WASH Assessment in 32 Health Care Facilities and Vaccination sites in Eswatini

Report

Mbabane

November 2022

Table of Contents

List of Tables

List of Figures

ACRONYMS

ABHR	Alcohol Based Hand Rub
AMR	Antimicrobial Resistance
EEC	Eswatini Electricity Company
EHO	Environmental Health Officer
EVS	Environmental Services
HAI	Health-care Associated Infections
HCF	Health Care Facility
HCW	Health Care Worker
HCWM	Health Care Waste Management
IPC	Infection Prevention and Control
JMP	Joint Monitoring Programme for Water, Sanitation and Hygiene
MSF	Medicine Sans Frontier
MoH	Ministry of Health
PHU	Primary Health Unit
PPE	Personal Protective Equipment
SDG	Sustainable Development Goals
SOP	Standard of Operation
SPSS	Statistical Package for the Social Sciences
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation, Hygiene
WASHFIT	Water and Sanitation for Health Facility Improvement Tools
WHO	World Health Organization

1. INTRODUCTION

1.1 Background

The water, sanitation, and hygiene (WASH) sector has been growing globally in terms of importance and to a larger extent, investment. To such an extent the global development agenda has a specific goal related to WASH, sustainable development goal (SDG) 6: Clean Water and Sanitation. The drive in this regard is to ensure improved and sustained access to safe drinking water and adequate sanitation and hygiene for all by the year 2030. In line with this goal, countries have been designing and implementing initiatives through specific programmes and projects to move towards this goal. Organizations have been set up, and governments departments have been created with specific mandates around the promotion of WASH, either in totality or some components of it. WaterAid is one such organization whose focus is on WASH in terms of mandate. In Eswatini, WaterAid Eswatini has been the major driving force in the design and implementation of WASH projects in recent, particularly at community level. Working with partner organizations and agencies including UNICEF, World Vision, and government departments such as the Environmental Health Department under the Ministry of Health (MoH), and the Department of Water Affairs (DWA) under the Ministry of Natural Resources and Energy (MNRE), WaterAid has seen improvement in terms of access to WASH services by communities in the country.

With all the progress that has been made in terms of WASH roll-out in communities, there is realization that there is limited access to these services at healthcare facilities, particularly in low-middle income countries. A study of 78 countries estimated that 50% of HCFs do not have piped water connection, 33% do not have improved sanitation facilities, and 39% do not have hand washing soap (Hirai, et al., 2021). The WHO and UNICEF Joint Monitoring Programme (JMP) for Water, Sanitation and Hygiene also reported that in 2019, 1.8 billion people did not have access to basic water services in HCFs, and 800 million people relied on HCFs without improved sanitation facilities (WHO & UNICEF, Wash in Health Care Facilities, Global Baseline Report, 2019). In Eswatini there was a lack of data in this regard thus the need to investigate. In May 2019, the World Health Assembly passed a resolution to accelerate global efforts on WASH in HCFs thereby combating hygiene related mortality among vulnerable groups. This resolution led to a subsequent global meeting where countries presented their national commitments with concrete actions. Eswatini made key country commitments, including the development of a national WASH in HCFs plan, standards, and targets. Despite the existing efforts from the government, there is still a need to build capacity and sustain WASH programs in HCFs settings given that, they are the first level health delivery centers. Through the UNICEF/WHO and WaterAid joint effort has been contributed to assist the government in strengthening WASH in Eswatini.

A new project, focusing on WASH improvement in healthcare facilities (HCFs) in the country is currently underway, implemented under the auspices of WaterAid Eswatini. The view in this regard is the

improvement and maintenance of WASH infrastructure and services as well as knowledge in 36 HCFs (including PHUs) and vaccination sites within the 4 administrative regions of Eswatini. Improved water, sanitation, hygiene (WASH) and health care waste management services in health care facilities (HCFs) are crucial to make it a point that, infection prevention and control (IPC) practices are followed (Hirai, et al., 2021). Availability, accessibility, acceptability of WASH services in HCF is a key aspect to of protecting human right and dignity of patients, visitors, and health workers (Kayiwa, et al., 2020). As a first step for this project, and to provide some form of baseline information on the status of the infrastructure, services, and knowledge in healthcare facilities, WaterAid has commissioned a technical assessment focusing on seven (7) key WASH domains, these being, water; sanitation; hand hygiene; environmental cleaning and food; healthcare waste management, energy and environment, and facility management. In 2020, during the COVID-19 pandemic, the United Nations Children's Fund (UNICEF), in collaboration with the Ministry of Health (MoH) and the World Health Organization (WHO), piloted the Water and Sanitation for Health Facility Improvement Tools (WASHFIT) in several countries (Hirai, et al., 2021). For purposes of collecting and generating data for this assessment, WASHFIT was adopted and rolled out across the 36 HCFs in the four regions of the country.

In the month of September 2022, four separate teams (one per region) were commissioned to collect data from the 36 HCFs. This report has been prepared on the backdrop of this exercise. It presents findings of the WASHFIT assessment with regards to the seven domains as assessed in the 36 HCFs.

1.2 Purpose of the assessment

As already alluded to, WaterAid commissioned the collection of data for purposes of informing the HCFs WASH assessment. The view was that through the WASHFIT, large amounts of data would be collected from the 36 HCFs (including PHUs) and meaningful information would be generated. The purpose of this assignment therefore was to fast-track the data interpretation through relevant data analysis methods adopted from other studies that have utilized UNICEF/WHOs' JMP methodology. Ultimately this report presents a composite status of WASH infrastructure, services, and knowledge in Eswatini healthcare facilities in as far as the seven domains are concerned.

1.3 Scope of the assessment

The scope of the assessment is limited was limited to collection, analysis and interpretation of data on the status of WASH as collected across the 36 HCFs. To this end, the provisions of the WASHFIT in terms of the set criteria for each of the seven WASH aspects were of interest in this assessment. It is on the backdrop of the seven domains as captured in the WASHFIT that this assessment report has been prepared.

2. ASSESSMENT PROCESS

To carry out the assessment, some key steps were followed. These were preliminary activities that were done before the fieldwork and data collection.

2.1 Identification of participating HCFs

For purposes of selecting HCFs that would participate in the assessment, operational HCFs were identified in each of the four regions of the country. The 36 were identified through this process and they were listed by name as reflected in Annexure A. The regions had an average of 9 HCF ranging from Hospital, Health Centers, Primary Health Units (PHU) and Clinics

2.2 Review and customization of WASHFIT tool

Before rolling out the assessment through WASHFIT there was need to review and customize the tool to the context of Eswatini in relation to WASH in healthcare facilities. As such WaterAid and other partners had a meeting where discussions and customization of the data collection tool to fit for purposes was done. After the deliberations and making of the necessary adaptations, the tool was deemed to be fit for purpose and there was consensus that it would generate the necessary data, and in the form that will be usable for purposes of producing the assessment report.

2.4 Visits to HCFs and Data Collection

With the tool ready for use in the field, the four teams as constituted for each region proceeded and visited the identified health care facilities. Data was collected through engagements with the senior personnel in each of the facilities, that is, the administrator or the Sister Nurse, and through observation. Notes and pictures were taken from the engagements and observations, respectively.

2.5 Analyze and report on collected data

The current report emanates from the collected data which was shared by the team leaders for the research assistant's use. Data was sent via email wherein a regional folder was presented wherein the contents were the respective regional HCFs' files. Files included assessment scores per HCF and respective HCF profile. The report is based on the analysis of this data.

2.6 Report-writing

A consultant was engaged to assist with writing the report. To this end, all the data was sent to the consultant to analyze, interpret, and prepare the report.

3. ASSESSMENT APPROACH

The assessment was conducted through a mixed-method survey approach. To this end data was collected using quantitative and qualitative approaches. These were accommodated in the WASHFIT tool that was used to collect and generate data for this assessment. Physical site visits were conducted to all the 36 HCFs, wherein both quantitative and qualitative information was collected. Guidance was provided to the data collectors through a one-day training session on the WASHFIT tool. This training also aided in harmonizing understanding of the data collection process among all data collection enumerators, particularly in relation to the contents of the WASHFIT tool and data collection procedures. Enumerators were largely selected based on their field competence in relation to the seven domains that were being assessed through WASHFIT. The team leaders were responsible for validating captured data thus ensuring the quality of the final report. This section of the report discusses the approach techniques that were used to collect and analyze the data for purposes of this assessment.

3.1 Data Collection

3.1.1 Application of the WASHFIT

As already alluded to, the assessment was based on the application of the WASHFIT tool for data collection in the 36 HCFs. Having customized the tool to fit for purpose, data collection was carried out in the four regions over a period of 5 days, with a data collection team assigned per region. Data was collected on the basis of indicators per domain as outlined in the WASHFIT tool (see Annexure C). Each indicator was assigned a score, ranging from 0 to 2 as illustrated in Annex D (an extract of the water domain)**.** The tool outlined the targets for all indicators. Where the target was not met, the indicator was given a score of zero (0). Where the target was partially met, the indicator score was assigned a score of one (1). For a fully met target the indicator was given score of two (2). To qualify the scoring, the tool also provided an allowance for the data collector (enumerator) to add notes or comments. These comments were based on observations and on qualitative responses from the interviewees in the form of the HFC administrators of Sister Nurses. To corroborate the scoring and the qualitative information collected through the engagements with senior HFC staff, pictures were taken in each of the HFCs, and these form part of the reporting on findings.

Upon collecting data there was an assembly of the team to consolidate HCFs' data which included the facility profile and the data sets for the seven domains.

3.1.2 Literature Review

For this task, some theoretical underpinnings on WASH in healthcare facilities were determined through the review of literature. This included documentation obtained from stakeholders who promote WASH in healthcare facilities. Documents gathered were the SOP and IPC guidelines and case studies. The information obtained from this review was triangulated with the collected data through the WASHFIT tool to provide the picture of the WASH status in the healthcare facilities as discussed in this report. Normally, WASHFIT assessments have 3 objectives that is; 1) develop an improved and contextualized version of the WASHFIT; 2) formulate policy recommendations for the Ministry of Health on the use of WASHFIT; and generate evidence for scaling-up.

3.2 Data Analysis

The results coming from the tool were segregated into files (WASHFIT assessment Excel file and Word files for hospital profiles). Each region submitted a set of HCF files thus it was compiled into a harmonized comprehensive Microsoft Excel spreadsheet. In the spreadsheet all HCFs' data were captured and cleaned by filling in missing domain indicator scores. The indicator scores for the 7 domains were captured as submitted by the enumerators, while HCFs' profile data was encoded and codes captured (Annex E). For example HCFs types were either hospitals, clinics, PHU or health center thus the codes 1 to 4 were entered on the spreadsheet: 1: hospital, 2: clinic, 3: health center and 4: PHU. In addition HCFs raw numeric data was captured therein (number of baby facilities, number of supported communities and number of beds). The comprehensive spread sheet file (with codes) was exported to SPSS for higher level analysis where codes were reassigned respective JMP classes: unimproved: 0; limited: 1 and improved: 2. Data sets were then quantified: for the HCFs' characteristics frequencies and percentages were computed and labelled from encoded data and for the numerical data the mean and standard deviation were computed (Table 4.1).

Domain indicator analysis included computation of frequencies and percentages of each of the JMP classes per indicator. Proportions were presented in their respective categories in the tables where the frequency and the percentage were presented per cell. Indicators were then assigned an overall indicator JMP ladder or service rating which was extracted from the basic/improved service column. The percentage value was a determinant of the overall indicator rating: no/unimproved service - <50%, limited - 50–75%, and improved service - > 75% (Hirai, et al., 2021).

To determine the domain rating, the mean for all the indicator scores (0, 1, and 2) was computed. The mean was interpreted as follows: <1 means service is assigned no/unimproved service, 1-1.5 is limited service and >1.5 is basic/ improved service (Kayiwa, et al., 2020).

Analysis also included domain performance calculation at regional level wherein percentages were computed per region and a comparison of domain performance was done at national level to weigh domains against each other. To compute the regional domain performance the following was done: summation of all field domain scores/maximum possible domain score * 100%. The maximum possible domain score was computed as a product of: 2(maximum possible score) *number of domain variables* number of HCFs per region. To weigh domain scores against each the formula was: national domain mean/national WASH performance mean* 100%. The domains ranks were presented in a pie chart for easy comparison.

The WASHFIT tool had optional commentary section which was analyzed by grouping of indicator themes and subthemes thereby extracting common thematic ideas. In this report findings are presented as national summary domain tables, common themes are presented as narratives, in addition there are regional graphic summaries and pictures to support/highlight key findings. The report also contains a discussion of findings where there are highlights of areas of concern, a comparison of findings to other cases studies or international standards and an outline of recommendations.

4. ASSESSMENT FINDINGS

The assessment results are largely limited to the HCFs' demographic data (Table 4.1), domains' service statuses, regional and national summary as presented in the subsequent sections. The presented statistical tables give details on the quantities of 3 JMP ladder levels for each indicator, a summation JMP ladder status (represents each indicator mean), the domain mean as well as the respective domain service status (represents all indicators). The statistical data is presented along with qualitative data extracted from comments submitted during the assessment and discussions therein. The results are a representation of an assessment of 7 domains wherein indicators were extracted from WHO health standards, national IPC/SOP guidelines and other studies thus, an outline of the incorporated standards form the baseline of the presented results in each of the sections.

4.1 Health care facilities' characteristics

As a first point of call, the assessment sought to establish some basic characteristics of the HCFs. Table 1 presents some descriptive characteristics of 32 HCFs (including PHUs). Assessed HCFs were mostly owned by government (94.4%) while a few (5.6%) were NGOs. Of these, a majority (58.3%) were clinics while PHUs, Health Centers and Hospitals quantities broke even at 13.9% each. Fewer HCFs had isolation rooms (16/36) while many (20/36) did not. Similarly, fewer COVID treatment rooms (13/36) where observed in the time of investigation.

The findings revealed that a majority (55.6%) had no budget for WASH services therefore a majority also had no dedicated WASH focal personnel (52.8%). The major reasons in this regard were: government constraints (8.3%), which included hire freeze (5.6%) constraints and budget constraints (19.4%). Small size HCFs (13.9%) and new HCF (1/36) also did not have WASH focal personnel due to under developed institutional arrangements. On the contrary, a majority (86.1%) of HCFs had an IPC focal personnel and an IPC committee (63.9%) although, a majority (55.6%) of the IPC committees were not trained. Similarly, few HCFs had dedicated plumbers on site (25%) while many did not because of budget constraints (27.8%).

