 on program implementation

The HBHM program was a school-based project designed prior to the COVID-19 pandemic; however, program implementation began during the pandemic. Public health restrictions implemented during this time, especially school closures, significantly impacted program implementation and limited the program activities that could be conducted. As such, COVID-19 became a unique, unpredicted barrier that had a discernible effect on program implementation, and adjustments needed

to be made. These adjustments included innovative and strategic solutions developed by program implementers to mitigate the impact. The following sections describe how the pandemic impacted the HBHM program, presenting both the negative effects, which exacerbated challenges, followed by the unexpected positive effects.

Negative impact of COVID-19

Respondents identified five negative impacts of COVID-19, which included i) project delays due to school closure and disrupted activities, ii) restricted movements and travel bans reducing field capacity, iii) supply chain disruptions, iv) project timeline extension, and v) inflation.

Program implementers faced significant challenges due to COVID-19 while trying to meet predetermined deadlines. These challenges resulted in delays in or reduced capacity to conduct program activities, as highlighted by one respondent: *"COVID-19 has actually affected the programming implementation in terms of delay... At the beginning some activities were not implemented immediately because of COVID-19 restrictions."* – KI 03.

Travel restrictions further reduced capacity by limiting who was able to participate in program implementation, as noted by one respondent: *"There was a flight ban... most of the technical team... can't go to the field to participate"* – KI 12. Another respondent stated, "*I wish we could go be of more support to the field by having more regular visits."* – KI 14.

Border restrictions led to supply chain disruptions, making procuring project supplies challenging. One respondent explained that: *"when it came to COVID time, movement was restricted, and local and international border movement was not possible. So, we had challenges in procuring the supplies."* – KI 02.

School closures, reduced capacity, and travel and border restrictions delayed implementation. Thus, a timeline extension was requested to complete the project's activities, as described by one respondent: *"COVID, which has impacted greatly... the implementation, especially in the first months, where there was lots of uncertainty... we had to actually negotiate the extension of the project implementation due to the delays incurred due to the closure of the schools."* – KI 14.

Respondents noted that, prior to the pandemic, the cost of living was already high for the South Sudanese population. COVID-19 led to further inflation, which required budget revisions to procure the necessary program supplies. One respondent explained that: *"because of COVID, it was not possible to get things at the normal price, because, remember South Sudan is a net importing country. So, the prices of items escalated. There is high inflation. You had to revise the budget"* – KI 12.

Positive impact of COVID-19

The positive effects of the COVID-19 pandemic resulted from innovative solutions that i) extended the project's reach, and ii) improved hygiene practices. The following section describes these positive impacts in further detail.

The HBHM project was school-based; therefore, school closures during COVID-19 impacted program implementation. Since students' needs, especially the girls, remained, program modifications were required to reach them during school closures. The creation of 190 "catchment areas" was one innovative solution developed to minimize the pandemic's impact. These catchment areas extended the project's reach to involve the communities surrounding the 38 targeted schools (five communities per school). As one respondent explained:

> *"the project wasn't supposed to do activities in the communities, we meant to be school-based... in the 38 schools. Because of the COVID school closure... We had to revise the modality of project implementation... we went back to [donor]... we want to go to the communities because... children are not in school... they are not receiving any awareness messages, no one is teaching them the proper prevention, no one is showing how to properly wash hands, and sometimes they don't even have facilities to store water for handwashing"– KI 08.*

Given the resource limitations of the region, program implementers reported diverting or repurposing funds in order to assist communities with hygiene practices. While the overall budget was originally fixed, the donor allowed for some budget modification to accommodate the pandemic's impact. Financial resources that were saved in other project areas were reallocated to obtain COVID-19-related supplies like soap, water containers, facemasks, and sanitizers. In addition, improved water supply and upgraded or new sanitation facilities helped to facilitate hygiene practices. Another strategy involved incorporating a COVID-19 focus into existing hygiene-related educational activities. As one respondent explained, COVID-19 education was incorporated into the program implementation and was delivered not only to the schoolgirls, but also to the communities living in the 190 program catchment areas.

> *"because of COVID-19 we had to come up with a new implementation strategy involving COVID-19 related activities, so implementation started with providing COVID-19 awareness sessions to the catchment areas around all the schools that we are supporting... Dissemination was through radio, radio talk show... announcement by using the public*

speaker system in… the catchment areas around the schools" – KI 03

While these innovative strategies helped to improve the hygiene practices among the intended targets, the schoolgirls, the communities in which they lived also benefited.

