



IRC

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Evaluation of Water, Sanitation, Hygiene and Environmental Conditions in 40 Healthcare Facilities in Kabarole District, Uganda

Baseline Report

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LATEX EXAMINATION GLOVES
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Acronyms

CDC	Centers for Disease Control and Prevention
DHI	District Health Inspector
DHO	District Health Office
FGD	Focus group discussion
HAI	Healthcare-associated infection
HCF	Healthcare facility
IPC	Infection prevention and control
JMP	Joint Monitoring Programme
KAP	Knowledge, attitudes and practice
NGO	Non-governmental organization
PHC	Primary Health Care grants
PPE	Personal protective equipment
SDGs	Sustainable Development Goals
UNICEF	United Nations International Children's Fund
WASH	Water, sanitation and hygiene
WHO	World Health Organization

Acknowledgments

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1. Introduction

1.1 Background

A recent global assessment of water, sanitation, and hygiene (WASH) in healthcare facilities (HCFs) in 78 low- and middle-income countries estimated that 50% of healthcare facilities lacked access to an improved water source, 39% had inadequate handwashing facilities, 33% lacked improved sanitation, and 39% had inadequate infectious waste disposal [1]. An evaluation of nationally representative data from six countries (Burkina Faso, Ethiopia, Ghana, Mali, Niger and Uganda) estimated that only 2% provided all four¹ of the required services – water, sanitation, hygiene, and waste disposal [1].

In Uganda, [Joint Monitoring Programme \(JMP\)](#) data from 2016 showed that countrywide, 31% of health facilities met basic standards for water, 12% of health facilities met basic standards for sanitation, and 43% met basic standards for medical waste management [2]. It is likely that rural HCFs have even more limited WASH infrastructure.

A lack of safe water, toilets, handwashing facilities, and adequate waste management pose significant health risks to patients and healthcare providers. Poor WASH conditions increase the risk of healthcare-associated infections (HAI) through contaminated water, food, hands, and medical equipment. HAI in low- and middle-income countries are two to twenty times higher than in developed countries, affecting between 2% to 15% of hospital patients, and 6% to 46% of surgical patients; the cumulative incidence of surgical site infections ranges from 2.5% to 30.9% [3], [4]. The recent Ebola epidemic in West Africa highlighted the dangerous consequences of the lack of handwashing facilities as a first line of defense for healthcare providers [5].

In recognition of these challenges, the [United Nations General Assembly](#) included 100% coverage of WASH infrastructure for HCF in low-income countries by 2030 among the post-2015 Sustainable Development Goals (SDGs). This issue is gaining further momentum in the international community; for example, the UN Secretary General and the Director General of the World Health Organization (WHO) have both described improving WASH in HCFs as an urgent priority, and WHO and UNICEF launched a strategic plan to mobilize a global effort to provide 100% coverage of WASH infrastructure in HCFs [6].

1.2 Project partnership and implementation plan

1.2.1 IRC

IRC is an international think-and-do-tank with a vision of ensuring that every person in the world has access to clean and safe water, sanitation and hygiene (WASH) services. IRC is a policy and lobbying organization working in strategic partnership with governments, NGOs, and corporate partners for the sustainable implementation of improved, low-cost water supply, sanitation and hygiene in developing countries.

Since its founding in 1968, IRC has worked with decentralized and national governments to facilitate the sharing, promotion and use of relevant knowledge, so that governments, professionals and organizations can explore the challenges of establishing viable services, conducting research and presenting findings; create communities that can become sustainable by working with governments and others to create long-term affordable services; and influence policy makers, ensuring that WASH is high on the agenda of national and global decision makers.

IRC has operated in Uganda since 2006 and is legally registered with the Ministry of Internal Affairs (National Bureau for NGOs), as an International NGO (INGO). For the last eight years, IRC has implemented a diverse portfolio of projects and activities mainly in the Rwenzori region, Northern Uganda, and at the national level with the Ministry of Water and Environment and other key WASH stakeholders. IRC's focus has been on:

- Strengthening national and district-level learning processes on WASH.
- Sustainable sanitation and hygiene including action research and learning on sanitation, monitoring sanitation and promoting effective WASH in schools, including menstrual hygiene management.
- Sustainable access to drinking water services in the rural areas that includes piloting and testing new ways of working for the delivery of rural water services in Uganda.
- Good governance including accountability and transparency in WASH. IRC's work and contributions have been documented and there is evidence that the interventions have contributed to addressing the challenges in WASH through action research, action learning, knowledge management and communication.