Furthermore, the findings indicate that, the mean number of beds for the 36 HCFs was 41 due to that a majority of health care facilities did not offer inpatients services. In addition, on average 128 patients were attended in the HCFs and services were rendered by 44 HCWs. HCFs had an average of 36 support staff members responsible for numerous tasks including environmental maintenance and cleaning among others WASH responsibilities. It was revealed that some HCFs were responsible for other facilities called "baby facilities", an average of 3 baby facilities per hospital. Ultimately, 11 services on average were offered in the assessed HCFs.

Table 1: Characteristics of 32 Healthcare Facilities

Description	**Characteristics**	**Frequency n=36**	**Percent (%)**
Region	Hhohho	8	22.2
	Lubombo	9	25.0
	Manzini	10	27.8
	Shiselweni	9	25.0
Facility type	Clinic	21	58.3
	PHU	5	13.9
	Health Centre	5	13.9
	Hospital	5	13.9
Facility ownership	Government	34	94.4
	NGO	2	5.6
Is there an isolation room available?	Available	16	44.4
	Not available	20	55.6
Is there a COVID treatment room available?	Available	13	36.1
	Not available	23	63.9
Does the facility have budget for WASH services operations and maintenance	Yes	16	44.4
	No	20	55.6
Does the Facility have WASH Focal Person?	Yes	17	47.2
	No	19	52.8
If no what are the reasons for not having a WASH focal person?	N/A (available)	17	47.2
	Government constraints	3	8.3
	Budget constraints	7	19.4
	Hire Freeze	2	5.6
	Small clinic	5	13.9
	New facility	1	2.8
	Institutional arrangement constraints	1	2.8
Does the facility have IPC Focal person?	Yes	31	86.1
	No	5	13.9
Does the facility have an IPC committee?	Yes	23	63.9
	No	13	36.1
Has the IPC Committee been trained?	Yes	16	44.4
	No	20	55.6
Does the facility have a dedicated Plumber onsite?	Yes	9	25.0
	No	27	75.0
	Government constraints	5	13.9

If no, what are the reasons for not having a plumber?	Budget constraints	10	27.8
	Hire Freeze	7	19.4
	Small Clinic	7	19.4
	Services outsourced	1	2.8
	Institutional arrangement constraints	6	16.7
N=36		Mean	Std. Deviation
Number of Health Care Workers		44.47	53.975
Number of Support Staff		36.89	92.321
Average number of patients per day		128.47	78.470
Average number of communities served		9.92	8.814
Number of baby facilities		3.42	5.862
Facility's bed capacity		41.28	85.528
Number of services offered		11.53	5.993

4.2 Water

Workers in health care facilities need sufficient quantities of safe water to provide health care services. Drinking and cooking, hand hygiene, showering and bathing, and a variety of general and specialized medical uses all require reliable supplies of safe water. Water is also essential for cleaning rooms, beds, floors, toilets, sheets and laundry. It is central to patient experiences of health care, as it enables them to remain hydrated, to clean themselves, and to reduce the risk of infections. Families and care-givers also need water to tend to patients and their own needs. Without water, a health care facility isn't a health care facility (WHO & UNICEF, Wash in Health Care Facilities, Global Baseline Report, 2019).

4.2.1 Water assessment standards

As far as water availability is concerned, most standards were extracted from WHO/UNICEF Joint Monitoring Programme where it states that, an improved water supply by nature of design and construction should have the potential to deliver safe water. Improved water covers a spectrum of piped water, public taps or standpipes; protected dug wells; tube wells; or boreholes, rainwater and packaged or delivered water (WHO & UNICEF, Wash in Health Care Facilities, Global Baseline Report, 2019). In addition, the Standard of Operation (SOP) guidelines state that, water should be available at the facility for all days/hours that it is open and providing care to patients. It is crucial that water stations are available in main waiting areas and or entrance to each ward and in all rooms where patients stayed overnight or received care (WHO, 2018).

Furthermore, chlorine residual should be frequently measured and dosing adjusted if residual is not met. Evidence of documented chlorine residuals should be available from previous testing and in the event of a

flood, chlorine alone will not disinfect water sufficiently as water is likely to be turbid. For effective disinfection, there should be a residual concentration of free chlorine (≥ 0.5 mg/l after at least 30 min contact time at pH < 8.0). A chlorine residual test should be maintained throughout the distribution system of the HCF. At the point of delivery, the minimum residual concentration of free chlorine should be ≥0.2 mg/l. WHO states that, the use of safe water minimizes the risk of exposure to water-related pathogens of enteric and environmental origin (for example, Pseudomonas, Legionella) and should be available for all clinical services. At a minimum, it should be provided to high-risk wards where the burden of Health-care Associated Infections (HAI) and Antimicrobial Resistance (AMR) are high and in all delivery room areas. The WHO guidelines further state that safe water has an E. coli detectable in 100 mL and free chlorine residual concentration of ≥0.5 mg/l after at least 30 min contact time at pH < 8.0 (WHO, 2017).

Moreover, the SOP and IPC guidelines indicate that to control infection, showers and bathing areas ought to be accessible, functioning and separated for staff and patients. In addition, showers should be lit and easily accessible during the day and night. The light switch heights should be at a maximum of 120 cm. In addition, the shower door should have a working lock, be lockable from the inside and the height of the lock should not exceed 70 cm. The gap between door and floor should not be more than 5cm and between roof and wall should be within 10cm. The standards also state that there should be no hole in wall and door and the shower should have a grab rails attached to floor or sidewalls at a height of 70 cm -80 cm. Shower/bathing area may have an optional seat. Ultimately, the shower or bathing area should be a minimum of 150cm x 150cm to allow space for manoeuvring and/or an extra person, a carer in most instances (ISO, 2021).

WASHFIT assessment requires that HCF should have water reduction strategies and for facilities to reduce water wastage. Water reduction strategies include the use of high-efficiency, low flow sinks for hand washing, low-water washing machines (and other strategies for laundry and cleaning), ensuring that pipes and fixtures do not leak (use a system to report and fix leaking faucets the same day), use checking meters to analyze water use, and using grey-water and/or rainwater where available to flush toilets, clean outdoor pavement areas and water plants among other options. In cases of climate-events or emergencies additional measures may be needed wherein water is prioritized for essential/life-saving services like delivery rooms, acute care wards and for priority users such as birthing mothers, young children, the elderly or undernourished patients (WHO, 2018). Similarly, where rainfall is sufficient and regular there should be functional rainwater harvesting system(s) including safe water storage. Optimally, gutters and roofs need to be used for rainwater catchment and storage tanks should be regularly cleaned at least monthly or as needed during heavy storms and rainfall. The system should also use a first flush device which is designed to divert the first portion of contaminated rainwater so it does not enter the storage tank and a filter box (WHO, 2018).

4.2.2 Water services in assessed HCFs

The current water services assessment included eight essential indicators that largely leaned on water availability, accessibility, reliability, quality, conservation and storage. The availability of water supply was evaluated by the presence of water supplies that had the potential to deliver safe water, for example piped water, stand pipes, packaged or rainwater as alluded in the outlined standards. In the main, the findings revealed that, a majority HCFs had unimproved water services as shown by the 'overall JMP ladder' (Table

4.2). This was revealed by (8/9) overall unimproved indicators while a smaller 'improved' proportion was observed on reliable drinking water (50%). In addition, unimproved services included: water piping within the facility (38.9%), water storage backup (75%), E.coli standards (80.6%), chlorine residual standards (63.9%), bathing area standards (94.4%), water quality testing (91.7%), reduction strategies (66.7%) and water harvesting (97.2%). The HCFs' mean score for the water domain was 0.43 resulting in an overall unimproved water services within the regions (Table 4.2).

Table 2: Water assessment results

Indicators	**no/unimproved service (n/%)**	**limited service (n/%)**	**basic/improved service (n/%)**	**Overall JMP ladder/service rating**
Water piping inside the facility to all high-risk areas	14 (38.9)	9 (25.0)	13 (36.1)	no/unimproved service
Reliable drinking water stations	13 (36.1)	5 (13.9)	18 (50.0)	limited service
Water storage 48 hours backup	27 (75.0)	6 (16.7)	3 (8.3)	no/unimproved services
Water E.coli's safety standards	29 (80.6)	6 (16.7)	1 (2.8)	no/unimproved service
Water chlorine residual's standards	23 (63.9)	7 (19.4)	6 (16.7)	no/unimproved service
Functional shower/bathing areas' availability for staff and patients	34 (94.4)	1 (2.8)	1 (2.8)	no/unimproved service
Water quality testing for all water supplies	33 (91.7)	1 (2.8)	2 (5.6)	no/unimproved service
Water reduction strategies	24 (66.7)	3 (8.3)	9 (25.0)	no/unimproved service
Water harvesting	35 (97.2)	1 (2.8)	0 (0)	no/unimproved service
Domain mean	0.43			no/unimproved service

Water services were notably faced with a number of challenges in the 4 regions thus resulted in low service output (unimproved service). Water was inaccessible in most of the HCFs such that in a number of instances there were no water access points in the waiting area and consultation rooms. One of the stipulated causes of non-access in the Hhohho region for example was that, the plumbing system was non-functional (Figure 1). In Shiselweni, another case was observed wherein water was running at a very low pressure as a result salt build up in the plumbing system (Figure 2). Generally, HCFs in the 4 regions especially in the Shiselweni region had no pipe systems inside wards and had no hand wash facilities therein. It was observed that most PHUs had improved water access such that all consultation rooms had running water.

Figure 1: Blocked drainage observed in of the HCFs

Figure 2: Tap with salt build-up observed in one of the HCFs

Generally, there was a shortage of drinking water stations in HCFs, for example in one of the regions (Lubombo) 5 of 9 HCFs had no drinking water stations. In some HCFs in the Manzini region drinking

stations were partially accessible wherein they were located in the kitchen and or dining halls where only inpatients and healthcare workers (HCWs) had access. It was observed that in some Manzini HCFs outpatients had no water dispensers. Similarly, in cases where water dispensers were available they were insufficient and inaccessible (i.e only in the reception and staff kitchen) and none in the waiting areas. In the Shiselweni region it was observed that a majority of facilities had no drinking water stations instead used hand washing stations to get drinking water while in Hhohho it was observed that the available taps that served as drinking stations were not strategically located. On the contrary (1/10) HCFs had more than 4 reliable drinking water sources within the Manzini region.

The interviews revealed that water testing was not done in nearly all HCFs in all the four regions. An observation was made in Manzini where 30% of the assessed facilities used galvanized pipes which were prone to rusting thus affecting water parameters such that the colour of running water was brown. In the bathing areas where HCFs that had inpatients, it was observed that a majority of showers in the 4 regions were not disability sensitive. In addition they had no hot water. In some cases there was no segregation of staff showers thus HCWs used patients' showers. In other cases showers were insufficient, non-functional and even unavailable such that patients used dishes, particularly in the Lubombo, Hhohho and Shiselweni regions. This was more a common feature in the children's' wards. In Manzini, only one (10%) of the assessed HCFs had adequate water supply connected to all bathrooms with fully functional showers.

Water wastage reduction strategies were not adopted in all regions and there was also no evidence of rain water harvesting. This was due to the lack of or damages on the required rainwater harvesting amenities such as water tanks and or gutters (Figure 3). In one of the facilities in the Hhohho region it was reported that HCWs are not knowledgeable on water wastage reduction strategies thereby do not conform to its principles. In addition, some of the HCFs had no backup storages in all the regions. For example in 1 of the 10 cases in Manzini it was revealed that, the HCF got support from the local municipality that supplied backup water whenever there was water shortage until normal flow was retained. In Shiselweni 2 out of the 9 assessed HCFs had limited water supply due to frequent instances of borehole malfunction, resulting in water unavailability for 48 hours or more. In the same Shiselweni region, most HCFs with backup water had capacity that could last for only 12 hours as it was also used for domestic purposes by HCWs. As observed in the HCFs, back-up is normally by means of 5000L or 10000L tanks (Figure 4). Where these are filled to full capacity, indications are that they lasted for just over 2 days, particularly for the 5000L. The 10000L could last up to a week, depending on the size of the facility, and the number of accommodation units for HCWs.

Figure 3 : Damaged gutter in one of the HCFs

Figure 4: 5000L tanks found in one of the HCFs

The findings also revealed that most HCFs had 2 major reliable water sources namely: Eswatini Water Services Corporation (EWSC) and boreholes in all the regions. EWSC piped systems were reported to have

minimal water cut offs and these were usually less than 8 hours therefore considered as the most reliable source.

4.2.3 Discussion of water services findings

Literature reveals that, up to 80% of illnesses in the developing world are linked to inadequate water and sanitation (AHRQ, 2016)**.** The shortage of drinking water stations compels patients to draw water from high risk areas which could be, hand washing stations in close proximity and at times from toilet sinks. Ideally the lack of drinking water stations requires plumbing in strategic locations, particularly in the waiting areas for patients to have access to drinking water at close access points. In the interim HCFs can adopt strategies that are being employed in other developing countries wherein bucket taps are strategically placed within the facility along with drinking cups, constantly refilled with water for drinking purposes.

In review of Sustainable Development Goal (SDG) 6 it is stated that, countries should "ensure availability and sustainable management of water and sanitation for all" (Askarian, Heidarpoor, & Assadian, 2010)**.** The targets cover all aspects of both the water cycle and sanitation systems**.** There is however, a huge gap in Eswatini considering that there still are HCFs that have leaking gutters, leaking taps and continuously flowing flushing systems compromising water harvesting efforts and water wastage reduction strategies in this regard. An assertion is presented by Gadgil (2018) that at any given time, about half the population in the developing world is suffering from one or more of the six main diseases associated with water supply and sanitation. It is therefore of concern that patients and HCWs in most of the HCFs in the country are at risk of consuming water with metal traces and other contaminants, particularly with water testing not being done at all for all the HCFs. There is a need for infrastructure improvement, research on affordable strategies that can combat the water challenges and capacity building to equip the health systems on the best international practices therein.

4.3 Sanitation

Access to safe sanitation is a human right. Sanitation services in health care facilities are essential to deliver high quality care that improves the health, welfare and dignity of patients, visitors and staff. It is also a major contributor to the improvement of health outcomes within healthcare facilities. Sanitation conditions influence patient's HCF's experience and professionals' work satisfaction. Sanitation management in health care is particularly important to ensure faecal pathogens do not contaminate the health care facility environment or surrounding areas (WHO & UNICEF, 2019).

