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Original Article

Development of a Framework to Improve the Provision of Water, Sanitation, and Hygiene in Healthcare Facilities of Mwanzi District in Western Province

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Healthcare facilities (HCFs) require safe water, sanitation, hygiene, environmental cleaning, and waste management (WASH) in the provision of quality services to promote, restore, maintain, and improve health. However, the unavailability of studies on the challenges and opportunities of WASH services in HCFs of Mwanzi District has limited the potential for improved health care and quality of life. Without proper elucidation, this has the potency to dissuade women from using HCFs for childbirth and healthcare, potentially increasing maternal mortality rates. To examine the challenges and opportunities in accessing safe WASH services in HCFs in Mwanzi District, more of Qualitative techniques were utilized to gather data from 8 HCFs in Mwanzi District. This involved initial observations employing the WASH Status Checklist, followed by focus group discussions with expectant mothers and 23 key informant interviews. Thematic analysis was used to analyse the data. The results showed that only half of the investigated facilities provided basic water services, hampered by water salinity issues. Even though most facilities had improved sanitation facilities, they, however, do not meet the basic sanitation standards. This was primarily due to issues such as corroded pipes, insufficient accessible toilets for people with disabilities, and the absence of menstrual hygiene facilities. Many facilities lacked gender-segregated staff facilities. Most of the facilities had functional hand hygiene facilities but also did not meet the basic standards due to a lack of soap for hand washing. A significant number encounter inefficiencies in cleaning protocols, and the majority face poor infrastructure conditions. The findings further revealed that these challenges stem from inadequate prioritization and funding for Water, Sanitation, and Hygiene (WASH) initiatives. The existing knowledge often concentrates on individual components, the findings stress the necessity for an integrated approach that collectively addresses water supply, sanitation, hygiene, and waste management. This holistic perspective can significantly contribute to the development of more effective guidelines and policies, offering a nuanced understanding of the interconnected nature of WASH components. Furthermore, the research sheds light on the pivotal role of localized political will, specifically highlighting the influence of Health Centre Advisory Committees (HAHC) in shaping governance at the community level, especially concerning WASH projects. The study offers a comprehensive overview of challenges and sustainability opportunities related to WASH services, crucial for

their effective functioning. It emphasizes the necessity for heightened awareness and increased budget allocation for the sustainable maintenance of WASH services.

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INTRODUCTION

Inadequate access to Water, Sanitation, and Hygiene (WASH) services in healthcare facilities (HCFs) poses significant risks to patients, healthcare workers, and communities, leading to healthcare-acquired infections and compromising the quality of care (Bouzid et al., 2018; WHO, 2019). Despite the recognition of WASH's crucial role in healthcare settings and its connection to patient dissatisfaction and quality of care, there is limited evidence on the availability of WASH services in HCFs, especially in rural areas like Mwand District (Abu et al., 2021). Challenges such as insufficient infrastructure, lack of understanding of the current WASH status, financial constraints, and absence of comprehensive national plans persist in these regions (Sundaram & Kim, 2019).

Statistics indicate that a quarter of healthcare facilities worldwide lack basic water services exposing 1.8 billion people to risk, especially the most vulnerable populations such as healthcare workers and patients who attend HCFs (Abu, et al., 2021). Further, one-third of HCFs lack hand hygiene facilities at the point of care and 10% of HCFs lack sanitation services (Bhavsar et al., 2022). Worldwide, in 47 least developed countries an estimated half of the HCFs do not have basic

water services and two-thirds of the HCFs lack basic sanitation services. Seven out of ten HCFs in least-developed countries do not have healthcare waste management services. About 50 % of the HCFs in least-developed countries had basic water services, 37% had basic sanitation and 74 had basic hand hygiene facilities at the point of care (WHO, 2020).

The situation is more serious in Sub-Saharan Africa, where only 51% of HCFs have basic access to water, and only 23% have basic access to sanitation (WHO, 2019; UNICEF, 2019). The situation of WASH in HCFs is more precarious in rural areas, where 15% of rural HCFs have no access to water services compared to 5% of urban HCFs (WHO, 2019; UNICEF, 2019). In addition, the quality of WASH services provided remains a challenge.

In rural areas like Mwand District, inadequate WASH facilities deter women from choosing healthcare facilities for childbirth and can cause delays in seeking care (Velleman et al., 2014). Improving WASH conditions can foster trust in healthcare services, encouraging expectant mothers to seek prenatal care and give birth in HCFs, thereby reducing maternal mortality rates (Russo et al., 2012). However, these opportunities remain unexplored, highlighting the urgent need

for research to assess the current status, challenges, and potential improvements in safe WASH services in Mwanzi District's HCFs. Addressing this research gap is crucial in developing an intervention framework to enhance WASH services and mitigate the risks associated with healthcare-acquired infections in low-income countries like Zambia.

MATERIALS AND METHODS

Study Area

Mwanzi District is situated in the Western Province of Zambia, approximately 105 kilometres to the west of Livingstone. The local population consists predominantly of semi-nomadic cattle herders and fishermen. Access to clean water has historically been limited, but recent development endeavours have initiated a transformation in this regard. The majority of residents identify with the Lozi ethnicity, although there is also a presence of individuals from other parts of the country. The district is home to an estimated population ranging from 25,000 to 33,000 people.

Mwanzi District is located within a region marked by a notably high incidence of malaria, exceeding 300 cases per 1,000 individuals according to the World Health Organization's 2016 data. A prominent healthcare facility in the area, the Mwanzi Mission Hospital, plays a vital role in addressing the healthcare needs of both local inhabitants and the broader surrounding region.