Discussion

Through key informant interviews with HBHM project implementers, we gained valuable insights into the project's implementation, including implementation barriers and potential solutions. We also developed an understanding of the impact the COVID-19 pandemic had on this MHM project.

Project planning and implementation was guided by a range of stakeholders—including beneficiaries, a teacher representative, and local leaders—and regularly reviewed by both the field team and the headquarters team, approaches that align with implementation, monitoring, and evaluation recommendations of the International Federation of the Red Cross Red Crescent Movement [36].

Many of the barriers identified by study respondents reflect challenges commonly faced in humanitarian programming. Insecure environments, in particular, have been recognized as one of the most prominent barriers for delivering humanitarian assistance, with attacks on aid workers continuing to rise [37, 38]. Beyond safety concerns, the HBHM project implementers noted that the unstable context also disrupted project delivery, as sudden influxes of displaced individuals fleeing conflict created unpredictable demands on program resources. This insight is critical for future program design, highlighting the need for adaptive solutions to manage resource demands. Potential solutions may include maintaining reserve stocks of MHM supplies or designing program elements that can be modified to accommodate fluctuating demand. Notably, while internal displacement presents challenges, it can also expand program reach, thus benefiting a larger population.

Another identified implementation barrier was climate change, which is increasingly complexifying the delivery of humanitarian aid across the world by damaging infrastructure, disrupting supply chains, and creating more harsh working conditions [39]. All humanitarian organizations will need to find ways to adapt to this changing environment; strategies may include adjusting the timelines of program cycles, as suggested by study respondents, and supporting community-led resilience planning [39, 40].

Beyond affecting program implementation, both conflict and climate change exacerbate MHM challenges for girls and women by limiting access to supplies, safe and private facilities, and clean water essential for personal hygiene and reusable pad maintenance [5, 9, 41]. Addressing the challenges of insecurity and climate change in future MHM programs in South Sudan can help ensure both more stable program delivery and improved MHM outcomes.

To manage barriers related to funding constraints, respondents suggested longer implementation periods and more flexible funding mechanisms for projects. Interestingly, these recommendations align with elements of the *Grand Bargain*, an international agreement established in 2016 aimed at increasing the efficiency of humanitarian financing [42, 43]. The "PRO-Jeunes" youth livelihood program in Côte d'Ivoire, a five-year initiative launched in 2016, exemplifies the advantages of multi-year, flexible funding [44]. These features fostered the development of strong local partnerships and facilitated collaborative program design that integrated the private sector, civil society, and technology to support long-term youth employment. Additionally, these features enabled implementers to continuously adapt their approach in response to feedback and the evolving contextual needs of the population [44]. In the context of the HBHM project, greater funding flexibility and duration could have facilitated the reallocation of earmarked resources to address emerging health needs and enabled continuous refinement of project activities, ultimately enhancing its impact.

An additional constraint encountered during the implementation of HBHM was the misalignment of interests and priorities among key stakeholders, including donors, government bodies, NGOs, and local communities. In the sphere of global health, such competing interests and priorities can produce contentious power dynamics, in which those controlling financial resources or regulatory authority hold disproportionate influence over program direction [45, 46]. As a result, programmatic decisions may become shaped more by external requirements than by locally identified needs. Reflecting these challenges, HBHM program implementers described donor reporting requirements that exceeded local capacity, government requests for expanded coverage despite limited resources, and tensions between NGO activities and school schedules—all of which complicated the program's ability to respond effectively to community needs.

The COVID-19 pandemic had an appreciable impact on the HBHM project implementation and required adjustments to established plans. School closures and disrupted activities resulted in project delays, while restricted movements and travel bans reduced field capacity. Additionally, border restrictions and rising inflation exacerbated underlying procurement and budgetary challenges. Similar obstacles were encountered by numerous health projects during the pandemic, with each project having varying levels of adaptation ability

and success [47–49]. For example, some of the pandemic adaptation measures employed by an adolescent sexual and reproductive health project in South Africa included shifting towards remote services and door-to-door visits [50]. While these measures enabled the continued delivery of specific intervention components, they were not well accepted by some community members, affecting the program's reach [50].