4.3.1 Sanitation standards

According to WHO/UNICEF improved sanitation facilities include: flush toilets to managed sewer or septic tank and soak away pit, VIP latrines, pit latrines with slab and composting toilets (WHO, 2018). The number of latrines needed is dependent on the size of the facility. For larger facilities with multiple wards, two outpatient toilets are not sufficient. It is recommended that where feasible each outpatient department has two toilets. Toilets may also be used by guardians, care-givers and visitors. It should be taken into account that, large numbers of visitors add to the demands on sanitation infrastructure and cleaning.

A toilet can be considered to meet the needs of people with reduced mobility if it meets the following conditions:

- accessible without stairs or steps

- handrails for support are attached either to the floor or sidewalls
- the door is at least 80 cm wide
- the toilet has a raised seat (between 40-48 cm from the floor)
- a backrest
- the cubicle has space for maneuvering

In addition, the sink, tap and water should also be accessible and the top of the sink should be 75 cm from the floor (with knee clearance). Switches for lights, where relevant, should also be at an accessible height - max 120 cm (ISO, 2021).

Moreover, hand washing stations at a toilet should also be accessible with the following considerations:

- taps with lever-type handles,
- the sink with grab rails on both side
- soap (or alcohol-based hand rub)
- easy to reach toilet paper.

4.3.2 Sanitation in assessed HCFs

Sanitation assessment focused on 7 indicators; that is, inclusiveness, adequacy, waste records, hand-washing stations, cleaning logs, PPE availability and waste water management. From an inclusivity perspective, the results indicate an overall rating of unimproved service in the 36 HCFs that were assessed, with only 8 (22%) of them getting a rating of improved service in this indicator according to the JMP ladder rating. A larger proportion (69%) of the facilities were rated as having limited service in relation to the inclusivity indicator. Of the seven sanitation indicators, only adequacy in terms of toilet facilities within the HCFs, and functional hand-washing stations had a majority of the facilities rated as basic/improved service on the JMP ladder. These were at 24 (67%) and 19 (53%), respectively. Wastewater recording was only evident in 2 of the 36 HCFs, with most of them rated as on/unimproved service on the JMP ladder for this indicator. Only one (2.8%) facility was rated basic/improved for the toilet cleaning records indicator with a majority (23 or 64%) recording a no/unimproved service rating. For the safe wastewater management indicator most of the facilities were rated as either having a limited service (20 or 56%) or basic/improved service (15 or 42%), with only 1(2.8%) rated as no/unimproved service. The sanitation PPE indicator as well reflected most of the facilities as having either limited (19 or 53%) or basic/improved service (13 or 36%), with only 4 (11%) rated as no/unimproved service on the JMP ladder.

For the sanitation domain, the computed mean score in relation to the rating codes of 0,1, and 2 for no/unimproved service, limited service, and basic/improved service, respectively came to 1.1. On basis of this mean the overall JMP rating for this domain with regards to the assessed HCFs is placed at limited service. Table 4.3 presents a summary in relation to the sanitation indicator ratings and the overall mean score for the domain and its subsequent rating on the JMP ladder.

Table 3: Sanitation indicator assessment results

Indicators	**no/unimproved service (n/%)**	**limited service (n/%)**	**basic/improved service (n/%)**	**Overall JMP ladder/service rating**
Functional toilets that are inclusive of mobility, sex and child sensitivity	3 (8.3)	25 (69.4)	8 (22.2)	no/unimproved services
Facility has adequate toilets	2 (5.6)	10 (27.8)	24 (66.7)	limited service
Records of waste water	26 (72.2)	8 (22.2)	2 (5.6)	no/unimproved services
Functional hand washing stations in toilets	6 (16.7)	11 (30.6)	19 (52.8)	limited service
Toilets' 2hrs cleaning records	23 (63.9)	12 (33.3)	1 (2.8)	no/unimproved service
Safe waste water management (collection, transport, treatment)	1 (2.8)	20 (55.6)	15 (41.7)	limited service
Sanitation PPE	4 (11.1)	19 (52.8)	13 (36.1)	limited service
Domain mean	1.1			limited service

Corroborating these ratings were observations made at the HCFs during the assessment. One key observation that was made was in relation to the gender segregation of sanitation rooms, wherein male and female patients use the same toilets. This was particularly true with the HCFs that had inadequate sanitation facilities as well as those with non-functional and poorly maintained patients' toilets (Figure 5). In general, all regions had toilet facilities that were mobility insensitive. For example in the Shiselweni region 7/9 HCF had no mobile sensitive toilets while the two HCFs that had these toilets kept their doors locked. A majority of HCFs do have flush toilets with hand washing basins. However, for facilities that use pit latrines, it was observed that the hand washing stations were not in close proximity (within 5 metres), especially in the Manzini and Shiselweni regions. Sanitation components were commonly not provided in patients' sanitation rooms except for water and it was observed that there was a shortage of elbow taps (Figure 6). It was observed that where there were no basins patients used tank running water with no soap to wash hands.

Figure 5: A poorly maintained toilet in one of the HCFs

Figure 6: Observed leaking hand-washing sink tap

Toilets cleaning records were not found in nearly all HCF in the four regions except for one in Shiselweni where the SLACK system is used to keep records. Discussions with HCFs senior personnel revealed that that toilets are cleaned at least once or twice a week. Wastewater management was observed to be largely

adequate and safe in a majority of HCFs wherein the system either had a septic tank or connected municipality sewage line. On few cases it was revealed that the manholes had episodes of leaking, blockage and or the septic tank was overflowing (2/9 in Shiselweni, 3/10 in Manzini). A high risk situation was observed in Manzini wherein the manhole was located inside one of the consultation rooms thus infusing an odour (Figure 7).

Figure 7: Manhole observed inside a consultation room

4.3.3 Discussion of sanitation findings

Although the findings reflect that the majority (67%) of the HCFs have adequate toilet facilities, the 33% that do not have these are still significant considering the sensitivity of this domain in as far as health of patients is concerned. The daily HCF population tends to be higher than the available toilet facilities and this results in issues such as poor segregation according to patients, staff and gender. In addition toilets are not available per department as required but there is usually a section where a block of sanitation rooms are located. The shortage of sanitation facilities is a global crisis and is dominant in an African context. According to a study done in Nigeria, inadequate sanitation causes premature mortality, and policymakers in Nigeria still struggle to improve sanitation practices despite their importance to national health and poverty eradication strategies (Harhay, Halpern, Harhay, & Olliaro, 2009). Although pit latrines have been observed in some HCFs as a way of substituting flush toilets, the conditions of these facilities are equally unpleasant and inadequate. In addition, the shortage of hand wash amenities in toilets increases the risk of infection transfer and it is concerning that many HCFs are without soap and paper towels. Toilet paper seems less of a priority, out of desperation patients may end up using hard paper for sanitation thereby blocking flush systems which exacerbates sanitation challenges.

WHO sanitation standards state the importance of mobile sensitive sanitation rooms. With most of the HCFs characterized by immobility insensitive sanitation facilities, the marginalization of immobile patients

remains a problem in HCFs as their sanitation needs are not catered for. This includes patients that may have limited mobility as a result of surgery or childbirth. Without hand rails in the toilets it is challenging to be in most HCFs in Eswatini as an immobile patient.

Sanitation standards may improve when authorities monitor minimal requirements like cleanliness of rest rooms through keeping track of cleaning log records which is currently not done. Properly cleaned toilets are less likely to block as maintenance issues would be attended to promptly which is not the case at the moment.

Ultimately, the challenges on bad hygiene conditions and inadequate sanitation in health care facilities can lead to people not seeking health care when they need it, and can reduce health care professionals' work satisfaction. There is a need for interventions that alleviate these challenges therefore.

4.4 Health care waste services

Health care wastes are one of the most hazardous wastes globally; second to only radiation waste (Wafula, Musiime, & Oporia, 2019)**.** Health care waste management (HCWM) is a process to help ensure proper hospital hygiene and safety of health care workers and communities. A spectrum of activities goes into the management including planning and procurement, construction, staff training and behavior, proper use of tools, machines and pharmaceuticals, proper disposal methods inside and outside the hospital, and evaluation. Health Care Waste management needs to be prioritized because of the devastating effects on human health and environment if not well managed.

4.4.1 Health care waste assessment standards

The standards (Wafula, Musiime, & Oporia, 2019) state that, a functional health care waste system should have at least three containers ("3-bin system") that are not more than three-quarters full (75%), that are leak-proof with a lid and are all clearly labelled (i.e. easily distinguishable according to colour, label or symbol). Bins should be in place to separate (1) sharps waste, (2) infectious waste, and (3) non-infectious general waste. Non-infectious waste needs to be separated for recycling. In addition bin liners/bags are recommended and each bin should not contain waste other than that corresponding to its label. Sharps containers should be puncture-proof. In addition, bins should be available in all waste generation points, that is, anywhere that care is delivered where waste is produced from providing care or other medical activities. Consultation room are such a typical point where waste bins should be available at all times. Where possible, cardboard sharps/safety boxes should be used in place of plastic boxes, to reduce harmful emissions when burned (particularly where low-temperature incineration is used).

Furthermore, waste handling staff should have appropriate PPE and ensure it remains hygienic at all times. Protective equipment for people handling waste management includes: face mask, thick gloves, long sleeved shirt, apron, glasses/goggles and tough rubber boots. Overuse and misuse of PPE can contribute to the spread of pathogenic organisms, especially in the absence of hand hygiene.

Ultimately, infectious waste should be combusted in an incinerator or fenced area that is protected from flooding, and it should be a facility that is lined and covered. In cases of flooding, waste should be stored in elevated containers and/or transported off-site. Sending waste to landfill should be a last resort. No unprotected health care waste should be visible. Additional storage should also be available when additional

waste is generated during climate-events and /or emergencies. Products such as water and soap or alcohol hand rub for hand hygiene should also be available (WHO, 2009).

4.4.2 Healthcare waste management in assessed HCFs

Healthcare waste was assessed on the basis of eight (8) indicators, that is, waste handlers' training, functional waste collection, segregation, availability of standard operating procedures (SOP), PPE, waste records and hazardous waste treatment and disposal. Six out of the eight indicators recorded a rating of no/unimproved service. Indicators where most HCFs recorded no/unimproved service in terms of rating on the JMP ladder were; protection and treatment of infectious waste within 24hrs (86.1%), availability of waste collection at all waste generation points using the 3 bin system (80.6%) and recording of health care waste (55.6%). A majority (67%) of HCFs were rated as basic/improved service in relation to the trained personnel that was responsible for health care waste indicator. 47% of the assessed HCFs were rated as having basic/improved service with regards to the segregated waste during collection, treatment and disposal indicator. A large proportion of HCFs had limitations regarding having appropriate waste handling PPE (72.2%) and disposing hazardous (infectious and sharps) waste (66.7%). Based on the computed mean for the domain, which came to 0.92, healthcare waste management in 36 assessed facilities is overall rated as no/unimproved service. Table 4.4 is a summative presentation of the indicator ratings for the healthcare waste domain on the JMP ladder.

Table 4: Healthcare waste indicator assessment results

Indicators	**no/unimproved service (n/%)**	**limited service (n/%)**	**basic/improved service (n/%)**	**Overall JMP ladder/service rating**
Trained person responsible for Health Care Waste	2 (5.6)	10 (27.8)	24 (66.7)	limited service
Functional waste collection at all waste generation points	29 (80.6)	0 (0)	7 (19.4)	no/unimproved service
Waste segregation during collection, treatment/disposal	3 (8.3)	16 (44.4)	17 (47.2)	limited service
Safe disposal of infectious and sharps waste	5 (13.9)	24 (66.7)	7 (19.4)	no/unimproved service
Records for generated Health Care Waste	20 (55.6)	8 (22.2)	8 (22.2)	no/unimproved service
Infectious waste protected and treated within 24hrs	31 (86.1)	2 (5.6)	3 (8.3)	no/unimproved service
Health Care Waste SOP in place (available and visible)	20 (55.6)	9 (25.0)	7 (19.4)	no/unimproved service
Appropriate waste treatment PPE for waste handlers	8 (22.2)	26 (72.2)	2 (5.6)	no/unimproved service
Domain mean	0.92			no/unimproved service

Engagements with HCFs personnel confirmed that for most of them, healthcare waste was handled by trained members of staff, some with professional qualifications on waste management and handling, whilst

some were trained healthcare workers. A case was told however in one HCF in the Shiselweni region that untrained community volunteers were responsible for handling waste. From an observation perspective, there was corroboration of the finding that most of the HFCs had no functional waste management and handling systems from collection to disposal. Inadequacy in the '3-bin' system was observed in most of the HCFs (Figure 8 & 9) and most of the available bins had non- functional bin pedals. Containers for sharps were replaced by regular buckets and on many instances waste was not labelled because of misplacement of relevant tags (Figure 10). In some instances the waste liners were seemingly unavailable with these not observed during the assessment. An observation was made in one of the HCFs in the Hhohho region where they utilized small-sized liners in all the consultation rooms.

Figure 8: Inadequate waste management practice observed in one of the HCFs

Figure 9: Observed improper handling of infectious waste

Figure 10: Observed inadequate bin labeling

Furthermore, waste segregation was slightly inconsistent in HCFs such that there were observations of waste bins that contained incorrect waste, a case in point observed in the Hhohho region wherein there was wrongful use of the red bin liners for general waste as a result of shortage of the rightful one (Figure 11).

Figure 11: Observed wrongful use of red bin liners

There was also an observation that was made during the assessment wherein some containers for sharps were kept beyond the required 75% capacity in a number of facilities. In the Manzini regions it was noted that some HCFs used domestic 25L buckets to collect and store sharps. As can be seen in all the images (Figures 9 – 11) there is the challenge of missing lids for the waste receptacles, whether general or hazardous waste. This was a common observation in all the four regions

It was disclosed by the engaged personnel in most of the HCFs that infectious waste tended to be kept within the facility premises for extended periods, largely due to lack of transportation which was as a result of vehicle and fuel shortages within the government system. There however were some HCFs that reported owning internal incinerators, thereby having some ability in terms of proper disposal of hazardous waste. A major challenge however that was reported in relation to the available incinerators was the shortage of consistent fuel supply for incinerator operation. To this extent the incinerators tend not to be used to their full capacity. It was reported by HCF staff in some of the facilities with incinerators that due to the lack of fuel they used cardboards resulting in incomplete combustion, particularly for sharps. HCFs in Manzini reported that they relied on Manzini Town Council's incinerator. Some Shiselweni HCFs reported transporting hazardous waste to Mankayane Government Hospital for incineration.