Justification for Selecting This Research Location

Literature suggests that Zambia, as a developing country, faces high levels of poverty and poor access to water, sanitation, and hygiene. According to the Ministry of Local Government and Housing (MLGH, 2011) report on Community Led Total Sanitation (CLTS), 80% of diseases in Zambia are environmental and related to water and sanitation. Access to improved sanitation in rural Zambia was estimated at 43% in 2011 (MLGH, 2011) while the use of improved sanitation facilities in rural Zambia in 2015 was at a low of 36% (UN, 2017). Further, as determined

by the World Health Organization, HCFs around the world more so in rural areas face challenges in the provision of WASH in HCFs, hence Mwanzi district was chosen on that basis. The district was also selected on the basis of it experiencing a major challenge of salinity in ground water which exacerbates the issues of poor access to WASH. According to Kamanga et al., (2022) and UNICEF Datawarehouse (2021), information shows that several rural districts are plagued by high rates of neonatal, maternal, and infant mortality caused by preventable WASH-related infection in household and non-household settings, and this is not exclusive to Mwanzi district. Concurrently, deaths due to neonatal sepsis and other neonatal infections have been rising steadily from 2,121 in 2000 to 2,704 in 2013. This may reflect poor WASH, the difficulty of accessing even basic-level healthcare facilities in rural areas, and/or rural mothers not recognizing early symptoms of these diseases. According to Cheng et al., (2012) indicated that poor WASH should be addressed, as it is known to adversely affect maternal, infant, and child mortality in rural areas in Mwanzi district. Mara, (2016) postulated that there is a need to have improved rural health care and targeted health/hygiene education for mothers and mothers-to-be. Further, there exist clear gaps in documentation of the status, challenges and opportunities in accessing safe WASH in healthcare facilities of Mwanzi. Additionally, there is an imperative need for an operational framework guide for WASH in rural areas arising from the recommendation of several scholars (Hanyinda, 2019; Kabunga et al. 2022).

Research Design

The study employed a mixed method research but more of qualitative research method was prioritised. The design was chosen because it sought to examine the challenges and opportunities in accessing safe WASH in HCFs in Mwanzi District. The qualitative component explored the challenges and opportunities of accessing safe WASH in HCFs from the perspectives of expectant mothers, cleaners, D-WASHE members, NGOs and HCF in charge. This method facilitated a nuanced comprehension

of the multifaceted dynamics involved, offering valuable insights crucial for policy development and interventions. These insights are essential for

enhancing WASH services and, consequently, the overall well-being of vulnerable women and children in the region.

Figure 1: Mwandi district (shaded area)



Source author (2023)

Study Population

The study population included key stakeholders in the delivery of WASH in HCFs in Mwandi. These include the District Health Office staff, HCF in-charges, District Water, Sanitation and Hygiene (D-WASH) members, Environmental Health Officers, Cleaners and Operators of WASH facilities in the HCFs. It also included expectant mothers and caregivers as they are at high risk of acquiring nosocomial infections.

Sampling Techniques

The participants were intentionally and purposefully chosen based on the researchers' local knowledge of the subject matter. Through this approach, individuals who were considered to be relevant to the study's objectives were identified and included in the research. These selected participants were seen as key informants due to their potential insights into the issues under investigation.

During the interviews, a comprehensive range of topics were explored. The discussions delved into broader issues concerning the adequacy of water supply and usage, sanitation practices, and hygiene within the HCFs. By addressing these fundamental aspects, the researcher aimed to gain a holistic understanding of the community's WASH (Water, Sanitation, and Hygiene) practices. This inclusive approach ensured that multiple dimensions of the WASH situation were explored, allowing for a nuanced analysis of the community's overall water and sanitation conditions.

Data Collection and Instruments

An exploratory qualitative inquiry was conducted in both the general and WASH contexts to gain a better understanding of the challenges with a particular focus on WASH provision in HCFs of Mwandi District. The evidence demonstrates that qualitative research has the potential to generate outcomes integrating actual facts with theoretical assertions that are applicable to a wide range of

situations (Schwandt, 2014). Furthermore, qualitative research methods such as focus group discussions and informant interviews have already been used in the formulation and validation of quantitative instruments such as survey questionnaires (Ahsan and Warner, 2014; Jones, 2007). Similarly, multiple processes were followed in order to successfully accomplish the assessment. Key informant interviews (KIIs) with; District Health Officer (DHO), HealthCare Facility (HCF) in charge, HealthCare Facility (HCF) cleaners in charge, two NGO representatives from WaterAid and Catholic Medical Mission Moard (CMMB), and WASH coordinator at Mwandu town council, were used in this study to narrow down the study area selection. Following that, data from the expectant mothers and caregivers were gathered through focus group discussions (FGDs) and Systematic observations were made using the WASH Status Checklist which focused on water supply, sanitation, hygiene, Waste Management, and Environmental Cleaning Practices. Finally, the data were thematically (Braun and Clarke, 2006) analysed and reported on the basis of the meaning, context, phrases, frequency, and intensity of the statements made by the participants.

Data Analysis

The data analysis in this study followed a thematic analysis approach, which is a commonly employed method in qualitative data analysis (Braun and Clarke, 2006). Initially, the KII audio recordings and FGD notes were accurately transcribed and subsequently translated into English. The data was then thoroughly reviewed multiple times to gain a comprehensive understanding. Following the transcription and comprehension phase, the author proceeded to identify the primary elements within the data, creating coded notes in alignment with the study's objectives. Subsequent to coding, a careful examination of the text led to the identification of initial themes and sub-themes derived from the data. Afterwards, the author conducted a thorough review of these themes and sub-themes, ensuring their alignment with the research objectives. Any

necessary adjustments were made at this stage. Finally, the author named and defined the established themes and sub-themes, culminating in the composition of the final manuscript for this study.