However, the key underlying causes and constraints that still prevent many people in Uganda from enjoying their right to safe, clean, accessible and long-lasting WASH services still exist and need to be addressed.

¹ An improved water source, handwashing facilities, improved sanitation and adequate infectious waste disposal

In Kabarole District, IRC is working on a district-wide approach to improve WASH in HCFs by collaborating with central and local government partners and other stakeholders to plan for and implement improvements to WASH in communities and institutions.

1.2.2 The Centers for Disease Control and Prevention

The Centers for Disease Control and Prevention (CDC) is a federal agency of the United States that conducts and supports health promotion, prevention, and preparedness activities with the goal of improving overall public health. The CDC team has over 20 years of experience supporting WASH in rural HCFs. CDC's engagement in the project in Kabarole District consists of:

- Conducting a baseline assessment to measure the status of water, sanitation, hygiene, and waste management in HCFs that includes:
 - Health facility observations and interviews with health facility directors
 - Measuring the knowledge, attitudes, and practices around hand hygiene, drinking water, and waste management of clinical and cleaning staff
 - Determining challenges faced by healthcare providers, cleaning staff, patients, and HCF directors through qualitative interviews and focus group discussions
 - Measuring the quality (*E. coli* and chlorine residual testing) of drinking and source water
 - Observing rates of health worker hand hygiene before and after patient contact
- Providing partners with assessment results and recommendations through reports, score cards, and presentations
- Providing technical assistance to partners on program design and development as needed
- Conducting follow-up assessments after implementation to assess progress

2. Methods

2.1 Evaluation design

CDC, IRC, and the DHO conducted a baseline assessment of Kabarole District health centers in August and September 2018. At each assessed health center, CDC and partners conducted in-depth quantitative assessments, source and stored water testing for free and total chlorine residuals and *E. coli* contamination; knowledge, attitudes, and practices (KAP) surveys of health providers and cleaning staff; focus group discussions or key informant interviews with health providers, cleaning staff, and patients; and observations of clinical staff hand hygiene practices.

2.2 Project setting

The baseline assessment took place in 40 health centers in Kabarole District, Uganda, including all 30 public health centers and 10 private health centers. Evaluation subjects included HCF directors, healthcare providers (including health extension workers), health center cleaning staff, and health center patients as applicable.

2.3 Data collection

There were several components of the evaluation:

- **HCF evaluation:** Enumerators completed the HCF evaluation form by interviewing the health facility in-charge and conducting observations around the health facility. The evaluation form was comprised of questions about general HCF characteristics and management; water supply; sanitation facilities; hygiene infrastructure and practice; infection prevention and control (IPC) supplies and practices; and waste management infrastructure and practices. The HCF evaluation form was informed by indicators found in the Water, Sanitation, and Hygiene Facility Improvement Tool (**WASH FIT**) developed by WHO.
- **Water testing:** Enumerators tested free and total chlorine using HACH colorimeters on-site at each HCF. CDC staff used Compartment Bag Tests (CBTs, www.aquagenx.com) to determine the presence or absence of *Escherichia coli* (*E. coli*).
- **Knowledge, Attitudes, and Practices (KAP) assessment:** Enumerators interviewed clinical staff members about their knowledge, attitudes, and practices regarding hand hygiene, drinking water treatment, and waste management practices. An additional KAP was conducted with cleaning staff at the health facilities.
- **In-depth interviews:** A qualitative researcher from Mountains of the Moon University conducted in-depth interviews with health center directors, staff, and cleaners. Interviews centered on their perceptions of WASH at their health centers and the challenges to managing WASH.
- **Focus Group Discussions (FGDs):** A qualitative researcher from Mountains of the Moon University conducted focus group discussions with patients. The FGDs focused on patient experience at health centers, their opinions of the health center environment, hand hygiene, sanitation, and water availability.
- **Handwashing observations:** Two enumerators completed observations of handwashing before and after patient contact.

The questionnaires were developed in English and programmed into SurveyCTO software for smartphone data collection. In-depth interviews and FGDs were conducted in English or Rutooro (the local language) as appropriate. In-depth interviews and FGDs were transcribed and translated to English as needed.