It was reported by most of the HCF personnel that were interviewed during the assessment that waste from their facilities was not weighed, hence the absence of waste records of generated healthcare waste. In Manzini region in particular, it was reported that only infectious waste is weighed before being taken for disposal. Due to the shortage of fuel, infectious waste was not treated within 48hrs in many HCFs thus it was kept in locked protected areas for weeks or months in some instances. Protected areas were mostly lockable however, even though in some instances the fence is damaged (Figures 12 & 13).

Figure 12: Observed containment of hazardous waste

Figure 13: Observed fenced storage area for hazardous waste

It was as well reported in the engagement with the HCFs personnel that a majority of the facilities had no SOP for healthcare waste management in place. To this end, some of the HCFs stated that they rely on IPC guidelines instead. In cases where SOPs are in place there it was observed that there is no supervision and as such compliance to these is not being enforced. Similarly, a gap was noted on waste PPE supplies wherein most facilities had incomplete kits (i.e water boots, heavy duty gloves, aprons, safety glasses) and there is no clear procurement plan in most HCFs for IPC consumables and as such these sometimes run out without being promptly replaced.

4.4.3 Discussion of health care waste findings

Healthcare wastes can have devastating effects on human health if not properly handled (Johannessen, et al., 2000). For the assessed HCFs a number of concerns were noted in relation to healthcare waste management. The observed mismanagement of healthcare waste can result into various hospital-acquired infections, occupational health hazards and food contamination (Manyele, 2004). In the assessment waste liners were lying on the floor in some HCFs which is risky because pathogens could easily be transmitted in such cases. In addition, mismanaged wastes such as sharps contaminated with blood increase the risk of transmission of infections such as hepatitis B, hepatitis C, HIV/AIDs and other viral infections (Askarian, Heidarpoor, & Assadian, 2010). Similarly, this risk is high in HCFs where inappropriate sharps containers (25L buckets) are used given that the containers puncher properties are unknown. The same concerns are triggered by unlabeled infectious waste bags where there is increased the risk of accidents because of less caution in waste handling due to unknown bag contents. The array of risk is vast, health care workers, patients, workers in support services, visitors to health facilities, waste handlers, scavengers, fetuses in the wombs, and the general public are susceptible to infections if exposed (Akter, 2000). The findings reveal that, there is a need for investment of procuring regulated sharps containers and waste labels.

In developing countries especially in Africa, healthcare waste has not received the much needed attention that it deserves (Harhay, Halpern, Harhay, & Olliaro, 2009). This is because of the inadequate resources in these countries resulting into low priority for waste management (Diaz, Eggerth, Enkhtsetse, & Savage, 2008). This is observed in the manner in which most waste related issues are neglected even when they seem less technical like pinning back fallen waste labels, weighing and keeping waste records in the current assessment.

Similar to Eswatini, many countries, have limitations regarding segregation of hazardous and medical wastes and these usually get mixed with non-infectious waste (Hassan, Ahmed, Rahman, & Biswas, 2008). The cause of this gap is the shortage of bins and liners as observed in a case where all waste was collected in red bags.

Inadequate knowledge and unsatisfactory management practices among the health care workers are major challenges in the management of healthcare waste (Patil & Parokhrel, 2015). This was observed in HCFs where untrained waste handlers were deployed for the task. Previous research indicate that healthcare waste management may be compromised by lack of formal training, lack of knowledge, and limited interest from hospital administration (Nkonge, Mayabi, Kithinji, & Magambo, 2012). Beyond investing in health care waste amenities there is need for vigorous training/refresher courses and strategies to collect infectious waste. On the basis of the results as presented for this domain, there is cause for concerns for populations within the HCFs, including the patients and healthcare workers.

4.5 Hand hygiene

For the hand hygiene domain, focus is principally on the healthcare workers in terms of improved access and utilization because they come into contact with multiple patients and as such are at the centre in terms of contacting and spreading pathogens through hand touching. Hand hygiene is also important for all healthcare facility visitors as well including patients and carers. It is in this aspect that hand hygiene facilities and essentials such as soap, sanitizers, and paper towels are to be placed in strategic locations within HCFs for ease of access and use by all within the facility (WHO & UNICEF, 2019).

4.5.1 Hand hygiene standards

WHO guidelines state that hand hygiene is a general term referring to any action of hand cleansing, that is, the action of performing physical or chemical removal of dirt, organic material, and/or microorganisms (WHO, 2009). The guidelines state that, a functional hand hygiene station should consist of soap and water with a basin/pan for washing hands and disposable or clean towels, or alcohol-based hand rub (ABHR). Hand hygiene needs to be practiced in all points of care. The point of care is the place where three elements come together: the patient, the health care worker and care or treatment involving contact with the patient or his/her surroundings (within the patient zone). In some facilities, health care workers carry ABHR around on their person as they move between service areas.

Hand hygiene monitoring can be categorized into 2 classes: direct and indirect monitoring. Direct hand hygiene monitoring means direct observation of performance as per the WHO 5 Moments while in-direct hand hygiene monitoring means monitoring consumption of soap and alcohol based hand rub. For WASHFIT assessments both direct and indirect monitoring are observed. For more advanced facilities, the WHO hand hygiene self-assessment framework can be completed annually.

4.5.2 Hand hygiene in assessed HCFs

Hand hygiene assessment was carried out on the basis of four (4) indicators, these being, functional hand hygiene stations at strategic points, hand hygiene promotion material, hand hygiene compliance and record keeping of supply refills. Similarly to the other domains, these indicators were assessed using the JMP ladder rating. For this domain, major issues seem to be on compliance and record keeping. In 26 out of the 36 (72%) assessed HCFs the indicator on hand hygiene compliance activities being undertaken quarterly and documented was rated as no/unimproved service on the JMP ladder. Only 3 (8.3%) were rated as having basic/improved service in this regard. For the indicator on established and working records for refills of hand-washing supplies, 24 (67%) of the assessed HCFs were rated as no/unimproved service, with only 9 (25%) rated as basic/improved service for this indicator. The assessment results do indicate some level of effort in hand hygiene promotion material display in most of the HCFs, although the majority of them (22 or 61%) were rated as having limited service in relation to this indicator. However only 4 (11%) were rated as no/unimproved service for the material display indicator, with 10 (28%) rated as basic/improved service on the JMP ladder. Similarly the indicator on functional hand hygiene stations at all strategic points was overall rated as limited service with 33 out the 36 HCFs obtaining this rating on the JMP ladder. Only 1 HCF got a rating of no/unimproved service for this indicator, with 2 obtaining a rating of basic/improved service. Based on the computed mean (0.78) for this domain in relation to the four indicators, the overall domain rating is placed at no/unimproved service for the HCFs in all the four regions. Table 4.5 presents a summary of the rating frequencies per indicator for the hand hygiene domain.

Table 5: Hand hygiene indicator assessment results

Indicators	**no/unimproved service (n/%)**	**limited service (n/%)**	**basic/improved service (n/%)**	**Overall JMP ladder/service rating**
Functional hand hygiene stations at all strategic points	1 (2.8)	33 (91.7)	2 (5.6)	limited service
Hand hygiene promotion materials displayed strategically	4 (11.1)	22 (61.1)	10 (27.8)	limited service
Hand hygiene compliance activities undertaken quarterly and documented	26 (72.2)	7 (19.4)	3 (8.3)	no/unimproved service
Records for refills of hand washing supplies is established and working	24 (66.7)	3 (8.3)	9 (25.0)	no/unimproved service
Domain mean	0.78			no/unimproved service

The indicator rating results for this domain were substantiated by observations made during the visits to the HCFs, as well as engagements with the senior personnel in the facilities. In relation to hand hygiene stations placement at strategic points, there was an observation that a majority of the HCFs had these at the entry points (Figure 14) and examination rooms (Figure 15). These were however not available in the waiting rooms, wards and PPE change rooms, thus corroborating the limited service rating for this indicator.

Similarly, an observation was made that there was insufficient hand hygiene promotional materials, as reflected as well in Figure15 for instance. It was stated during the engagements with HCF senior personnel that in most cases the promotional material falls off and hardly gets replaced. This was true for hand-washing stations, waiting areas, toilets, public areas, and waste disposal areas.

For the compliance activities, a case was reported where in conjunction with MSF, audits were carried out in one HCF. This again substantiates the rating for this indicator as no/unimproved service as assessed through the JMP ladder. For most of the HCFs they did actually report that there were no compliance reports and compliance auditing was very irregular. In a similar fashion, most of the HCFs reported that they did not have hand-washing supplies refill records. At best any form of records in this regard is usually order placement records and requisitions from the administrators.

Figure 14: Hand-washing station at one of the HCFs entrance

Figure 15: A hand-washing station at an examination room for one of the assessed HCFs

4.5.3 Discussion of hand hygiene findings

As already indicated in the assessment findings for this domain, indicator rating has been either limited service or no/unimproved service, with the frequencies in the number of HCFs getting these ratings resulting in a mean score of less than 1 rendering the whole domain as no/unimproved service in terms of overall rating. Indeed it was noted that for most of the HCFs, hand hygiene standards are not met with observed shortages in the required essentials such as soap, water basins, disposable towels or alcohol based hand rub (ABHR). The hand washing stations are themselves inadequate, with healthcare workers expected to periodically use the next closest station, a practice whose practicability is questionable based on the distances therein. This approach compromises the quality of hand hygiene standards as it can be tiresome for healthcare workers to keep up with the regular movements for hand-washing purposes, thus increasing risks of pathogens contact and spread (WHO, 2009).

During the peak of the COVID 19 pandemic, patients were vigilant on taking care of hand hygiene. They carried and regularly used hand sanitizers to clean their hands. However, this practice has since slowed down as the pandemic largely believed to be now contained and the enforcement of these practices now removed. Since HCFs have no dedicated personnel for monitoring hand hygiene in many cases, this results in a shortage of hand hygiene supply and poor supply refill at the hand washing stations. Institutional arrangements need strengthening to cater for this need. The assigned personnel may not combat all

challenges especially those related to plumbing and budget constraints, but available communication materials should be re-pinned to the walls whenever they fall, and soap should be refilled at hand-washing stations. More research is needed on short term strategies that can be employed to improve hand washing standards in the interim, while in the long term more plumbing is required to put in place improved hand washing stations that meet the WHO standards (WHO, Guidlines on hand hygiene in health care, 2009).

4.6 Environmental cleaning and food

The healthcare environment contains a diverse population of microorganisms and can be a reservoir for potential pathogens. If environmental cleaning is not performed correctly, then environmental contamination can contribute to the spread of multidrug-resistant organisms and health care-associated infections. Collaboration between infection prevention and control (IPC) and environmental services (EVS) staff limits therefore becomes crucial in the prevention of disease transmission, particularly within a healthcare facility (WHO & UNICEF, 2019).

4.6.1 Environmental cleaning and food standards

Environmental cleanliness is critical in HCFs and it can be assessed from the cleanliness of all horizontal surfaces in the interior (i.e floors) and exterior of a facility (WHO & UNICEF, 2019). Evaluation of cleaning standards incorporates monitoring how well cleaning materials are kept and maintained, and availability of cleaning utensils (bucket, colour coded mops, cleaning cloths, soap and disinfectant solution, e.g., chlorine). These materials and utensils ought to be kept in a designated area according to these standards. For protection of the cleaning staff, it is required that all cleaners be provided with the appropriate PPE (e.g. heavy-duty gloves, safety glasses, rubber boots, aprons, and masks). There should be adequate cleaning staff (based on the number of working shifts in HCF: 1 per shift per unit). In addition, personnel should be trained and demonstrate understanding for correct cleaning and disinfection procedures. Cleaners must have a standard adopted procedure for the cleaning of each room/unit on a regular basis and when required (i.e frequently touched surface areas should be regularly cleaned and disinfected - at least twice daily. Cleaning after a patient's discharge is also covered by this procedure). Moreover, it is expected that HCFs have visible cleaning records-signed by the cleaners each day (WHO & UNICEF, 2019).

For medical equipment the procedure states that there should be a trained person for decontamination and sterilization who is provided with sterilization equipment such as autoclave, poupinel and accessories needed for sterilization. Similarly, there should be availability of liquid detergent, disinfectant, soft brush, washing sink, running water (hot and cold) for cleaning of medical equipment in the HCF (WHO, 2009). For linen and laundry processing the following aspects are crucial:

- segregation of linen wherein there are separate bins for clean and soiled linen
- available linen transporting means
- adequate laundry machine or hand washing arrangement
- drying method and adequate laundry staff.

In addition, there should be written protocol for laundry posted in laundry area on linen management (Askarian, Heidarpoor, & Assadian, 2010).

For the food aspect of this domain. HCF food handlers are expected to utilize food handling equipment that is kept clean and in good state to prevent any risk of contamination of food during processing. As stated by WHO (2019) All food handlers ought to have a Food Handlers Medical Examination Certificate that is not older than 6 months and the appropriate PPE (clean, light-coloured, washable material and change rooms/lockers)**.** Food should be kept in the correct packaging and temperatures to prevent cross-contamination (Dry storage - 10 – 21^{0}C and Cold storage - 5^{0}C and lower). Furthermore, HCFs should have adequate water supply in food preparation: a supply of clean and safe water (hot and cold running water), adequate and appropriate sinks for food and hand washing**.** Kitchen garbage handling and disposal requires that garbage be deposited in an impervious and fitting lid receptacle and be frequently emptied to the appropriate site. Ultimately, HCFs should have a mechanism to track supply and the use of IPC-related materials with stock cards appropriately filled in.

4.6.2 Environmental cleaning and food in assessed HCFs

The assessment of the environmental cleaning and food domain was premised on 17 indicators (Table 4.6). The findings revealed significant limitations in the appropriate handling and maintenance of cleaning equipment (86.1%), inadequacy of cleaners (69.4%) and lack of written linen and laundry processing protocol (52.8%) thereof. Moreover, in cleaning materials there was a gap in the availability of adequate cleaning utensils such as: buckets, colour coded mops, cleaning cloths, soap and disinfectant solutions and more so in the availability of designated areas for storing cleaning material. In addition, 66.7% HCFs had no visible cleaning records, signed by staff members.