RESULTS

Overview of WASH In Mwandu District

Results of the handling of basic WASH services in Mwandu districts indicated that only 50% of the selected HCF in Mwandu District provided basic water services. However, this is happening with a lot of bottlenecks due to water salinity. Although improved sanitation facilities and at least a standard ablution block on the premises were available in 16% of visited HCFs only 21% of them fulfilled the norms for basic sanitation services. The main reasons for such low coverage to basic sanitation services were the corrosion of pipes due to high water salinity, the lack of toilets accessible for people with reduced mobility, and the lack of menstrual hygiene facilities (a private place with water and soap and a bin with lid for disposal of used menstrual products) in female toilets. Additionally, there was no HCF with designated gender-segregated staff toilets and showers except for clients and patients. In almost all visited HCFs (75%), functional hand hygiene facilities with water and soap and/or alcohol-based hand rub dispensers were available at points of care and within 5m from toilet seats or cubicles. Waste was safely segregated, treated, and disposed of in a few visited HCFs (33%). In almost half of the HCF (46%), basic environmental cleaning protocols indicated inefficiencies in procedures, responsibilities, and schedules, and staff responsible for cleaning were incapacitated. Furthermore, close to all the selected HCFs for this study (95%) have poor infrastructure, the reason being poor prioritization of WASH and poor financing to sustain the WASH. *Table 1* below, provides the detailed breakdown of each WASH parameter, out of 8 selected research sites in Mwandu district from which the overview aforementioned was generated.

Table 1: detailed breakdown of WASH parameter

	Basic 2	Limited 1	No service 0
Water			
An improved water supply is piped into the facility/located on the premises	4	2	2
Water is available during all operating times of the facility	4	3	1
The main water supply system has been functional for the past 3 months with no major breakdowns	4	0	4
A functional shower or space for women that is private and lockable is available in the Labour and delivery area	3	3	2
Sanitation			
The facility has a sufficient number of improved toilets for patients	2	5	1
All toilets have functional hand washing stations within 5 metres	3	1	4
At least one functional improved toilet meets the needs of people with reduced mobility.	1	2	5
Hygiene			
Functioning hand hygiene stations are available at all points of care, including in the delivery room	7	1	0
Functioning hand hygiene stations are available in all waiting areas and other public areas and in the waste disposal area	6	1	1
Regular (at least every three months) ward-based audits are undertaken to assess the availability of hand rub, soap, single-use towels and other hand hygiene resources	5	0	1
Waste management			
Functional waste collection containers are available in close proximity to all waste generation points for non-infectious (general) waste, infectious waste and sharps waste	3	4	1
Reminders for correct waste segregation are clearly visible at all waste generation points	5	0	3
Appropriate protective equipment and resources to perform hand hygiene are available for all staff responsible for handling waste and in charge of waste treatment and disposal	3	3	2
Functional burial pit, fenced waste dump or municipal pick-up available for disposal of non-infectious (non-hazardous/general) waste	5	0	3
Environmental Cleaning			
A clear and detailed facility (or ward) cleaning policy or protocol is clearly displayed, which is implemented and monitored.	5	3	0
Toilets are cleaned at least once each day, and a record of cleaning is signed by the cleaners and displayed visibly	6	0	2
All staff responsible for cleaning have received training on cleaning	3	4	1
An annual budget for environmental cleaning supplies and equipment exists and is sufficient for all needs.	4	3	1

Water Supply Status at HCFs

FDGs revealed that water supply is a critical issue hounding most facilities, as they grapple with the constant struggle to meet the demand for clean water. The primary source of water for the facilities are solar-powered boreholes and shallow-dug wells. For instance, at Magumwi

HCFs, the primary water source is about 400 meters away from the facility. The respondent from this facility confessed,

“The water is unsafe for human consumption, but we don’t have a choice. We don’t have chlorine to treat our water. However, nowadays an NGO called Catholic Medical

Mission Board (CMMB) has been giving us water purifiers those are the ones we use here at the facility and even in our homes”

Some water systems, like the 5000 litres, powered by solar at Mushukula, may seem sustainable, nonetheless, it falls significantly short of the water requirements of the facility, especially considering that the facility serves not only the patients but also the staff members residing in staff houses and the broader community in the vicinity. The facility's dependency on this borehole system, with its limited water storage capacity, leads to frequent shortages, causing disruptions in daily operations and patient care. As water is an essential component of healthcare delivery, these shortages pose a significant challenge to maintaining hygiene standards, sanitation, and overall patient well-being. The inadequacy of the water supply not only affects the medical services offered within the facility but also has far-reaching implications for the health and livelihoods of the community it serves. The participant from this facility indicated,

“The major challenge we are facing at this facility is inadequate water supply. The facility only has a 5000l tank and this is connected not only to the facility but the staff houses as well. The entire surrounding community also depends on the same water source. This means the water finishes fast making it difficult to operate fully at the facility”

Fortunately, at Mission Hospital, the water supply infrastructure is notably well-maintained and functional. Patients and visitors benefit from readily available handwashing facilities strategically located around the hospital premises, particularly at the entrance and in the outpatient department (OPD). These strategically placed handwashing stations ensure that individuals can practice good hygiene and sanitation, a vital aspect of healthcare settings. However, it is worth noting that despite the overall adequacy of handwashing facilities throughout the hospital, the mothers' shelter area faces a shortfall in this regard. In this specific area, individuals resort to

washing their hands at the main tap used for fetching water. While this makeshift solution demonstrates resourcefulness, it also underscores the importance of addressing the specific needs of all areas within a healthcare facility to maintain high standards of hygiene and ensure the well-being of patients and caregivers alike. Two quotes by a certain respondent indicated,

“I feel it is safe because it comes from taps and that it is treated with chlorine, but you never know the water could be contaminated along the way from the source”

“Around the hospital there are handwashing places dotted around especially at the entrance of the hospital and at OPD. But here at the mothers' shelter there are no hand washing facilities we just wash our hands from the main tap we use to fetch water from.”

