OPINION EDITORIAL

Using Water, Sanitation, and Hygiene Interventions to Advance Maternal Health in South Sudan: A Feasibility Study

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INTRODUCTION

Investments in maternal health have become an international development priority as they are known to reduce poverty, advance gender equality, and build strong societies. Access to water, sanitation, and hygiene (WASH) – especially the adoption of effective hygiene behaviors such as washing hands with soap and water at all points of contact with expectant mothers – are amongst the primary interventions that are effective for reducing maternal morbidity and mortality [1]. Sustainable Development Goal (SDG) 6 of the 2030 Agenda strives to achieve the equitable provision of WASH and to "leave no one behind" by paying special attention to the needs of women and girls globally [2].

In conflict settings, poor access to WASH poses additional risks for expectant mothers. One such setting, South Sudan, continues to face significant challenges in meeting maternal and newborn healthcare needs. Ongoing conflict, damaged infrastructure, poor health coverage, and limited government efforts have resulted in disintegrated healthcare systems across the country [2]. The simple and life-saving act of washing hands with soap and water is complicated by insecurity and unending struggles to sustain peace. Given South Sudan's complex situation, it is clear that mainstream WASH interventions for improving maternal health may not be as effective. In this article, we share our perspectives on the possibilities of improving WASH and maternal health in South Sudan using a 3-phase feasibility study.

OVERVIEW OF WASH SITUATION IN SOUTH SUDAN

According to recent data, approximately 60% of the 13 million people in South Sudan depend on surface water supplies or must walk more than 30 minutes to reach an improved water source [3,4]. Furthermore, an estimated 5.2 million women and children in the country are in dire need of WASH services [3]. Hygiene awareness continues to be one of the world's poorest and sanitation access remains low, with only 15% of households owning a latrine and 4% sharing one [5]. In these conditions, women and girls face increased risks of sexual violence when accessing water or communal toilets. Most health facilities – particularly maternity wards – lack basic water and hygiene services, increasing facility-associated infection in both mothers and newborns [6].

WASH AS A MATERNAL HEALTH ISSUE

Limited access to WASH impacts maternal health outcomes multidimensionally in South Sudan. The country has one of the weakest maternal health indicators in the world, with approximately 1,150 women dying annually for every 100,000 live births, doubling the average for sub-Saharan Africa [7]. Sepsis – a bacterial infection linked to unclean water and inadequate sanitation during labor – is one of the most common causes of maternal illness and death in South Sudan [8,9]. Similarly, anemia

contributes to poor maternal health, as it is associated with malnutrition and chronic diarrhea, with the latter usually occurring due to insufficient clean drinking water and sanitation [10].

Exposure to unsafe water during pregnancy can increase fecal-oral contamination and may lead to typhoid, dysentery, or malaria – all of which pose high risks to pregnant women [11,12]. The gendered burden of water collection can cause spinal injuries, hernia, and a heightened risk of spontaneous abortion [12]. Indeed, the consequences of inadequate WASH for maternal health can be destructive as many complications are caused by unsanitary conditions, poor hygiene, and water inaccessibility. The benefits of improving WASH amenities for women and children in emergency contexts can be lifesaving. The importance of WASH to health is well-documented, and the presence of birth attendant handwashing and clean surfaces can reduce the risk of sepsis infection and death for infants and mothers by 25% [12].

IMPROVING MATERNAL HEALTH USING A FEASIBILITY STUDY

South Sudanese women require safe water, sufficient sanitation facilities, and adequate supplies to enable good hygiene practices, particularly during childbirth. Despite efforts made by relief organizations and the government, South Sudan remains far from making serious contributions to the 2030 Agenda. Presently, high-quality data and evidence on how to best deliver WASH interventions in fragile and conflict-affected contexts are limited. Key challenges in providing WASH for improving maternal health outcomes in South Sudan include insecurity, poor access in rural areas, and lack of coordination between actors and beneficiaries [13]. This adds clarity to the ways in which WASH-related challenges are magnified by conflict and tend to be more difficult to tackle. These challenges, while multifaceted, cannot be left unaddressed and will require sustained engagement in order to make strides in improving maternal health outcomes.