The domain did have positive results in terms of the indicator assessment. For instance, the indicator for food handling PPE was rated basic/improved service for 26 (72%) out of the 36 HCFs. This suggests that it is clean, light coloured, and washable. Similarly, in most HCFs, the food storage indicator was rated basic/improved in 24 (67%) of the assessed HCFs, suggesting that food items were stored at the correct temperatures and were well packaged, with no risk of cross- contamination. Water supply (hot/cold) was running, clean, safe; adequate and proper sinks were also available in 24 HCFs at the time of assessment. A large proportion of HCFs had sterilization equipment at designated spaces (63.9%). In addition, HCFs practiced good disposal of garbage (63.9%), had a mechanism of tracking IPC related supplies (50%), and had a trained person(s) for decontamination and sterilization (55.6%). Table 4.6 presents the indicator assessment findings for the environmental cleaning and food domain. Overall the domain was rated a limited service for the four regions based on the computed mean score of 1.2 in relation to the rating frequencies per indicator in the 36 assessed HCFs.

Table 6: Environmental cleaning and food indicator assessment results

Indicators	no/unimproved service (n/%)	limited service (n/%)	basic/improved service (n/%)	Overall JMP ladder/service rating
Floors and horizontal work surfaces appear clean (internal and external)	3 (8.3)	17 (47.2)	16 (44.4)	limited service
Appropriate and well maintained cleaning material	2 (5.6)	31 (86.1)	3 (8.3)	no/unimproved service
Adequate and appropriate PPE	11 (30.6)	22 (61.1)	3 (8.3)	no/unimproved service
Cleaning procedure	16 (44.4)	16 (44.4)	4 (11.1)	no/unimproved service
Adequate cleaners	3 (8.3)	25 (69.4)	8 (22.2)	no/unimproved service
Mechanism exists to track supply and use of IPC-related materials	16 (44.4)	2 (5.6)	18 (50.0)	limited service
Visible cleaning records-signed by the cleaners each day	24 (66.7)	9 (25.0)	3 (8.3)	no/unimproved service
Linen and laundry processing and written laundry protocol	13 (36.1)	19 (52.8)	4 (11.1)	no/unimproved service
Sterilization equipment availability	5 (13.9)	8 (22.2)	23 (63.9)	limited service
Availability utensils for cleaning medical equipment	5 (13.9)	16 (44.4)	15 (41.7)	no/unimproved service
Trained person for decontamination and sterilization	11 (30.6)	5 (13.9)	20 (55.6)	limited service
Functional and appropriate food handling equipment	16 (44.4)	11 (30.6)	9 (25.0)	no/unimproved service
Food handling PPE	8 (22.2)	2 (5.6)	26 (72.2)	limited service
Availability of food handlers' 6 months medical examination certificates	29 (80.6)	5 (13.9)	2 (5.6)	no/unimproved service
Appropriate food storage (wet and dry ingredients)	2 (5.6)	10 (27.8)	24 (66.7)	limited service
Water supply in food preparation	6 (16.7)	6 (16.7)	24 (66.7)	limited service
Garbage handling and disposal	9 (25.0)	4 (11.1)	23 (63.9)	limited service
Domain mean	1.2			limited service

Observations made during the fieldwork for this assessment validate some of the ratings made for this domain indicators. The clean floors and surfaces indicator was overall rated as limited service in the JMP ladder. The observations made do indeed indicate that for most of the HCFs the floors were not in a good

state in terms of cleanliness at the time of the assessment. Instances where these were visibly dirty (Figure 16) were observed. In engagements with HCF personnel, the major reason provided for the non-cleaning of the floors was staff shortages. In the Hhohho region for instance, two HCFs reported that their labs were not cleaned due to shortage of staff.

Figure 16: A visibly dirty floor observed in one of the HCFs

The issue of cleanliness extended to the exterior environment for some of the HCFs. Cases of poor garbage handling and disposal were noticeable in this regard (Figure 17). Issues of staffing come to the fore as well in this regard. In one engagement in the Manzini region for instance, it was reported that the grounds man also served as the gate attendant for the facility and as such tended to neglect the environmental cleaning duties. Most of HCFs had vegetation overgrowth during the time of the assessment.

Figure 17: An observed case of poor garbage handling

With regards to appropriate and well maintained cleaning material, the JMP ladder rating placed this indicator at limited service. Inadequacy in cleaning material was as well confirmed by most of the HCF personnel that were engaged during the assessment. Where available, these materials were mostly in a bad state, as evidenced by observed dirty mops, brooms and broken buckets **(**Figure 18). It was also reported in most of the HCFs that refilling and replacement of cleaning materials is usually delayed, hence the insufficient mops (both colour coded and non-colour coded), cleaning buckets, detergents and disinfectants. For cleaning purposes, it was established during the assessment that generally the available cleaning materials could not meet the facilities' requirements in terms of quantities and condition. The main reason for this as reported by the HCF personnel was shortage of funds. As reflected in Figure 18, the storage of the cleaning material is also of concern with there being no designated storage space, an observation that was made in the four regions. In some instances materials were kept in the dry food storage rooms (Figure 19)

Figure 18: Dirty and poorly stored cleaning material

Figure 19: Observed cleaning material stored in a designated dry storage

Adequate and appropriate cleaning PPE was overall rated as no/unimproved service on the JMP ladder during the assessment. This rating was corroborated by the responses in the engagements and interviews with the HCF personnel in most of the facilities. It was reported during the discussions that PPE was not constantly available for the cleaning staff and in some cases was not available at all. In some instances

cleaners were provided with either only gowns or gloves whilst in other instances they used surgical gloves instead of heavy duty gloves. Water boots were barely provided in all the regions. In some facilities where PPE was available it was not in good condition, with old aprons, for instance, a common feature for the cleaners in these facilities. Some of the common reasons provided by the HCFs senior personnel were: to

- Short supply from national stores
- Regular absence of store man from work
- Cleaners were not directly employed by government

In terms of establishing a cleaning procedure, HCFs reported that they had no cleaning standards in place. This as well is in line with the JMP rating for this indicator, which overall is rated as no/unimproved service. The common practice in most of the HCFs is that cleaning is done once a day, with spot cleaning done during the course of the day as and when necessary, mainly in response to some spillages or other emergencies.

Interviews with HCFs personnel revealed that cleaning staff for most of the facilities is inadequate. A case was reported during the discussions where one cleaner had to clean both the HCF and the Home Affairs Department offices. Other elements the exacerbated the inadequacy of cleaning staff as gathered from the interviews with HCFs senior personnel include:

- High levels of absenteeism
- Government hiring freeze (retired and deceased staff not replaced)
- Lack of training and understanding of cleaning and disinfection procedures

For HCFs external environment which basically constituted the yard and grounds therein, it was reported by most of the HCFs that there was no designated grounds man to clean and maintain the facilities' yards.

In relation to the tracking mechanisms for IPC related material indicator, the overall JMP ladder rating was placed at limited service. Of this overall rating 18 (50%) of the HCFs were rated at basic/improved service for this indicator. Consistent with this rating, the responses from the interviews with the HCFs personnel revealed that some facilities had tracking systems and some did not. In the Shiselweni region, some HCFs actually reported that they utilised online tracking systems. For other facilities however they reported that they do not have score cards to track supplies. In some instances information on the tracking mechanisms could not be obtained because the store man servicing a particular facility would be based in another facility at the time the information was required.

Cleaning record keeping was rated no/unimproved service on the JMP ladder. Visits to the facilities did confirm this rating with most of the HCFs not providing any evidence of cleaning records. This was even true for facilities where indication was that cleaning was done on regular basis. For those facilities that had some records, the daily signing of these was found to be inconsistent. During the engagements with the senior HCFs personnel, it was indicated that of importance to them was more the standing cleaning schedule than the record keeping. They did indicate though that they were cognizant of the fact that it is good practice and that it was the duty of management to introduce and enforce cleaning record-keeping.

Laundry processing was another indicator that got a poor rating on the JMP ladder, with an overall placement on no/unimproved service. The assessment determined during the fieldwork that for some HCFs there was no laundry processing largely due to the size of the facility which would be small, thereby having no room for laundry amenities. It was actually reported in some facilities that cleaners have to take laundry to their places of residence for washing because there is no laundry room within the facility. In cases where the laundry room is available there is still issues around linen handling wherein there is no equipment in the form of washing machines, driers and irons. Where available, it was reported that this equipment is usually broken and not maintained. It was observed and reported as well that laundry transportation means were in short supply such that in some instances waste wheelie bins were used for linen transportation. It was also reported in most of the facilities that other challenges in relation to laundry processing were in relation to the insufficiency of detergents. This was a result of reduction in supply of the detergents for rationing purposes (from 25L to 5L). Issues of water availability (as noted under the water domain) also present a challenge for laundry processing. An observation was made for instance in one HCF in the Shiselweni region during the assessment fieldwork wherein the laundry room had no water supply. It was also observed that laundry rooms in most of the HCFs were relatively small in size (Figure 20). This presents a challenge when it comes to the segregation of clean and dirty laundry (Askarian, Heidarpoor, & Assadian, 2010).

Figure 20: A relatively small laundry room observed in one of the HCFs

From a linen distribution perspective, it was noted that most of the HCFs have no distribution schedule. Storage is also another issue when it comes to laundry and linen processing. A case was reported in one HCF in the Hhohho region where dirty linen get to be temporarily stored in the filing room. Furthermore,

some facilities had poor grey water drainage. Findings indicate that, there were no written protocol for linen processing in many facilities.

A majority (23) of the HCFs were rated as basic/improved service in relation to the sterilization equipment indicator. Overall however, the indicator was rated as limited service because the other 13 HCFs were rated as either no/unimproved service (5) or limited service (8). Concerns with regards to sterilization equipment in the HCFs were that it was old and rusty, not maintained and non-functional. These observations were largely made in the Hhohho and Shiselweni regions. Hot water and detergent supplies were observed to be insufficient in most HCFs. It was also noted that for most of the facilities there was no designated person tasked with sterilization and decontamination responsibilities. This was resultant from staff rotation wherein trained personnel were redeployed and as observed during the fieldwork some would take leave with no one to hold fort in their absence.

Although most of the HCFs had relatively clean kitchens, for a majority of them the flooring is made of non-smooth tiles (Figure 21). Concern in this regard is that the roughness of the floors could result in dirt being trapped thereby compromising the cleanliness levels, particularly as it has already been alluded to that cleaning materials and staff tend to be in short supply in most of the facilities.

Figure 21: An observed kitchen floor with non-smooth floor tiles

From a food handling equipment perspective, a majority (16) of the HCFs were rated as no/unimproved service, 11 rated as limited service, with only 9 rated as basic/improved service. Observations made during the assessment fieldwork largely substantiated these ratings, with most HCFs having food handling equipment that was not fully functional. Instances of raw and finished food being too close to each other were observed, raising concerns over possible food cross contamination. In some regions it was noted that there is no temperature gauge for dry storage. A case was reported in one HCF where the food warmer was

available but was non-functional due to insufficient space inside the kitchen. With regards to Food Handling Medical Certificates it was noted that these were updated by a few food handlers with most of them having not been examined or had expired certificates. The general observation during the assessment was that food handling PPE was not consistently worn by food handlers in most of the HCFs. In instances where it was used it was largely unsatisfactory, with handlers seen wearing black colours or incomplete gear. What was largely available and worn by food handlers as observed during the fieldwork was boots and hairnets. Change rooms for kitchen staff were however of concern during the assessment. Instances where dry food storages were used as change rooms as well as being storage for cleaning material were observed

Another gap was noted in the insufficiency of change rooms for the kitchen staff such that food was susceptible to contamination in dry storages that were also used as either change rooms or storing for cleaning material. It was observed as well that what was supposed to be cold storages in most of the HCFs tended to have temperatures ranging between 5 and 10 degrees Celsius.

4.6.3 Discussion of environmental cleaning and food findings

As already indicated, the mean rating for this domain on the JMP ladder was computed to be 1.2, thereby placing the whole domain at limited service overall in terms of rating. Of major concern in this regard are some of the provided reasons for the domain indicators performing poorly, which included shortage of staff, material, equipment, and space within the HCFs. Several challenges in HCFs lack of support staff emanate from governments hire freeze due to fiscal adjustments over the years. Similarly, adjustments have been made on the supply of cleaning essentials like detergents, mops, buckets, brooms and disinfectants to name a few. The non-compliance with WHO cleaning standards likely results in the spread of health care associated infections which further burdens the already strained health system when disease outbreaks occur. Healthcare-associated infections (HAI) are a significant burden globally, with millions of patients affected each year (Diaz, Eggerth, Enkhtsetse, & Savage, 2008)**.** These infections affect both high- and limited-resource healthcare settings, but in limited-resource settings, rates are approximately twice as high -15 out of every 100 patients versus 7 out of every 100 patients (Diaz, Eggerth, Enkhtsetse, & Savage, 2008).

It is well documented that environmental contamination in healthcare settings plays a role in the transmission of HAIs (Johannessen, et al., 2000). Storing of dry food products and cleaning material in the same room escalates the probability of infection in HCFs where these observations were made and where cleaning materials hang and lie in random places.Environmental cleaning is a fundamental intervention for infection prevention and control (IPC). It is a multifaceted intervention that involves cleaning and disinfection internal and external environment alongside other key program elements, e.g., leadership support, training, monitoring, and feedback mechanisms (Johannessen, et al., 2000). Human capacity and financial resources are critical at this phase in many HCFs judging from the unaesthetic view of most HCFs.

To be effective, environmental cleaning activities must be implemented within the framework of the facility IPC program, and not as a standalone intervention (Askarian, Heidarpoor, & Assadian, 2010). Environmental cleaning programs in healthcare facilities should involve resources and engagement from multiple stakeholders and departments, such as administration, IPC, WASH, and facilities management. They require a standardized approach, as well as strong management and oversight, to be implemented

effectively. The scope of an environmental cleaning program and its implementation can vary (e.g., in-house management versus external contract), based on the size of the facility and level of services provided. Comprehensive environmental cleaning programs are most important at healthcare facilities and higher tiers of healthcare, where the burden of HAIs is highest. It is essential that IPC programs advocate for and work with facility administration and government officials to budget, and operate and maintain adequate water, sanitation, and hygiene (WASH) infrastructure to ensure that environmental cleaning can be performed according to best practices.

4.7 Energy and environmental services

Access to reliable energy in health facilities is an important enabler of essential and quality health services. Electricity in particular is central to the effective running of healthcare facilities. Over and above lighting and heating, most of the healthcare equipment used in these facilities is electricity powered. The efficient use of energy in HCFs is of paramount importance because at no point in the operations of these facilities should electricity not be available. It is in this context that skill and coordination is required for efficient energy management in healthcare facilities because not only does it result in cost savings, it is also of paramount importance in the recovery process for patients (UED, 2021).