The key informant interview revealed that the source of water for staff and patients at Kalundu HCF is also a solar-powered borehole. Nonetheless, its availability is compromised in that it is being shared with the nearby school. The cleaner who was one of the key informants indicated,

“It is inadequate since it is shared with the nearby school hence sometimes the water runs out of the tanks”

Sankolonga facility is currently facing a severe water supply issue, with tap water being in use for patients and staff. However, the water is reported to be excessively salty, rendering it unfit for consumption. The respondent indicated,

“Water is very unsafe we actually don't use it for drinking. The salt content is too high I think it could actually have some negative impact on our health”

A similar situation exists at Situlu. Water is excessively salty. The respondent confessed,

“From the borehole, we do not have any problems with water availability the only problem is that the water is salty and has limited use. So, for portable water, we fetch it

at the church which is about 30 minutes' walk"

Finally, the FDGs and checklist observations results indicated that, at Masese, there were accessible water facilities within their respective healthcare facilities. In Masese, an enhanced water supply system was in place, with options for piped water within the facility buildings or on the premises. However, it was noted that not all high-risk wards had access to piped water, and the functionality of taps varied. Ideally, water availability should be continuous and reliable, with the main supply system free from major breakdowns. At Lwazamba, a water supply was also accessible within the facility buildings, but similar challenges were observed regarding access to all high-risk wards. Nevertheless, more than half of the taps were functioning, indicating a relatively favourable water supply situation. Equitable access remains an area that may require attention

Sanitation and hygiene at WASH facilities

Mushukulu Health Care Facility, there were significant challenges regarding toilet facilities and hand hygiene. Patients expressed dissatisfaction with toilet services due to the lack of water in the toilet facilities, which resulted in many resorting to defecating in nearby bushes. The absence of water for handwashing was another concern. Respondents indicated that they had to bring their own soap from home for bathing, as it was not available for handwashing. Moreover, the condition of the bathing shelter was raised as a significant issue, as there was no privacy, even for women who had just given birth.

"No, water is always available at the tap outside and some hand washing facilities around the facility but those are mostly used by the members of staff. However, we are told to wash our hands with soap but here we don't have soap for hand washing the only soap we have we come from home and is mainly used only for bathing as it is not enough"

The situation at Magumwi was slightly better with the presence of newly constructed VIP toilets,

which were noted for their cleanliness. However, water availability for both toilet use and handwashing remained a significant problem, with water scarcity being a recurring issue. Participants expressed the urgent need for solutions like rainwater harvesting or dam construction to address the water shortage. The available toilets were considered suitable for use by various groups, but they were not fully adequate. Respondent indicated,

"There is no water at the toilet facility not even for hand washing after using the toilet. You see here water is a very scarce commodity where we even feel hand washing is a luxury and here in Magumwi we need water as they say water is life. The government needs to find a solution either through rainwater harvesting or construction of dams along the Machile River"

Another response from the Facility in charge of Magumwi said,

"All aspects need to improve but they all hinge on the aspect of water provision. If a solution for water is found a lot of aspects would almost immediately improve. If a permanent solution to water is found then we could ask our all-weather partners in the district i.e. WaterAid Zambia and CMMB to help construct ablution blocks this would help especially with expectant mothers. Hygiene would also improve because water for handwashing and cleaning would be readily available. Improved funding to the facility would also help in procuring cleaning materials and disinfectants"

At Kalundu, some patient toilets were available but not all, and fewer than 50% had functioning handwashing stations nearby. There were no separate toilets for staff use, and privacy was limited in other toilets. Hand hygiene stations were not consistently available in all areas, and compliance activities were not regularly carried out. While at Sankolonga, the facility never met the requirement for a sufficient number of improved toilets for both outpatients and

inpatients. However, not all patient toilets were usable, and some lacked functioning handwashing stations nearby. Staff toilets were available but not always clearly separated or labelled. Compliance activities were undertaken regularly. A key informant confessed,

‘There is a need to build more toilets to add to the numbers as well as putting up hand washing facilities’

The other said,

“Fresh water is the most urgent thing needed at this facility, we also need help with the provision of toilet paper and hand washing facilities around the facility”

Fortunately, Masese HCF results, showed that the toilets in the maternity and delivery areas were very clean, possibly because they were new, but the ‘Ventilated Improved Pit Latrines’ were not as clean due to higher usage. While they were satisfied with water availability in general, they mentioned that there were no soap brooms and disinfectants, including water for handwashing at the VIP toilets, which required them to walk a distance to wash their hands and this crippled the sanitation and hygiene requirements of WASH.

“Everything is very nice at the moment but not so good with VIPs where there is no water for hand washing, we have to walk a distance to wash after using them sometimes we even forget”

Another respondent from Mases indicated,

“We need more materials to use to make the facilities clean e.g. soap, brooms and disinfectants. We also need to have a proper solution to maintain this new facility because we have seen how bad they can go within a short time. So as a community, we need to find a solution this is our facility, and we need to take care of it.”

In terms of Situlu, cleaning staff at the facility adhere to rigorous hygiene practices, utilizing essential products such as soap and disinfectants. Handwashing facilities are strategically placed at

entry points, ensuring proper hand hygiene. Regarding the cleaning process, the HCF rooms undergo cleaning once a day, with additional cleanings conducted as needed, especially when toilets require attention or after deliveries. Bathrooms and toilets are cleaned every day using disinfectants in the morning and whenever there's a specific requirement. Nonetheless, the water is not safe. A respondent confessed,

“Water service needs to be improved to get rid of the salt”

Mwandi Mission Hospital's health centre facility has only two flush toilets, which they consider insufficient for the population. In terms of cleanliness, they noted that the maternity ward's toilets were very clean, but the female ward and the mother's shelter had cleanliness issues. Many mothers resort to using the bush when there is a lack of water. The respondent expressed dissatisfaction with water availability, particularly in the mother's shelter and the female ward. They suggested the need to build more flushable toilets at the shelter and improve cleanliness in the female ward.

“The mothers’ shelter only has two toilets which are pour flush but are not enough for the population in and out of the mothers’ shelter Build more toilets flushable ones at the shelter and improve the cleanliness in the ones in the female ward.”