To lessen the burden of preventable maternal disease and death in South Sudan, a small-scale feasibility study targeted at health facilities (Figure 1) may be beneficial. A feasibility study is an evidence-based analysis of a proposed intervention to determine whether it is feasible and should proceed [14]. To achieve the overarching objective of decreasing WASH-related maternal infections like sepsis, anemia, and diarrheal diseases, a 3-phase approach can be applied. The 1st phase focuses on collecting data to identify specific WASH-related gaps in the target community. Results from phase 1 will inform the intervention implemented in phase 2.

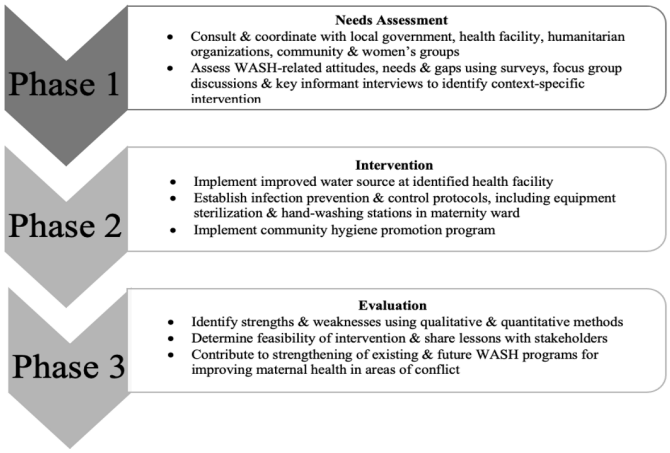

Figure 1. Feasibility study design and activities.

Using the theory of change framework, phase 3 will evaluate the intervention to determine its feasibility, report findings, and share lessons learned with stakeholders [15].

The goal of the intervention in phase 2 is to establish a maternity ward that is capable of practicing infection prevention and control at all points of care. Evidence suggests that washing hands with soap under running water is one of the most effective approaches to preventing infection and improving quality of care [16]. The intervention will enhance WASH conditions in the participating health facility through the provision of consistent clean water, achieved by installing boreholes, wells, or filtration plants for surface water sources. To determine the exact and most suitable water source for the target health facility, the community's beliefs, practices, and norms (derived from phase 1) must be taken into consideration. A key aspect of the intervention is to increase WASH knowledge of community

members to foster good hygiene practices beyond phase 2. We recognize that merely providing a water source will not guarantee its use or result in improved sanitation and hygiene. Therefore, the proposed intervention focuses on community consultation to promote local ownership and ensure sustainable improvements. Raising awareness that poor hygiene practices put everyone – and particularly pregnant women – at an increased risk of disease may trigger the community's desire for collective change. This may also propel individuals into action, foster mutual support, and lead to greater ownership and long-term sustainability.

The intervention will require financial, administrative, and human resources, including health workers and research assistants. It will also need strong collaborations with stakeholders, women's associations, local hospitals, government, and civil society organizations. The funds needed for implementing the feasibility study cannot fall on the government alone, as it will likely lead to financial gaps. Multi-sector engagement can help fill these gaps and leverage the government's efforts. Undeniably, this could prove to be a timely investment for South Sudan and, if successful, will create robust WASH policies and programs that curb maternal mortality in the country.

CONCLUSION

Investing in maternal health in conflict-affected contexts is one of the most effective, yet understudied and underutilized instruments for fostering social stability. When crises strike, women do not stop becoming pregnant or giving birth – reinforcing the need for a feasibility study tailored to maternal health in fragile settings. We acknowledge that the conflict-to-peace transition and the challenges of nation-building are slow processes that require deep and sustained commitment by the government and development partners. With current trends in maternal mortality, WASH inaccessibility, and the status of health systems, South Sudan is unlikely to achieve the SDGs by 2030. Nonetheless, high-level commitment and concentrated efforts to improve and strengthen local systems can go a long way. By incorporating WASH into previous and new approaches to improve maternal health, South Sudan might be able to create sustainable change for women and children to ensure that no one is left behind.

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