4.7.1 Energy and environment standards

In isolated inpatient settings (such as rural hospitals) and in temporary structures (such as cholera treatment centres), generators or solar panels and batteries are likely to be required and provision for these should be made. As a minimum, a safe type of kerosene or gas lantern and powerful hand torches should be available. Energy needs cover lighting, communications, medical devices/appliances, and staff housing. Natural light may be sufficient during the day and should be used where possible to reduce energy-consumption (WHO & UNICEF, 2019). In HCFs where upgrades to pumping systems are needed, there should be consideration of installing renewable energy for example solar energy. Similarly, in some cases where upgrades to heating systems are needed, renewable energy should be opted for. A backup source may be needed for medical devices, refrigerators, lighting and pumping water. The connected backup should turn on automatically if the routine power source is cut and sufficient budget must be available for fuel to power backup generators (UED, 2021).

Lighting for showers is necessary in all facilities where night-time services are provided and where there is not sufficient natural light to safely use the shower during the day. Similarly, lighting for toilets is necessary in all facilities where night-time services are provided and where there is not sufficient natural light to safely use the latrine during the day. For pleasant environmental aesthetics, buildings should be located and built using designs and materials that produce the best indoor conditions such as bigger windows, large overhangs for shade, taking into account the local climate and prevailing winds. Buildings can be improved with the effective use of blinds, opening and closing of doors and windows, planting of suitable vegetation around the building and other operational measures to help optimize indoor conditions. Where the climate allows, large opening windows, skylights and other vents can be used to optimize natural ventilation. Ceiling fans and small portable ventilators are not recommended as they dispense dust around the room. Increasing ventilation reduces reliance on air-conditioning.

To control diseases like malaria, insecticide-treated nets should be washed every 6 months if used only for patients with non-infectious diseases. For patients with infectious diseases such as cholera, mosquito nets are not advisable because the staff member needs access to the patient. Other methods such as indoor residual spraying or coils will be needed. Nets can only be provided exceptionally (patient request, patient comfort, etc.) and burned after use (Diaz, Eggerth, Enkhtsetse, & Savage, 2008).

4.7.2 Energy and environment in assessed HCFs

This domain was assessed on the basis of thirteen (13) indicators. These are:

- Facility has a functional and well-maintained electricity source
- Energy is sufficient for all electrical needs of the facility
- Sufficient energy is available for pumping water
- Sufficient energy is available for heating water
- Existence of a functional backup source of energy
- Energy-efficient lighting controls and energy-saving bulbs
- Delivery room is adequately lit, including at night
- Shower(s) are adequately lit, including at night
- Toilets are adequately lit, including at night
- Sufficient functioning environmental ventilation is available in patient care areas
- Beds have insecticide-treated nets to prevent mosquito-borne diseases
- Sustainable procurement (using a life cycle approach) is applied throughout the facility
- General environmental cleanliness

Of these 13 indicators, the majority (6) of them were on the overall rated as no/unimproved service on the JMP ladder. Five were rated as limited service, with only two getting an overall rating of basic/improved service. The two indicators that are performing as determined by the assessment are functional electricity source, wherein a total of 34 (94%) HCFs recorded a rating of basic/improved service, and sufficient energy for pumping water with 29 (81%) HCFs obtaining a rating of basic/improved service. Major contributors to the no/unimproved service ratings were indicators such as beds with insecticide treated nets (34 HCFs), energy-efficient lighting controls and bulbs, and adequately lit delivery room, both with 21 HCFs obtaining the no/unimproved service rating. The overall computed mean score for this domain was 1.3, resulting in a rating of limited service for energy in the assessed HCFs. Table 4.7 is summative presentation on the obtained ratings per indicator, as well as the domain computed mean.

Table 7: Energy and environment indicator assessment results

Indicators	no/unimproved service (n/%)	limited service (n/%)	basic/improved service (n/%)	Overall JMP ladder/service rating
Facility has a functional and well-maintained electricity source	2 (5.6)	0 (0.0)	34 (94.4)	basic/improved service
Energy is sufficient for all electrical needs of the facility	14 (38.9)	0 (0.0)	22 (61.1)	limited service
Sufficient energy is available for pumping water	3 (8.3)	4 (11.1)	29 (80.6)	basic/improved service
Sufficient energy is available for heating water	3 (8.3)	9 (25.0)	24 (66.7)	limited service
Existence of a functional backup source of energy	12 (33.3)	14 (38.9)	10 (27.8)	no/unimproved service
Energy-efficient lighting controls and energy-saving bulbs	21 (58.3)	15 (41.7)	0 (0.0)	no/unimproved service
Delivery room is adequately lit, including at night	21 (58.3)	2 (5.6)	13 (36.1)	no/unimproved service
Shower(s) are adequately lit, including at night	19 (52.8)	7 (19.4)	10 (27.8)	no/unimproved service
Toilets are adequately lit, including at night	6 (16.7)	24 (66.7)	6 (16.7)	no/unimproved service
Sufficient functioning environmental ventilation is available in patient care areas	14 (38.9)	0 (0.0)	22 (61.1)	limited service
Beds have insecticide-treated nets to prevent mosquito-borne diseases	34 (94.4)	1 (2.8)	1 (2.8)	no/unimproved service
Sustainable procurement (using a life cycle approach) is applied throughout the facility	16 (44.4)	2 (5.6)	18 (50.0)	limited service
General environmental cleanliness	2 (5.6)	20 (55.6)	14 (38.9)	limited service
Domain mean	1.3			limited service

Findings indicate that a large proportion of HCFs had functional and well maintained electricity sources wherein Eswatini Electricity Company (EEC) was the main source coupled with solar energy on a few occasions. Although electricity was available in all regions, there was a limitation in electricity sufficiency such that observations were made during the assessment of open distribution boxes, non-functional switches and plugs, as well as sockets without light bulbs (Figure 22-24).

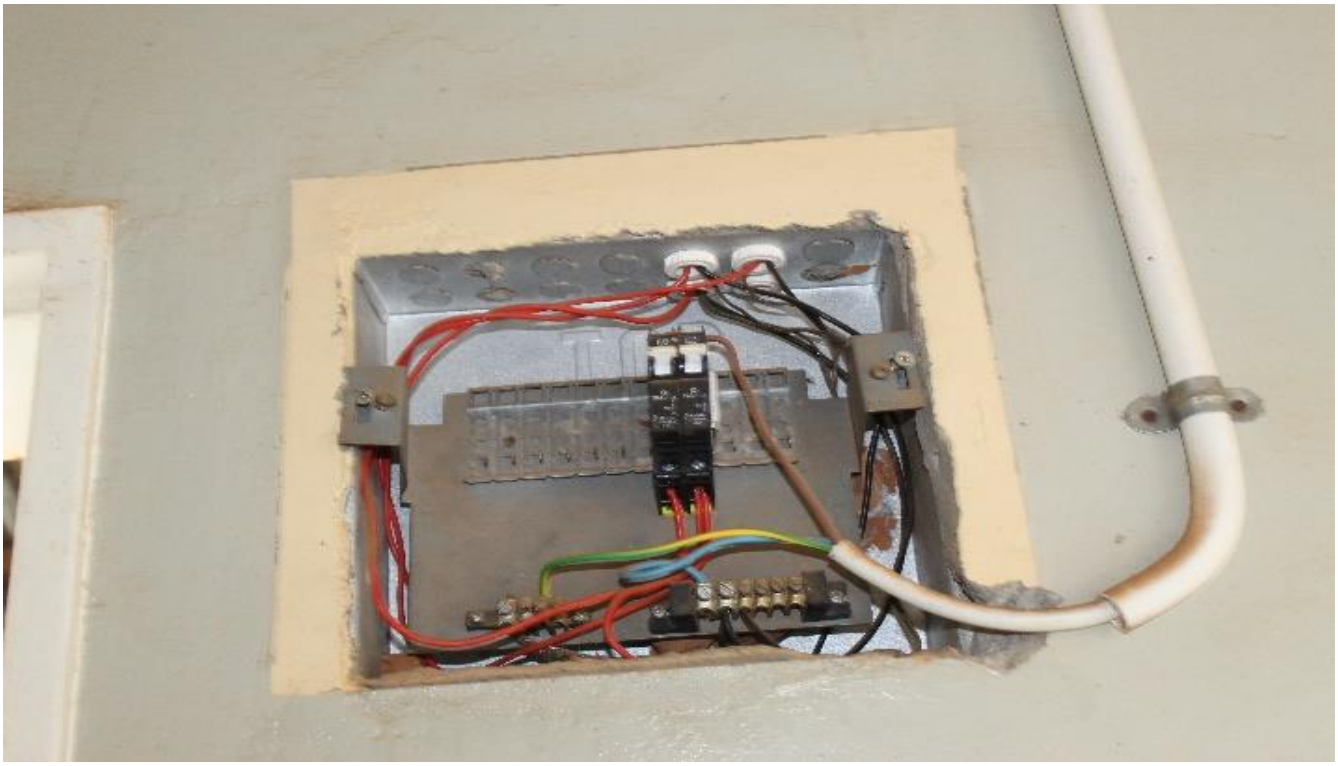

Figure 22: An open distribution box (DB) observed in one of the HCFs

Figure 23: A non-functional plug observed in one of the HCFs

Figure 24: A light socket without a light bulb as observed in one of the HCFs

In discussions with the HCFs senior personnel during the interviews, it was indicated in most of the facilities that there are challenges with regards to functional backup sources of energy. These were either not available, or where available they were non-functional due to mechanical breakdowns. Fuel shortages were also highlighted as a major issue for the functioning of back-up sources such as generators. Solar energy was rendered more reliable, but only a few HCFs had this source of energy back-up. HCFs mostly used Eswatini Water Services for water supply thus there were few facilities that needed to pump water and of those that had the need, pumping energy was available. The results revealed an inconsistency in the 4 regions in efficient lighting controls and energy-saving bulbs. Some rooms did not have lighting across the board.

Few HCFs offered delivery services. Although showers and toilets were wired there however were no bulbs available in most areas. In HCFs where pit latrines were used, these had no electrical wiring, and as such had no electricity lighting at night. Examples of these were found in the Manzini region. Water heating for these facilities is also a challenge.

As noted in the indicator JMP ladder rating, most of the facilities did have natural ventilation with 22 out of the 36 (61%) rated as basic/improved service for this indicator. HCFs are required to have sufficient natural ventilation. Natural ventilation is the use of natural forces to introduce and distribute outdoor air into or out of a building. These natural forces can be wind pressures or pressure generated by the density difference between indoor and outdoor air. Natural ventilation systems include having no obstacles on either side of the prevailing wind; the use of wind tower to extract wind and inducing air movement by density differentiation (WHO, 2009). For this assessment, observations were made where in some instances rooms were found to be have non-functional windows due to damages or designs that compromised air circulation

(Figure 25). For facilities that have mechanical ventilation in the form of extractors some were found to be non-functional at the time of the assessment (Figure 26).

Figure 25: A non-functional window observed in one of the HCFs

Figure 26: A non-functional extractor observed in one of the HCFs

Furthermore, few HCFs had admissions services and were in malaria endemic zone hence no insecticide-treated-nets were needed. It was revealed in the Manzini region that, the management had reported about

the unavailability of insecticide treated nets to the National Malaria Programme and HCFs await the resolution of procurement issues therein. In addition, a large proportion of HCFs had no sustainable procurement approach resulting in challenges in stock replenishment.

General waste was not prioritised in HCFs thus waste bins were either not strategically located and in some cases 25L buckets were used instead in one HCF (Shiselweni region). Similarly, in Manzini there were facilities that were not well groomed, the environment was visibly unpleasant (old wall painting, overgrown grass, old open bins) contributing to the un-aesthetic appearance of the health facility.

4.7.3 Discussion of energy and environment findings

HCFs are among the largest commercial consumers of electricity, relying on power for everything from water supply, water heating, temperature control, lighting, and ventilation to a huge range of clinical equipment. Poor access to electricity is a significant barrier to quality health care services in Eswatini wherein even getting access to warm water is a challenge. Generally, the lack of consistent, reliable electricity inhibits the use of medical equipment like heart rate monitors, dialysis equipment, constrains laboratory testing, and makes it difficult to properly sanitize (UED, 2021). Although few HCFs lack energy those that have limitations may face serious problems, including the spoiling of medicines and the inability to use essential medical and diagnostic devices. Even the lack of basic lighting and communications can complicate treatments, especially emergency procedures. Lack of electricity limits working hours and inhibits the deployment of medical technology. Recent reports have highlighted the importance of technology in health care and its potential to transform how health care is delivered in Africa (Ousman, et al., 2019). But most technology requires a reliable source of electricity, and that is often lacking.

Much of the discussion focuses on ways to improve electricity access for healthcare facilities, including the benefits and drawbacks of various approaches. Many organizations nowadays are working to enhance electricity access by connecting HCFs to solar-powered mini grids. Distributed, well maintained generators can reduce total reliance on the Eswatini Electricity Company (EEC) grid, as well as exposure to high electricity tariffs. Capacity, technical and financial resources need strengthening to realize benefit from these efforts. Access to reliable electricity in health facilities is an important enabler of quality, essential health services for women, children, and families, and is necessary to achieve the Sustainable Development Goal in both energy and health (Diaz, Eggerth, Enkhtsetse, & Savage, 2008).

4.8 Management and workforce services

Healthcare facilities are in many ways delicate, sensitive and to a larger extent scary spaces, particularly for the patients. The emotional and physical turmoil manifesting in these spaces does take a toll not only on the patients, but on all that are within them including the healthcare workers, visitors, and care-givers. It is in this context that within the healthcare fraternity one of the biggest challenges is bringing some level of calm and warmth to these painful spaces. It is on the backdrop of this realization that healthcare facility management is elevated as a major contributor that enhances patient and workforce experience thereby increasing recovery prospects from ailments.

4.8.1 Management and workforce standards

An improved management system emanates from leadership that demonstrates support for IPC programmes, ensures quality improvement and files management plan documents. This includes IPC

guidelines and SOPs on hand and respirator hygiene, PPE use and disposal, cleaning, disinfection, sterilization, healthcare waste management, etc. It is also within the management sphere to ensure that communication materials including information and health promotion posters are available and accessible for all within the health facility (Akter, 2000).