Waste Management and Environmental Cleaning Practices in Selected HCFs

The results from the research observation through the WASH checklist tool revealed a number of environmental cleaning and waste management practices at different healthcare facilities, highlighting the presence or absence of certain key practices and resources in each facility. In evaluating waste management and environmental cleaning practices across various healthcare facilities, several key points emerge. Mwandi Mission Hospital demonstrates a commendable commitment with an active cleaning policy, daily toilet cleaning, trained staff, and safety protocols. However, budgetary constraints hinder their

comprehensive implementation. Sankalongo Health Care Facility, though basic, effectively manages waste with segregation and protective gear but faces challenges in staffing and safety measures. Conversely, Masese Health Care Facility struggles significantly, lacking waste management services, awareness of safety protocols, and clear cleaning policies. Kalundu Health Care Facility faces issues in waste management and environmental cleaning due to limited resources, inadequate training, and staffing problems. Lwazamba and Mushukulu Health Care Facilities exhibit basic practices, yet require reinforcement in waste segregation and protective equipment use. Meanwhile, Magumwi and Situlu Health Care Facilities face substantial challenges in both waste management and environmental cleaning, lacking clear policies, training, and necessary resources. The lack of manpower, as highlighted in Magumwi, hampers the proper maintenance of WASH infrastructure, impacting overall hygiene standards across these facilities. A respondent from Magumwi.

“Lack of manpower to adequately clean and maintain the WASH infrastructure. At the moment am the only cleaner at this facility but I have other duties such as screening patients, family planning, and collecting TB samples I do a lot of work that should be done by a clinician apart from giving injections to patients. This makes it difficult to properly do the work I was employed for”

Sustainability of WASH in Mwand District

On the theme of sustainability of Water, Sanitation, and Hygiene (WASH) services in Mwand District, the KIIs and FGDs portray a series of intricate sustainability challenges. Notably, sustainable WASH committees, crucial for the maintenance of these services, often operate in relative obscurity without the due recognition they deserve. For instance, a key informant from DHO said,

“Lack of recognition for sustainable WASH committees by both healthcare facility (HCF) staff and Health Centre Advisory Committees (HAHC), inadequate HCF running costs to

maintain WASH infrastructure, the absence of designated staff in approximately 33% of HCFs responsible for cleaning WASH facilities such as toilets, showers, and handwashing facilities, and the detrimental impact of high levels of salt-impregnated water in three HCFs, resulting in infrastructure corrosion threatens the overall sustainability of WASH services in these facilities”

Additionally, the findings from KIIs and FGDs indicated that the sustainability of WASH in Mwand District is compounded by several significant factors. Firstly, high levels of salt-impregnated water in approximately three healthcare facilities have led to the corrosion of critical infrastructure, casting a shadow on the long-term viability of WASH services. Moreover, the corrosion of pipes and sanitary facilities due to the mineral content in underground water further exacerbates this issue. In addition to infrastructure concerns, the sandy terrain in the region inflates costs related to WASH projects. Furthermore, the lack of rainwater harvesting and lack of community demand for WASH services, stemming from cultural factors or inadequate knowledge, hampers sustainability efforts. Lastly, the poor maintenance of WASH facilities due to inconsistent grant allocation and competing priorities has led to their deterioration over time. These findings underscore the multi-faceted nature of the WASH sustainability challenge in Mwand District, demanding a holistic approach for effective resolution. This is substantiated by the words of a key informant from the Catholic Medical Mission Board.

“Several key challenges contribute to the sustainability issues of WASH services in Mwand District, including high corrosion of pipes and sanitary facilities caused by mineral-rich underground water, elevated project costs due to the sandy terrain, limited community demand attributed to cultural factors and insufficient awareness, as well as the ongoing problem of poor maintenance stemming from erratic grants allocation and

competing priorities, ultimately leading to the deterioration of WASH facilities”

The response from one Key Informant at Masese HCF says,

“At this facility, the biggest issue we are facing at the moment is a plan to sustain this facility of course our partners have helped us form committees, but the committees are not very active. The other issue is ignorance in the use of the facilities for example people are not very familiar with flushable toilets and hence risk constant breakages, but we are busy sensitizing them on proper usage. Also, the issue of poor funding for the purchase of cleaning materials such as soap and brooms makes it hard and dangerous for someone to clean”

WASH Operational Management Systems

The results from KIIs concerning operational management systems for WASH within healthcare facilities (HCFs) reveal a variety of existing structures and support mechanisms. Many HCFs have established essential bodies such as WASH committees, caretakers, Health Advisory Committees (HACs), and Mother support groups. These entities have undergone training in operation and maintenance (O&M), sustainability, and life cycle costing, demonstrating a commitment to effectively managing WASH services

Furthermore, the availability of Standard Operating Procedures for Infection Prevention and Control (IPC) specific to WASH in healthcare facilities and the presence of both WASH sustainability committees and Infection Prevention and Control (IPC) committees within HCFs underscore the commitment to maintaining high standards of hygiene and sanitation.

However, it is important to note that the budgets allocated for WASH, as indicated in the provided (Figure 2), appear to be notably low, which presents a significant constraint in the effective management of WASH services within the selected HCFs. This financial limitation

necessitates attention and potential reconsideration to ensure the sustainability and quality of WASH services in these healthcare facilities. This is vividly depicted in the quote by one of the Key informants,

“In many healthcare facilities (HCFs), there are established structures such as WASH committees, caretakers, Health Advisory Committees (HACs), and Mother support groups. These entities have received training in operation and maintenance (O&M), sustainability, and life cycle costing. Additionally, the District Health Office (DHO) provides support through grants to HCFs, allowing flexibility to allocate portions of these funds for maintenance as needed. Moreover, there are IPC guidelines and policies in place, including Standard Operating Procedures for Infection Prevention and Control (IPC) specifically related to WASH in healthcare facilities”.