2.4 Sampling

2.4.1 HCF assessments

We conducted the HCF assessment at 40 health centers. At each health center, we directed our questions to the in-charge or their designee.

2.4.2 Knowledge, attitudes, and practices (KAP) assessments

For the healthcare provider KAP survey, we selected approximately 50% of healthcare providers at each health center, distributed proportionally across the different types of healthcare provider (doctors, nurses, health officers, etc.) for a total of 74. All healthcare providers present the day of the survey were eligible for inclusion.

For the cleaning staff KAP survey, we selected one cleaning staff member from each health center that had a cleaning staff member present for a total of 22 cleaning staff KAP surveys. All cleaning staff present on the day of the survey were eligible for inclusion.

For both KAP surveys, we randomly selected participants using a random number generator.

2.4.3 Hand hygiene observations

To calculate the sample size required for the hand hygiene observations, we assumed that handwashing compliance rate would increase from 5% at baseline to 20% at follow-up. With this assumption, a confidence level of 95%, and power 90% in a design with 10 repeated opportunities observed per person at both baseline and follow-up, we calculated a sample size of 56 healthcare providers among the 20 randomly chosen health clinics. The number of people selected in a clinic was set to be proportional to health clinic size (2 to 5 people per clinic). We assigned each staff member a number and used a random number generator to select participants.

2.4.4 Healthcare provider, director, and cleaning staff interviews

The health center director, one healthcare worker, and one cleaning staff member (where present) were selected from four health centers for in-depth interviews for a total of 17 interviews. We selected the health centers based on their WASH status as determined by survey data, with the aim of selecting health centers with varied WASH statuses and varied health center levels (HC II, III, IV, and hospital).

2.4.5 Patient focus group discussions

For the patient focus group discussions (FGDs), we recruited 2-4 male and female patients waiting for outpatient services at each of the three chosen health centers for a total of three focus group discussions.

2.5 Data analysis

We analyzed quantitative data using SAS version 9.4 and qualitative data using MAXQDA.

2.5.1 HCF- and district-level coverage calculations

To calculate handwashing station coverage at the HCF-level, the denominator was the total number of rooms where healthcare providers came in physical contact with patients and locations where providers handle lab specimens or medication. The numerator was the number of handwashing stations present in those rooms. To calculate drinking water coverage at the HCF-level, the denominator was the total number of waiting areas and rooms where patients spent the night or took oral medication. The numerator was the number of drinking water points present in those rooms. To calculate waste coverage at the HCF-level, the denominator was the total number of rooms where healthcare providers came in physical contact with patients, providers handled lab specimens or medication, patients spent the night, and patients took oral medication. The numerator was the number of those rooms with appropriate waste disposal—at least two segregated bins and a sharps box.

These calculations gave us the percent coverage for each HCF, but to determine district-level coverage numbers, we calculated the median HCF-level percent coverage and the range across all HCFs in the district.

2.6 Ethical considerations

The CDC Institutional Review Board determined that this activity was non-research because it involved the evaluation of accepted public health practice. In Uganda, the evaluation protocol was approved by the Uganda Virus Research Institute and Uganda National Council of Science and Technology.