Management should have a protocol for monitoring staff exposure wherein the investigation team is alert and infection managed. Furthermore there should be compliance tools like registers, assessment tools and communication (Wafula, Musiime, & Oporia, 2019). For example, scorecards are required for recording IPC compliance such that it ensures IPC measures and equipment are put in place (Ousman, et al., 2019). IPC measures require that there be adequate cleaners and WASH maintenance staff, regular audits of hand hygiene and other critical IPC supplies. All these elements are within the remit of management.

To ensure adequate consistency of all IPC interventions, weekly supervision and, in some instances, daily supervision depending on the physical conditions of the facility should be conducted by trained IPC specialists (Ousman, et al., 2019). In addition, it is required that IPC focal person be supported by an equally trained IPC team or committee to monitor responsibilities and authority. IPC training should be for all staff members including healthcare workers and cleaning personnel, on at least standard precautions and additional precautions. Practical and theoretical sessions should be done within the last 6 months and the training register should have updated data in this regard. Staff is expected to receive continuous weekly in-service training through supervision and refresher sessions. HCF should have usable TOR for the facility IPC and team (AHRQ, 2016).

A person responsible for managing the supply chain for critical IPC supplies should be in place ensuring that required PPE is available and accessible to all staff at all times in sufficient quantities. The facility is expected to be able to estimate its consumption rate (supply used per week) for critical supplies, including PPE, hand hygiene supplies, and disinfection materials. Record keeping as discussed in earlier sections of this report becomes important in this regard.

4.8.2 Management and workforce assessment findings

The management and workforce assessment was premised on eighteen (18) indicators, these being:

- Sufficient natural ventilation
- Adequate bed spacing (1.5 m at least)
- Management tools are in place
- Adequate cleaners and WASH maintenance staff
- Regular audits of hand hygiene and other critical IPC supplies
- IPC training of all HCW and cleaners within 6 months
- Staff receive continuous weekly in-service training
- A dedicated WASH/IPC focal person and IPC team/committee is available
- The facility leadership demonstrate support for IPC programme
- There is usable TOR for the facility IPC and team
- Communication materials on PPE
- Required PPE available and accessible to all staff in sufficient quantity

- A protocol for HW's exposure and infection management is in place
- There is system of monitoring staff exposure and compliance
- Facility is able to estimate its consumption rate
- A person responsible for managing the supply chain for critical IPC supplies is in place
- Rationale use of PPE is practiced

On the JMP ladder, most facilities had these indicators rated as no/unimproved service or limited service. To such an extent, there is no single indicator for the management function that had an overall rating of basic/improved service. Of the 18 indicators, 13 had an overall rating of no/unimproved service on the basis of the number of facilities that were rated for each indicator. The other 5 indicators had an overall rating of limited service on the JMP ladder. Based on the computed mean, the overall rating for the management function was placed at 0.99 which borders on being limited service. The summary of the indicator rating on the basis of the number HCFs per JMP ladder rating criteria is provided in Table 4.8.

Table 8: Management and workforce indicator assessment results

Indicators	**no/unimproved service (n/%)**	**limited service (n/%)**	**basic/improved service (n/%)**	**Overall JMP ladder/service rating**
Facility has sufficient natural ventilation	3 (8.3)	11 (30.6)	22 (61.1)	limited service
Beds have adequate spacing from each other (1.5 m at least)	25 (69.4)	4 (11.1)	7 (19.4)	no/unimproved service
Management tools are in place (WASH/IPC score cards, management plan)	18 (50.0)	9 (25.0)	9 (25.0)	no/unimproved service
Adequate cleaners and WASH maintenance staff	4 (11.1)	19 (52.8)	13 (36.1)	no/unimproved service
Regular audits of hand hygiene and other critical IPC supplies	19 (52.8)	10 (27.8)	7 (19.4)	no/unimproved service
IPC training of all HCW and cleaners within 6 months	13 (36.1)	16 (44.4)	7 (19.4)	limited service
Staff receive continuous weekly in-service training	14 (38.9)	11 (30.6)	11 (30.6)	no/unimproved service
A dedicated WASH/IPC focal person and IPC team/committee is available	7 (19.4)	10 (27.8)	19 (52.8)	limited service
The facility leadership demonstrate support for IPC programme	7 (19.4)	25 (69.4)	4 (11.1)	no/unimproved service
There is usable TOR for the facility IPC and team	19 (52.8)	7 (19.4)	10 (27.8)	no/unimproved service
Communication materials on PPE	3 (8.3)	25 (69.4)	8 (22.2)	no/unimproved service
Required PPE available and accessible to all staff in sufficient quantity	0 (0.0)	29 (80.6)	7 (19.4)	no/unimproved service

A protocol for HW's exposure and infection management is in place	16 (44.4)	13 (36.1)	7 (19.4)	no/unimproved service
There is system of monitoring staff exposure and compliance	16 (44.4)	10 (27.8)	10 (27.8)	no/unimproved service
Facility is able to estimate its consumption rate	16 (44.4)	9 (25.0)	11 (30.6)	no/unimproved service
A person responsible for managing the supply chain for critical IPC supplies is in place	8 (22.2)	5 (13.9)	23 (63.9)	limited service
Rationale use of PPE is practiced	4 (11.1)	17 (47.2)	15 (41.7)	no/unimproved service
Domain mean	0.99			no/unimproved service

The findings revealed that most HCFs had adequate natural and mechanical ventilation with few poorly ventilated facilities where windows could not open to full capacity due to mechanical limitations such as window design. To improvise on air circulation, doors were regularly kept open.

Due to COVID, and the distancing requirements therein, many HCFs complied with the required bed spacing (at least 1.5m). However, some facilities had extra beds reserved for possible patients' influx thus increasing the possibility of overcrowding**.** There were HCFs that had incorrect bed spacing (1m) to accommodate more patients, particularly in Lubombo.

A majority of regions had a huge gap on improvement tools wherein there was a shortage of WASH/IPC FIT or IPC scores cards, quality improvement tools and management plans. For example 1 of 9 HCFs in Lubombo had screening, testing and quality improvement plans. At Shiselweni 1 out 9 assessed HCFs was found to have a reliable online management system.

A large proportion of facilities had a shortage of cleaners such that in a number of institutions there was 1 cleaner and at times a volunteer was responsible for cleaning. In the Hhohho region findings further highlighted the shortage of grounds men and EHOs because of no replacement and hiring freeze by the government and shortage of budget. Regular audits on hand hygiene and other critical IPC supplies were not observed in all the 4 regions. Those that attempted to comply with the standard conducted audit once a month. Records, however, were incomplete in this regard and others relied on the assistance of MSF in Shiselweni**.** One of the stated reasons was the regular absenteeism of the store men. In addition, in most of the assessed HCFs there was no evidence of healthcare workers and cleaners being trained on IPC standard

precautions within the past 6 months. In the Shiselweni region for instance only 2 out of 9 assessed HCFs indicated that training was done for their staff, and evidence in the form of attendance registers was provided in this regard. Similarly, weekly in-service training was practised in few facilities in the 4 regions.

The findings also revealed inconsistency in the availability of a dedicated WASH/IPC focal person and IPC team/committee or a corresponding authority. In most cases one or more elements were missing according to the facility requirements. For example most new nurses were not trained on IPC. In the Hhohho region, for instance, all the HCFs reported not having a dedicated WASH focal personnel within the facilities. The gap emanated from the absence of TORs and appointment letters therein. In one case in the Hhohho region the TOR was available but was not put to use. Findings indicated inconsistent WASH/IPC leadership support wherein it was stated in some instances that management became overwhelmed by COVID-19 and neglected IPC support. However they were keen to reintroduce the programme. In Shiselweni there was a HCF where there was no IPC programme and in the Hhohho region one facility stated that IPC was not a priority.

The findings indicated the shortage of IPC guidelines and SOPs in visible areas for all healthcare workers in the 4 regions. In areas where the latter were available the documents were inaccessible to healthcare workers. Most areas lacked communication materials in the regions, more-so the respiratory hygiene posters and how to use PPE. In many situations communication materials that fell-off the walls were not re-pinned. There is also a gap in the availability of PPE wherein there is regular stock shortage due to poor replenishment. In addition there are inconsistencies in stock cards updates and availability. This is resultant from limitations in keeping PPE consumption records. The short supply of PPE essentials was associated with theft as well as poor institutional arrangements. A large proportion of HCFs had no documented protocol for HCWs' exposure and infection management in place. In many occasions protocols were memorized but not available on display. Similarly, there was a gap in the system of monitoring staff exposure and compliance. Only post-exposure prophylaxis was readily available.

IPC training was inconsistent and absent in a large proportion of HCFs since COVID 19 has subsided such that at the time of assessment trainings took place once in a while. A large proportion of cleaners were not wearing PPE during the assessment and it was highlighted that since the decrease of COVID-19 staff stopped using PPE at all times.

4.8.3 Discussion of management and workforce findings

Healthcare management has garnered huge interest in recent times given the spectrum of elements that require managing in HCFs. The scope of Healthcare Management is increasing each day and it is true for the entire world (AHRQ, 2016). Healthcare workers are constantly adjusting and adapting to the ever evolving health atmosphere. COVID prevalence has recently emphasized the long outstanding gaps on WASH thereby exacting pressure of management. Essentially, healthcare management need strengthening as the pillar that needs to be in place to ensure that operations in the entire healthcare sector are maintained seamlessly (AHRQ, 2016). Solutions to the existing gaps are interlinked ranging from gaps in institutional arrangements (HCFs workforce availability and performance) to internal management constraints (monitoring record keeping, WASH infrastructure and support staff/HCWs work ethics) and intergovernmental constraints (budget and inter-ministerial support). Healthcare Management solutions are

more than one factor that contributes to the increasing demand in the healthcare sector. Some of these solutions include improved awareness about Healthcare Management services, health policies and enhancement in the demand for world class health care facilities in Hospital management (Askarian, Heidarpoor, & Assadian, 2010)**.** In an ever-changing world, healthcare management is essential to compete in the industry in providing better care to patients thus the need for strengthening in all the facets.

5. ASSESSMENT DISCUSSION AND CONCLUSION

This assessment described the status of WASH services in 36 HCFs including respective PHUs using the WASH FIT as a standardized assessment methodology. The findings revealed that, on average, 50% of HCFs did not have adequate WASH services in water, health care waste, hand hygiene, management and workforce. Although limited the situation was less challenging for Energy and environment; Environmental cleaning and food; Sanitation. More than 50% of the assessed indicators were unimproved on WASH service coverage in HCFs. To reduce the risk of infectious disease transmission in HCFs, immediate actions are needed to provide sufficient water for all users, disability-friendly sanitation facilities, hand washing facilities, waste collection, incineration strategies or waste treatment facilities, cleaning supplies, and financial resources for HCFs to manage WASH facilities.

In Eswatini, WASH in HCF Taskforce members should leverage their unique expertise to address the key gaps identified by WASH FIT assessment. For example, Ministry of Health, Ministry of Natural Resources and Energy, Ministry of Labour and Social Security, Ministry of Tinkhundla, Ministry of Finance, UNICEF and WaterAid need to join hands to facilitate rehabilitation of WASH infrastructure and strong reinforcing of good hygiene practices in close liaison with HCF management teams and various departments of the Ministry of Health. The engagement of consultants may be required to support HCFs on their compliance with WASH standards and guidelines. National research institution and the academic sector need to conduct field research to explore new technologies for efficient waste treatment, management, and improved hand washing practices. The Department of Disease Control and the Department of Environmental Health Services may play a vital role in ensuring that WASH in HCF interventions are linked with other key national priorities, such as cholera elimination by 2028, implementation of the national development strategy**,** and other WASH interventions in communities. One analytical contribution of this study was to classify HCFs by key cut-off points (i.e., no/unimproved service derived from <1.0 (mean score) or <50%; limited service (1.0-1.5)/ (50-75%); basic/improved service >1.5 (>75%))

This analysis contributed to the identification of specific gaps and priority intervention areas across WASH FIT domains and indicators. The cut-off points remain flexible and may be modified depending on the aim and purpose of WASH FIT users. While WASH FIT may not be a comprehensive tool, the potential utility and application of WASH FIT have been well-documented (Harhay, Halpern, Harhay, & Olliaro, 2009); (Hirai, et al., 2021). Moreover, WASH FIT will be further updated to accommodate additional topics, such as climate, occupational health, and gender as being discussed in the national climate change tables. Thus, WASH FIT may be scaled up in Eswatini and other countries as a key component of a WASH improvement methodology in HCFs. This investigation noted a number of limitations and areas for improvement. The assessment only covered 36 HCFs and their respective PHUs, the findings may not be generalizable. A larger sample size may be better suited to review the status of WASH service coverage at the national level and inform policy discussions. This study only applied WASH FIT methodology to assess the status of WASH conditions inn32 HCFs (and their PHUs), without implementing other steps such as the establishment of trained WASH FIT teams and the development of improvement plans for each HCF. Consequently, HCF management teams may not be fully owning the WASH FIT methodology for continuous improvements. Lastly, WASH FIT data were collected between 19 and 23 September 2022.

Despite the observed limitations, this assessment revealed that WASH FIT is a useful tool to assess the status of WASH services in HCFs in Eswatini. In Eswatini, many HCFs still struggle with access to key WASH services. Immediate WASH interventions are needed to minimize the risk of health related infections by infectious agents within HCFs. By scaling up WASH FIT and mobilizing financial resources, HCFs may be able to monitor WASH service gaps more systematically and address issues in a timely manner.

Bibliography

AHRQ. (2016). Planning and Managing Health Systems. *The New Public Health*, 614-640.

Akter, N. (2000). *Medical Waste Management: a review Bangkok.* Asian Institution of Technology. Thailand: Environmental Engineering Program, School of Environment, Resources and Development.

Askarian, M., Heidarpoor, P., & Assadian, O. (2010). A total quality management approach to healthcare waste in Namazi hospital. *Iran Waste Management, 30*(11), 2321-6.

Diaz, L., Eggerth, L., Enkhtsetse, S., & Savage, G. (2008). Characteristics of healthcare. *Waste Management Research, 28*, 1219-26.

Gadgil, A. (2018). Drinking Water in Developing Countries. *Energy and Environment Research*, 253-86.

Harhay, M., Halpern, S., Harhay, J., & Olliaro, P. (2009). Health care waste management: a neglected and growing public health problem worldwide. *Waste Management Research, 14*(11), 1414-17.

Hassan, M., Ahmed, S., Rahman, K., & Biswas, T. (2008). Pattern of medical waste management: existing scenario in Dhaka City, Bangladesh. *BMC Public Health, 8*(36), 36.