Opportunities to Enhance the Provision of (WASH) in Healthcare Facilities

The FDGs and KII responses indicated the opportunities for improvement in enhancing safe Water, Sanitation, and Hygiene (WASH) in healthcare facilities within the district. Firstly, the Constituency Development Fund (CDF) presents a significant potential resource that can be further leveraged to upgrade and maintain WASH infrastructure in healthcare settings. The availability of structures like Neighbourhood Health Committees (NHCs) and Health Centre Advisory Committees (HAHC) offers opportunities for community involvement and advocacy to prioritize and secure resources for WASH initiatives. One key informant suggested,

“The availability of Constituency Development Fund (CDF) can be better utilized to ensure the provision of safe WASH facilities and use Neighbourhood Health Committees (NHCs) in advocating for such improvements”

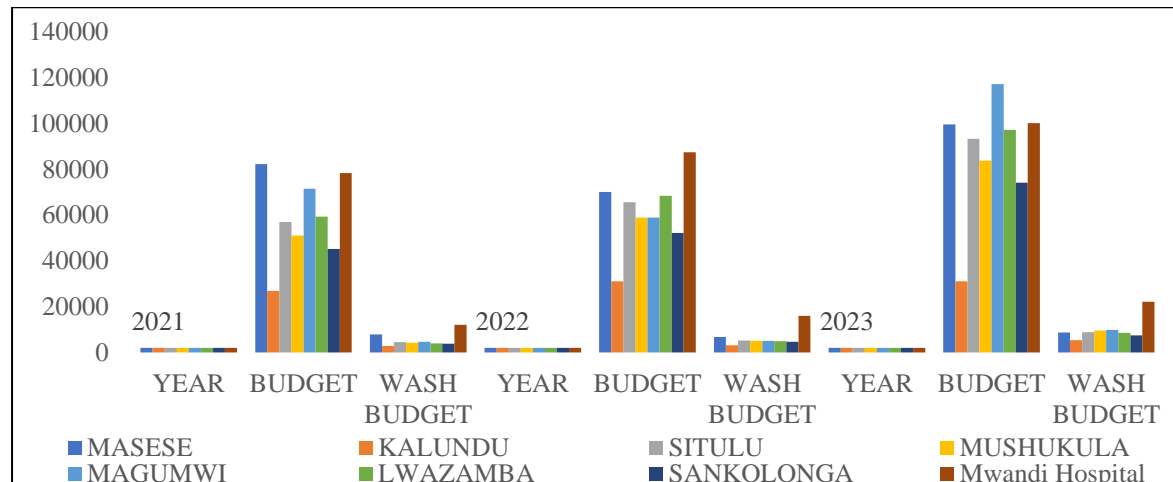
The District Health Officer (DHO) key informant underscored the role of Health Centre Advisory

Committees (HAHC) in lobbying for projects within their health facilities.

“There is a Political will through the Health Centre Advisory Committees (HAHC) to

lobby for various projects through the availability of the Constituency Development Fund (CDF) which is further decentralized to the local level.”

Figure 2: Mwandi District HCFs Annual Budget Allocation in comparison to that goes towards WASH services.



FRAMEWORK

Interventional Framework

The research findings unveiled the urgent need for a comprehensive framework intervention which involves infrastructure upgrades, Water Supply Improvements, Hygiene Promotion, capacity building, sustainability and scaling, intensive monitoring and evaluation, and policy advocacy. This Framework necessitates a holistic approach that combines infrastructure improvements with community engagement, education, and sustainable management practices. Thus, this multifaceted strategy aims to not only enhance the physical aspects of WASH services but also foster a culture of hygiene and responsibility within healthcare facilities and the local communities they serve.

The interventional framework for improving Water, Sanitation, and Hygiene (WASH) in selected healthcare facilities in Mwandi District is structured around key steps, each meticulously designed with a specific rationale to directly address the identified problems in the provision of safe WASH services.

Infrastructure Upgrades

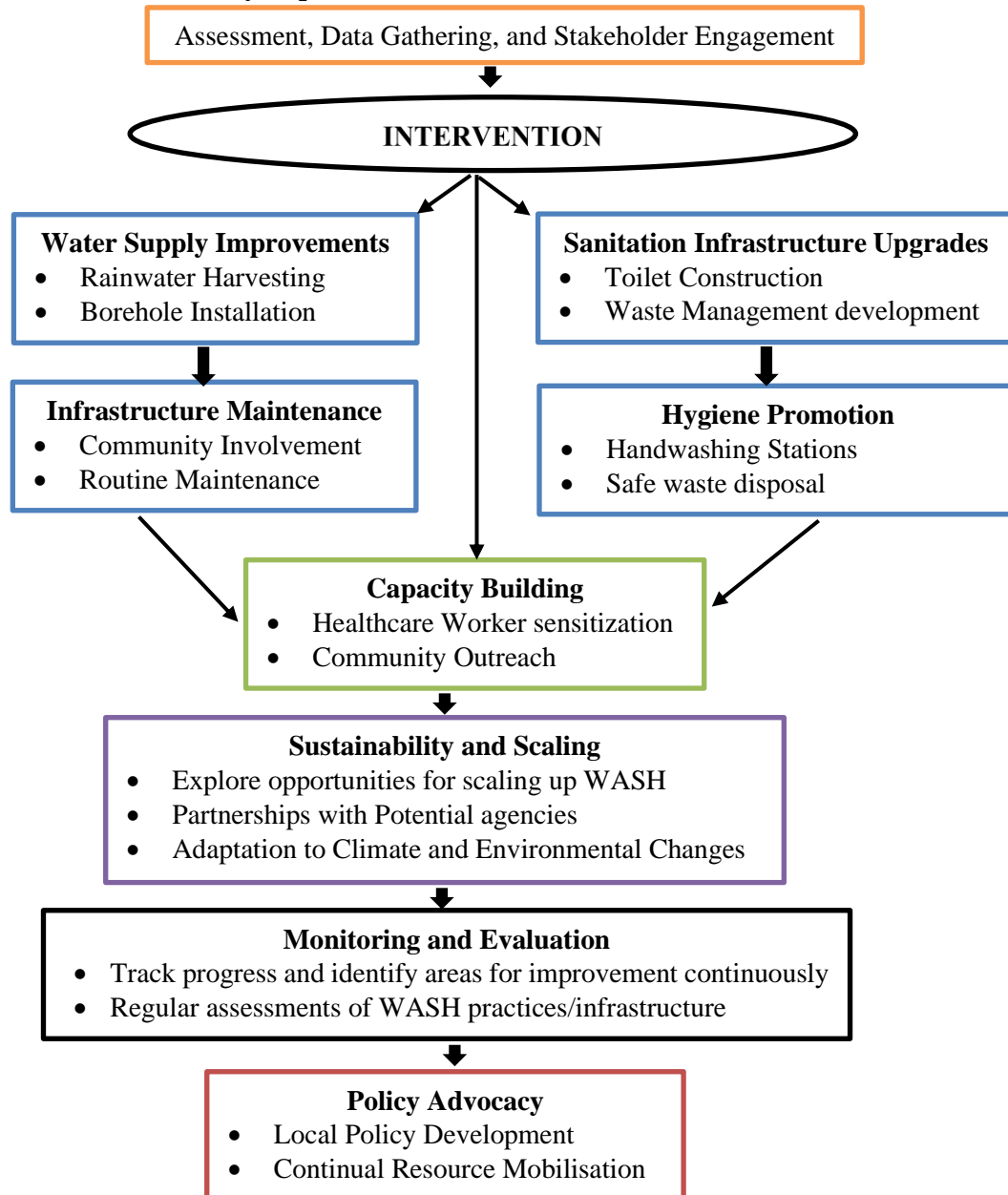
Many healthcare facilities in Mwandi district as a rural setting face challenges with outdated or insufficient infrastructure, hindering the provision of safe WASH services. Upgrading infrastructure ensures that the physical facilities meet the required standards for hygiene and sanitation, creating a foundation for effective WASH practices (Cronk et al., 2015).