The HBHM project implementors succeeded in developing innovative and strategic solutions to overcome some of the pandemic challenges, which extended the project's benefits to the surrounding communities. One such innovation was the creation of 190 "catchment areas," which exemplifies how an emergency-driven adaptation can provide greater benefits than initially envisioned during the project planning stage. Furthermore, it highlights the need to develop solutions to maximize the impact of projects in resource-limited, protracted crises. Such a shift towards community-based models should be considered in future MHM programs. Another key adaptation was the reallocation of financial resources saved in other project areas to address emerging challenges related to the pandemic.

Overall, the pandemic-related modifications to the HBHM project enabled the support of MHM among girls while providing much-needed assistance for hygiene and infection control within supported communities. The community's improved capacity to perform public health control measures will be an asset during future disease outbreaks and global health emergencies.

Study limitations

COVID-19 restrictions limited our ability to travel to the field where the HBHM project was being implemented. Consequently, key informant interviews were conducted online using the ZOOM platform. Internet connectivity was occasionally a challenge; however, this was mitigated by conducting interviews during off-peak hours and by providing flexibility in the interview schedule in case the project team in South Sudan experienced internet connectivity issues that could not be quickly resolved.

Another limitation was that interviews were solely conducted with implementers. However, we interviewed a broad range of implementers, including local implementers—SSRC field officers, supervisors and decision-makers, and government advisors—in addition to CRC technical advisors and decision-makers. This ensured we obtained a diversity of perspectives about the program implementation, supporting the robustness of our findings. It would have been beneficial to include focus group interviews with service users to obtain their perspectives, but interviewing service users was beyond the scope of this study. Examining service users' experiences with MHM program implementation is an important area for future research.

Conclusion

The design and implementation of the HBHM program were conducted through a collaborative process with delegates from the CRC, SSRC, and the South Sudanese Government. Barriers faced during the implementation of the program included resource constraints, logistical challenges, competing stakeholder interests/priorities, protracted conflict, and climate change. These barriers were identified as being interrelated and compounding, thus creating more pronounced challenges to project implementation. To mitigate these barriers and improve the delivery of MHM programs, respondents recommended strategies such as extending implementation timelines, planning program activities around anticipated climate events, and strengthening collaboration between organizations. The COVID-19 pandemic introduced additional barriers, particularly by restricting the movement of people and goods. However, it also yielded unexpected benefits, notably expanding the project's reach beyond the target group of girls to the broader community. This more community-based model may be beneficial to employ in future MHM programs.

Findings from this study offer valuable insights for organizations seeking to implement effective MHM programs in South Sudan and beyond. Future program planning should consider implementing MHM interventions at the community level, as the HBHM project demonstrated distinct advantages using this approach.

Abbreviations

CRC	Canadian Red Cross
HBHM	Healthy Bodies, Healthy Minds
LMIC	Low- and middle-income country
MHM	Menstrual hygiene management
SGBV	Sexual and gender-based violence
SSRC	South Sudan Red Cross
WASH	Water, sanitation, hygiene

Acknowledgements

We would like to thank our respondents from the field in South Sudan for taking the time to speak with us, particularly through the immense challenges they experienced while implementing the program in a state of protracted crisis and during the COVID-19 pandemic. We would also like to thank the Canadian Red Cross and South Sudan Red Cross leadership teams on the Healthy Bodies, Healthy Minds program and for facilitating access to the respondents. Finally, we would like to thank Global Affairs Canada supporting the Healthy Bodies, Healthy Minds project and partnership.

Authors' contributions

S. D. R. conceptualized the study; she was responsible for conducting the qualitative interviews and drafting the main manuscript text. H. C. supported with conducting the qualitative interviews and was an equal participant in drafting the main manuscript text with S.D.R. He also prepared the tables and figures for the paper. J. L. drafted the discussion section and paper abstract. L. K. supported S. D. R. with developing the concept for the study, she reviewed each draft of the paper and provided substantial comments and editing. S.S. also supported S. D. R. with developing the concept for the study. He reviewed

each version of the paper and provided comments and edits throughout. All authors reviewed the manuscript.

Funding
This research was supported by Mitacs, Canada (IT23111). The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
Written consent was obtained from all respondents via email prior to the interviews. Ethics approval was obtained from the Hamilton Integrated Research Ethics Board (HiREB), Canada, in accordance with the Tri-Council Policy on the Ethical Conduct for Research Involving Humans.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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Received: 12 August 2025 / Accepted: 16 March 2026
Published online: 23 May 2026

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