Hirai, M., Nyamandi, V., Shirihuru, N., Kanyawo, T., Mwenda, J., Dodzo, L., . . . Manangazira, P. (2021). Using the Water and Sanitation for Health Facility Improvement Tool (WASHFIT) in Zimbabwe: A Cross-Sectional Study of Water, Sanitation and Hygiene Services in 50 COVID-19 Isolation Facilities. *International Journal of Environmental Research and Public Health, 18*, 5641-5662.

ISO. (2021). *Building construction – Accessibility and usability of the built environment.* -: ISO 21542. Retrieved from http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=50498

Johannessen, L., Dijkman, M., Bartone, C., Hanrahan, D., Boyer, M., & Chandra, C. (2000). *Health care waste management guidance note.* Washington DC: World Bank.

Kayiwa, D., Mugambe, R., Mselle, J., Isunju, B., Ssempebwa, J., Wafula, S., . . . Yakubu, H. (2020). Assessment water, sanitation and hygiene service availability in healthcare facilities in the greater Kampala metropolitan area, Uganda. *BMC Public Health, 20*, 1768-1778.

Manyele, S. (2004). Effects of improper hospital-waste management on. *Afr Newsl Occup Health Safety, 14*(2), 30-33.

Nkonge, A., Mayabi, A., Kithinji, J., & Magambo, J. (2012). Knowledge, attitude and practice of health-care waste management and associated health risks in the two teaching and referral hospitals in Kenya. *Community Health, 37*(6), 1172-7.

Ousman, K., Kabego, L., Talisuna, A., Diaz, J., Mbuyi, J., Houndjo, B., . . . Fall, I. (2019). *The impact of Infection Prevent and control (IPC) bundle implementation on IPC compliance during the Ebola virus outbreak in Mbandaka/Democratic Republic of Congo: a before and after design.* Congo: BMJ Open.

Patil, G., & Parokhrel, K. (2015). Biomedical solid waste management in an Indian hospital. *Waste Management, 25*, 592-9.

UED. (2021). *Intergrating Health and Energy Efficiency in Health Facilities.* Department, US Energy. -: Office of Energy Efficiency and Renewable Energy.

Wafula, S., Musiime, J., & Oporia, F. (2019). Health care waste management among health workers and associated factors in primary health care facilities in Kampala City, Uganda: a cross-sectional study. *BMC Public Health, 19*(203), 1145-1167.

WHO. (2009). *Glove use information leaflet.* Geneva: World Health Organisation. Retrieved from https://www.who.int/gpsc/5may/Glove_Use_Information_Leaflet.pdf

WHO. (2009). *Guidlines on hand hygiene in health care.* Geneva: World Health Organisation. Retrieved from https://www.who.int/gpsc/5may/tools/9789241597906/en

WHO. (2009). *Natural Ventilation for Infection Control in Health-Care Settings.* Geneva: World Health Organisation. Retrieved from http://WHO/hcf/WASH%20Literature/WHO%20ventilation%20standards.pdf

WHO. (2017). *Drinking water quality.* Geneva: World Health Organisation. Retrieved from https://www.who.int/water_sanitation_health/publications/drinking-water-quality-guidelines-4-including-1st-addendum/en/

WHO. (2018). *Water and Sanitation Standards for Health Settings.* Geneva: World Health Organisation. Retrieved from https://www.who.int/water_sanitation_health/publications/drinking-water-quality-guidelines-4-including-1st-addendum/en/

WHO, & UNICEF. (2019). *Wash in Health Care Facilities, Global Baseline Report.* Geneva: World Health Organisation and United Nations Childrens Fund.

ANNEX A

List of 36 Health Care Facilities under study for WASHFIT

Region	Facility
Shiselweni	1. Mashobeni
Shiselweni	2. Nhlangano PHU
Shiselweni	3. Nhlangano Health Care
Shiselweni	4. Dwaleni
Shiselweni	5. Matsanjeni Health Care
Shiselweni	6. Matsanjeni PHU
Shiselweni	7. The Luke Commision
Shiselweni	8. Hlathikhulu PHU
Shiselweni	9. Hlathikhulu Government Hospital
Lubombo	1. Siphofaneni
Lubombo	2. Mafutseni Clinic
Lubombo	3. Malindza
Lubombo	4. Lomahasha
Lubombo	5. Mpolonjeni
Lubombo	6. Sithobelweni
Lubombo	7. Bholi
Lubombo	8. Khuphuka Clinic
Lubombo	9. Tikhuba
Hhohho	1. Dvokolwako Health Care
Hhohho	2. Hhohho Police Clinic
Hhohho	3. Lobamba Clinic
Hhohho	4. Mangweni Clinic
Hhohho	5. Mbabane Male Wellness Clinic
Hhohho	6. Mkhuzweni HC
Hhohho	7. Pigg's Peak Gov
Hhohho	8. Pigg's Peak PHU
Manzini	1. AHF LaMvelase
Manzini	2. AHF Matsapha
Manzini	3. Pschatric
Manzini	4. Mankayane
Manzini	5. King Sobhuza ii Clinic
Manzini	6. Lamvelase Zombodze
Manzini	7.Hluthi Clinic
Manzini	8.Luyengo Clinic
Manzini	9.Mankayane PHU
Manzini	10. Moti

Date of visit	
Name of Health Care Facility	
Name of respondent	
Inkhundla	
Name/type facility (Clinic, Health Centre, Hospital)	
Ownership of the facility: Gov't/private/NGO	
Services offered by Facility	
Number of Health Care Workers (Male, Females)	
Number of non-professional health workers	
Bed capacity	
Average out-patients per day	
Average number of communities serviced by the Facility	
If Facility is a mother facility, how many baby facilities does it have?	
Presence of an isolation room (yes/no): (non-covid facility)	
On-site treatment of COVID-19 cases (yes/no)	
Does the facility have a budget for WASH services operations and maintenance	
Does the Facility have WASH Focal Person?	
If no what are the reasons (Type of facility, financial constraints, hire freezing, proximity of facilities, other)	
Does the facility have IPC Focal person?	
Does the Facility have IPC Committee?	
Has the IPC Committee been trained?	
Does the facility have a dedicated Plumber onsite?	
If no, what are the reasons: (type of facility, hire freeze, other)	

ANNEX B

Demographic Data of Health Care Facilities

ANNEX C

Summary of gathered data

Water: water accessibility; water quality test on (E. coli and chlorine); shower/bathing area conditions including accessibility, segregation according to (gender, patient and staff), bathing area function condition; internal water quality testing routine for (primary, backup supplies) and water saving strategies (reduce, reuse, harvesting).

Sanitation: toilet/latrine sufficiency i.e facility to patient ratio (1:20 for inpatients and a minimum of 4 for outpatients); segregation according to (gender, inpatients, outpatients, staff); inclusivity (disability and child sensitive); cleaning records and waste water management of black/grey water (collection, transport, treatment) onsite/offsite.

Health care waste: assigned trained HCW, 3 coded bins (covered, labelled); waste segregation at (collection, treatment, disposal), safe disposal of infectious waste (incinerator or treatment technology); infectious waste stored in safe storage and treated in 24hrs; water records, SOP/IPC guidelines and PPE for handling waste (heavy duty gloves, rubber boots, aprons, masks).

Hand hygiene: sufficient and functional hand hygiene station (point of entry, point of care, waiting areas, PPE removal stations); segregated stations for (visitors, patients, staff); hand hygiene promotion material at strategic areas; hand hygiene compliance (documented and done quarterly) and records for supply refills.

Environmental cleaning and food: Clean surfaces (internal i.e floors, external); manage cleaning utensils (bucket, colour coded mops, cleaning cloths, soap, disinfectants); designated equipment storage, sufficient cleaning PPE (heavy-duty gloves, safety glasses, rubber boots, aprons, and mask); cleaning procedure (routine in patients' rooms, after patients' discharge, frequently touched areas, high risk areas); standard on cleaning frequency (visible cleaning records) and sufficient cleaning staff; supply monitoring (stock cards). Trained person for decontamination and sterilization; sterilization equipment availability (autoclave, poupinel and accessories needed for sterilization). Availability of cleaning supplies (liquid detergent, disinfectant, soft brush, washing sink, running water (hot and cold) for cleaning of medical equipment. Laundry management (segregation of soiled and clean linen); adequate laundry staff, adequate laundry machinery; visible laundry IPC guidelines. Appropriate food management (safe handling equipment, correct food storage (wet and dry), adequate water supply, appropriate garbage handling/disposal, food handling PPE and Medical Examination Certificate within 6 months).

Energy and environment: Functional and well-maintained electricity source; sufficient energy for (water pumping and heating, lighting and stand-alone devices); functional backup source of energy; energy efficient (energy saving bulbs); functional at night lighting in (delivery room, toilets and showers). Sufficient ventilation in patient care areas. Insecticide-treated nets on beds in malaria-endemic areas. Sustainable procurement. Clean general aesthetic (painting, environmental greening, litter management, appropriate equipment storage).

Management and workforce: Dedicated WASH/IPC focal person and IPC team or committee; usable TOR for the facility IPC and team; leadership support for IPC programme; available IPC guidelines and SOPs; Communication materials on PPE use including poster (respiratory hygiene); required PPE available and accessible to all staff at all times, protocol for HW's exposure and infection management, system of monitoring staff exposure and compliance; estimate PPE consumption rate (supply used per week) for critical supplies, including PPE, hand hygiene supplies, and disinfection materials (Ask facility to provide consumption rate estimates); A person responsible for managing IPC supplies; rationale use of PPE is practiced; sufficient natural ventilation; beds adequately separated from each other (1.5 m at least); improvement tool in place: such as WASH/IPC FIT or IPC Score card tool or other quality improvement and management plan; adequate cleaners and WASH maintenance staff; regular audits of hand hygiene

and other critical IPC supplies; IPC training for all staff ; staff receive continuous weekly in-service training through supervision and refresher sessions.

ANNEX D

1

WASH FIT TECHNICAL ASSESSEMENT FORM FOR HEALTH CARE FACILITIES (WATER)

Name of Data Collector: _____

Name of Health Care Facility: _____ **Name of respondent:** _____

Date of Assessment: _____

Key informant interviews may be conducted with Biomed/ Matron/ Sister in charge/ administrator

#	AREA	Indicator WASH + IPC FIT	Question priority to assess (Required or optional)	Data collection method	Meet target 2 points	Partially meet target 1 point	Does Not Meet Target 0 point	Result (0, 1 or 2)	AGREED ACTION and remark (eg specific note of the result)
1	Water	An improved water supply is piped into the facility or located on premises	Required	observation and interview	Water piped inside the facility to all high-risk areas (maternity, operating room/OR, intensive care/ICU, consultation rooms, kitchen)	Water is piped inside but not to all high-risk areas	There is no piped water supply		
2	Water	A drinking water station with safe drinking water is available and functioning at all times in main waiting areas and/or entrance to each ward and in all rooms where patients stay overnight or receive care	Required	Random interview with staff, observation	A reliable drinking water station is present at all times at required locations	A reliable drinking water station is present sometimes, or only in some places or not available for all users	A reliable drinking water station is not available		
3	Water	There is water storage/tank sufficient to cover water needs for at least 48 hours during main water shortages (refer to page xx	Required	Interview with facility IPC/WASH focal person, observation, registers to know max. number of	Yes, water storage is sufficient to meet the needs of the facility for 2 days	Water storage meets more than 75% of the needs of the facility for 2 days	Water storage meets less than 75% of the needs of the facility for 2 days	Water	

ANNEX E

	A	B	C	D	E	F	G	H	I	J	K	L
1	Region	Facility	Facility type:	Ownership	Num_HCW	Num_supStaff	B_capacity	Av-pat/day	Av-com-serv	Num-bbyF	Isol Room	COVID tre
2	Shiselweni	1. Mashobeni	1	1	5	8	0	48	10	0	2	
3	Shiselweni	2. Nhlangano PHU	2	1	5	1	0	70	4	9	2	
4	Shiselweni	3. Nhlangano Health Care	3	1	107	39	99	200	4	9	1	
5	Shiselweni	4. Dwaleni	1	1	3	2	0	98	7	0	2	
6	Shiselweni	5. Matsanjeni Health Care	3	1	48	33	57	100	25	5	1	
7	Shiselweni	6. Matsanjeni PHU	2	1	16	6	0	35	25	5	2	
8	Shiselweni	7. The Luke Commision	4	2	110	550	90	100	10	1	1	
9	Shiselweni	8. Hlathikhulu PHU	2	1	15	8	0	95	13	13	2	
10	**Shiselweni**	**9. Hlathikhulu Government Hospital**	**4**	**1**	**241**	**83**	**375**	**150**	**13**	**13**	**2**	
11	Lubombo	1. Siphofaneni	1	1	77	12	0	85	10	0	1	
12	Lubombo	2. Mafutseni Clinic	1	1	6	2	0	50	6	0	2	
13	Lubombo	3. Malindza	1	1	6	4	0	90	9	0	2	
14	Lubombo	4. Lomahasha	1	1	9	22	0	100	12	0	2	
15	Lubombo	5. Mpolonjeni	1	1	6	9	0	100	6	0	2	
16	Lubombo	6. Sithobelweni	3	1	78	42	90	166	4	3	1	
17	Lubombo	7. Bholi	1	1	8	26	0	150	6	0	1	
18	Lubombo	8. Khuphuka Clinic	1	1	6	9	0	60	7	0	1	
19	**Lubombo**	**9. Tikhuba**	**1**	**1**	**4**	**12**	**0**	**100**	**4**	**0**	**2**	
20	Hhohho	1. Dvokolwako Health Care	3	1	61	51	68	111	6	4	2	
21	Hhohho	2. Hhohho Police Clinic	1	1	8	2	0	65	2	0	2	
22	Hhohho	3. Lobamba Clinic	1	1	20	23	0	150	4	0	2	
23	Hhohho	4. Mangweni Clinic	1	1	7	13	0	100	9	0	1	
24	Hhohho	5. Mbabane Male Wellness Clinic	1	1	5	3	0	17	7	2	2	
25	Hhohho	6. Mkhuzweni HC	3	1	68	74	62	150	10	4	1	
26	Hhohho	7. Pigg's Peak Gov	4	1	85	76	220	150	24	24	1	
27	**Hhohho**	**8. Pigg's Peak PHU**	**2**	**1**	**13**	**8**	**0**	**30**	**3**	**1**	**2**	
28	Manzini	1. AHF LaMvelase										