Addressing the WASH challenges in healthcare facilities within the Mwandi district through infrastructure upgrades not only enhances the physical structures but also plays a pivotal role in solving critical issues related to water, sanitation, and hygiene. According to Cronk et al., (2015), modernizing infrastructure facilitates the implementation of advanced WASH technologies, such as water purification systems and efficient sewage disposal mechanisms, thus ensuring a safer and more reliable supply of clean water and proper waste management. Upgrading healthcare facilities in this rural setting goes beyond meeting basic hygiene standards; it establishes a comprehensive framework that supports healthcare workers in delivering quality services and promotes a healthier environment for both patients and staff. Additionally, improved

infrastructure contributes to the prevention of waterborne diseases, reducing the overall burden on the healthcare system and enhancing the overall well-being of the community. Therefore, investing in infrastructure upgrades emerges as a

sustainable solution to the WASH challenges faced by healthcare facilities in the Mwandi district, fostering a resilient and healthier community.

Figure 3: Framework key steps



Water Supply Improvements

Reliable access to clean water as a step in the Framework is fundamental for any WASH initiative. Improving water supply infrastructure ensures a sustainable source of safe water for various purposes within healthcare facilities, such as patient care, sanitation, and hygiene practices.

Accordingly, enhancing water supply infrastructure stands as a cornerstone in addressing WASH challenges within healthcare facilities, constituting a vital component of the overarching framework. In line with the sentiments of Connett, (2013), establishing reliable access to clean water is not only a

foundational step but also a linchpin for the success of any WASH initiative. By upgrading the water supply infrastructure, healthcare facilities can guarantee a consistent and sustainable source of safe water essential for diverse purposes, including patient care, sanitation, and hygiene practices. This strategic improvement not only safeguards the well-being of patients but also strengthens the overall healthcare ecosystem. The upgraded water supply system ensures that healthcare professionals can consistently uphold stringent hygiene standards, fostering a safer environment for both patients and staff (Pack, 2010). Furthermore, it mitigates the risk of waterborne diseases, promoting public health resilience and supporting the broader goals of the WASH initiative. In essence, prioritizing water supply improvements emerges as a strategic and impactful measure in fortifying healthcare facilities against WASH challenges, contributing to the overall success of WASH initiatives.

Hygiene Promotion

Hygiene promotion efforts aim to inform and empower healthcare staff, patients, and the community on the importance of good hygiene practices, contributing to the prevention of healthcare-acquired infections.

Hygiene promotion efforts can play a pivotal role in effectively addressing WASH challenges in the Mwandu district by focusing on informing and empowering healthcare staff, patients, and the community about the critical significance of adopting good hygiene practices. This approach serves as a proactive strategy to mitigate and prevent healthcare-acquired infections, which are often exacerbated by inadequate hygiene measures. By disseminating knowledge and promoting awareness, healthcare facilities can instill a culture of hygiene that extends beyond the immediate healthcare setting and permeates into the broader community (Ezbahe et al., 2019). Empowering individuals with the understanding of proper hygiene practices not only contributes to the reduction of healthcare-associated infections but also establishes a foundation for sustained improvements in overall public health (Chirgwin

et al., 2021). Moreover, this approach fosters a sense of collective responsibility, as informed individuals become active participants in the ongoing efforts to combat WASH challenges, thereby creating a more resilient and healthier environment in the Mwandu district.

Capacity Building

Building the capacity of healthcare staff and local communities is essential for the successful implementation and maintenance of WASH practices. Training programs ensure that individuals have the necessary knowledge and skills to sustain effective WASH measures over the long term.

By instituting comprehensive training programs, individuals can be equipped with the essential knowledge and skills required to sustain effective WASH measures over the long term. According to Willetts et al., (2021) investment in capacity building not only empowers healthcare professionals with the expertise to uphold stringent hygiene standards but also engages local communities in becoming active stakeholders in WASH initiatives. The emphasis on capacity building ensures a continuous and self-sustaining cycle of knowledge transfer, enabling healthcare facilities and communities to adapt to evolving WASH requirements. Ultimately, this proactive approach contributes significantly to the long-term success of WASH interventions in the Mwandu district, creating a foundation for improved public health outcomes and community resilience.

Sustainability and Scaling

Ensuring the sustainability of WASH initiatives requires planning for long-term success and scalability. This step involves developing strategies that can be integrated into routine operations and expanded to other healthcare facilities, maximizing the impact of the intervention. Sustainability and scaling are integral components in effectively resolving WASH challenges in HCFs of Mwandu district. Recognizing the need for lasting success, this approach involves careful planning to ensure the

longevity of WASH initiatives and their potential scalability (Setty et al., 2017). By developing strategies that seamlessly integrate into routine operations, healthcare facilities can embed WASH practices as inherent components of their standard procedures. This not only fosters sustainability but also establishes a framework for continuous improvement. The emphasis on scalability is equally crucial, as it involves crafting strategies that can be expanded to encompass other healthcare facilities within the district. This approach maximizes the impact of the intervention, extending the benefits of improved WASH practices to a broader community. Through a focus on sustainability and scaling, WASH initiatives become enduring pillars of public health, creating a ripple effect that positively influences not only the immediate healthcare settings but the overall well-being of the Mwandi district.

Intensive Monitoring and Evaluation

Regular monitoring and evaluation are crucial for assessing the effectiveness of the intervention. This step involves the systematic collection of data to measure progress, identify challenges, and make informed adjustments to the WASH program for continuous improvement.

Intensive monitoring and evaluation constitute a pivotal strategy in addressing WASH challenges in the Mwandi district comprehensively. Recognizing the dynamic nature of public health interventions, this approach emphasizes the importance of regular and thorough monitoring to assess the effectiveness of the intervention. By systematically collecting data, healthcare facilities can quantitatively measure progress, identify emerging challenges, and make informed adjustments to the WASH program (Ezbakhe et al., 2019). This iterative process is crucial for ensuring continuous improvement and adapting interventions to the evolving needs of the community. Intensive monitoring and evaluation not only provide insights into the immediate impact of WASH initiatives but also serve as a valuable feedback loop for refining strategies over time. This data-driven approach enhances the

overall efficiency and responsiveness of WASH programs, making them more adept at overcoming the specific challenges faced by healthcare facilities in the Mwandi district.

Policy Advocacy

Policy support at local, regional, and national levels is instrumental in sustaining WASH improvements. Advocacy efforts aim to influence policies that prioritize and support the necessary infrastructure, resources, and regulations for ongoing WASH success in healthcare facilities.

Policy advocacy emerges as a fundamental strategy in the comprehensive resolution of WASH challenges in the Mwandi district. According to Nabalema, (2015), recognizing the intricate relationship between policy and sustained improvements, this approach underscores the importance of garnering support at local, regional, and national levels. Advocacy efforts are directed towards influencing policies that prioritize and support the essential infrastructure, resources, and regulations needed for ongoing WASH success in healthcare facilities. By engaging with policymakers, this strategy aims to create an environment that fosters long-term commitment to WASH initiatives. Advocacy for supportive policies ensures that healthcare facilities have the necessary backing to implement and maintain effective WASH practices. Furthermore, it sets the stage for the allocation of resources and the establishment of regulations that fortify the resilience of WASH programs. In essence, policy advocacy acts as a catalyst for enduring change, creating a conducive framework for sustained improvements in WASH outcomes across healthcare facilities in the Mwandi district.

Users of the Framework

Implementation of the framework relies on the collaboration and engagement of multiple stakeholders. Healthcare professionals, responsible for facility management, patient care, and community outreach, play a central role in executing the framework. Their active participation is crucial for the effective integration

of WASH practices within healthcare settings. Local communities surrounding healthcare facilities are equally vital stakeholders, as their adoption and sustained commitment to WASH practices contribute significantly to improved health outcomes. Policymakers at various levels also hold a key position in the framework, as advocacy efforts target them to ensure supportive regulations and resource allocation for sustainable WASH initiatives. This engagement with policymakers aims to create an enabling environment for long-term success. Additionally, researchers and evaluators play a pivotal role by contributing insights into the program's effectiveness and areas for improvement through intensive monitoring and evaluation. Their involvement can and shall enhance the overall adaptability and responsiveness of the framework, creating a collaborative and comprehensive approach to address WASH challenges in healthcare facilities throughout the Mwandu district.

DISCUSSION

WASH Challenges in Mwandu Healthcare Facilities

The study highlights significant challenges faced by healthcare facilities in Mwandu District concerning Water, Sanitation, and Hygiene (WASH) services. Similar to findings in African rural healthcare facilities, just over half of the 52,000 healthcare facilities in 23 countries lacked efficient water supply sources, emphasizing the disparity in WASH provisions (World Health Organization, 2012; Hsia et al., 2012). In Mwandu, issues like distant water sources, lack of treatment resources, and salinity problems contribute to inconsistent water safety, leading to poor sanitation and hygiene practices (Psutka et al., 2011). Inadequate funding results in unsustainable infrastructure, hampering facilities' ability to provide consistent and safe water supply, thereby affecting patient care and community well-being (Tseole et al., 2022). Broken WASH infrastructure negatively impacts sanitation and hygiene practices, and the scarcity of water forces individuals into open defecation practices,

compromising WASH provisions (Bartram et al., 2019).

Opportunities and Sustainability of WASH in Mwandu District

Despite these challenges, there are opportunities for improvement and sustainability in WASH services. Political will, demonstrated through stakeholder support and the Community Development Fund (CDF), can catalyse funding for enhanced WASH services, aligning with WHO's recommendations (WHO, 2011). Partnerships with NGOs and the private sector, such as WaterAid Zambia and the Catholic Medical Mission Board (CMMB), provide essential resources and contribute to the advancement of WASH programs (World Health Organization, 2015). Establishing and enforcing national standards for WASH in healthcare facilities, accompanied by strategies ensuring adequate funding and human resources, are crucial steps in improving access and services (WHO, 2014). However, challenges like inadequacy of running costs, lack of designated personnel for WASH facilities' maintenance, and issues like elevated salinity levels in water sources must be urgently addressed to ensure the long-term viability of WASH services in Mwandu District (Alhassan & Hadwen, 2017). These efforts are essential not only for the healthcare facilities but also for the overall public health and well-being of the community.

CONCLUSIONS

In Mwandu District, unreliable water safety and supply result from inadequate solar-powered boreholes and distant water sources, exacerbated by insufficient funding and poor maintenance. However, bridging these gaps is feasible through government support, community committees, and non-government involvement, utilizing a well-planned framework for sustainable improvement.

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Ethical Approval

This study was permitted by the University of Zambia Natural and Applied Sciences Ethics Committee-IRB of the Directorate of Research and Graduate Studies. Permission to collect data from the study site was also obtained from the Board of Graduate Studies and other relevant authorities. Participants who took part in the study completed consent forms and were assured of anonymity.

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