WOMEN

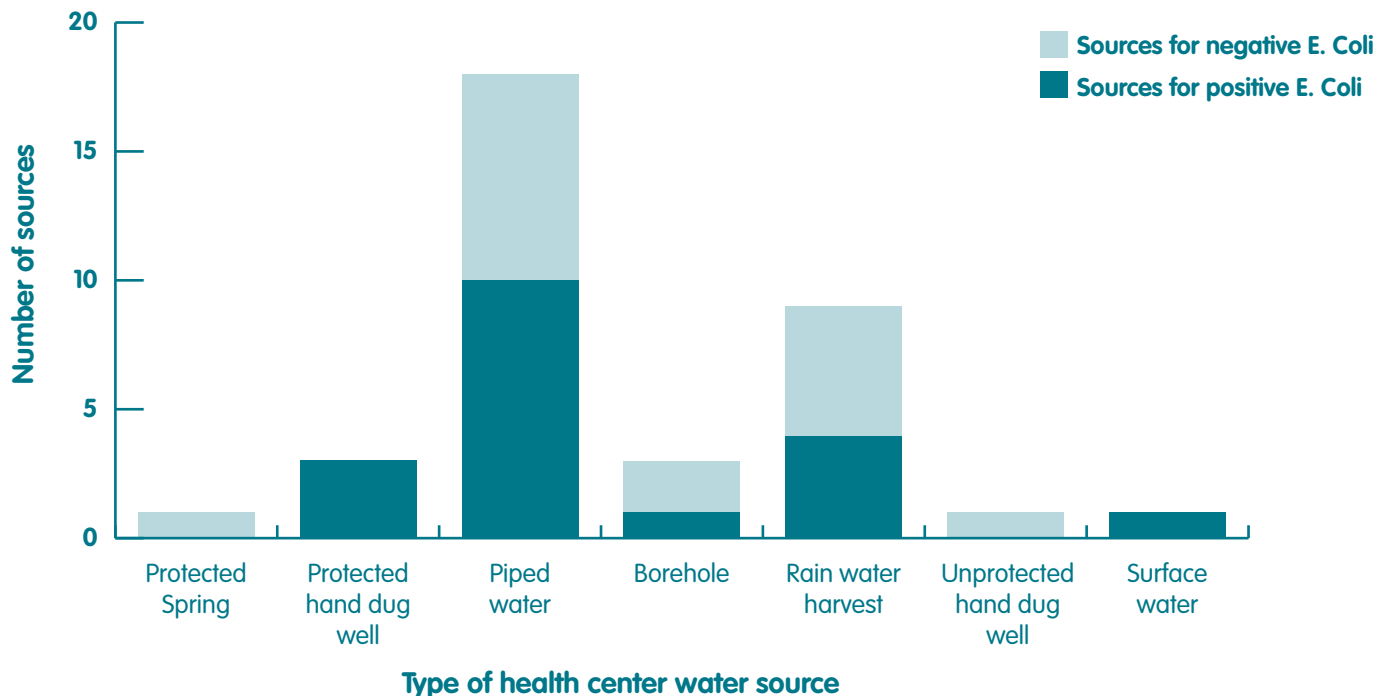
3. Results

3.1 Health center assessments

We visited 40 health centers in Kabarole District, including 16 HC IIs, 21 HC IIIs, 2 HC IVs, and 1 hospital. Health centers reported a monthly average of 488 outpatient consultations, 0 admissions, and 5 deliveries [Table 7.1.1]. The majority of facilities had electricity (75%), and of those with electricity, 45% reported interruptions.

Half of health centers used piped water as their main source of water, and 25% of health centers used rainwater harvesting as their main source [Table 7.1.2]. The majority (78%) of health centers could access their main source on facility premises. Of those facilities without on-site access, people left the HCF to obtain water in 56% of health centers. The majority of health centers (73%) experienced interruptions to water access, usually due to seasonal availability (62%). Sources of 8 (42%) health centers did not have water available for three or more months of the year. Most health centers (68%) used water from a secondary source, either as a supplement to the primary source (41%) or when the primary source was not available (52%). Water was regularly stored at many facilities (35), but storage capacity only met the needs of the facility for two or more days in 22 facilities. Of the 37 main water sources tested, 57% were contaminated with *E. coli*. Figure 1 shows the distribution of positive *E. coli* results by type of water source.

Figure 1 Health center primary source water quality by type of source (n=36)



Drinking water was provided to patients at least some of the time in 30 (75%) health centers, and to staff in 18 (45%) health centers [Table 7.1.3]. Enumerators observed the presence of drinking water at the time of the visit in 30 (75%) health centers. However, overall median coverage of appropriate drinking water stations (piped tap or a covered container with a tap) with water present across the district was 0% (range 0-33). At least one drinking water container tested positive for *E. coli* in 4 health centers, and at least one drinking water container had detectable free chlorine residual in 7 (18%) health centers.

The majority of health centers (93%) had at least one toilet/latrine present [Table 7.1.5]. Of all 134 toilets/latrines in the district, only 1 (1%) was present inside a patient care room, 30 (22%) were present inside the facility but not in a patient care room, and 103 (77%) were present outside but within the health center grounds (nearby the health center) [Table 7.1.5]. Some toilets (34%) were not separated between staff and patients and the majority (60%) were not separated by user sex. Most toilets (62%) had no handwashing station within 5 meters, and only 26 (19%) had handwashing stations with soap and water present. Toilets were either flush toilets (12%), pit latrines (62%), VIP latrines (24%), or EcoSan toilets (2%). When assessed for cleanliness, toilets ranged from clean (34%), to somewhat clean (50%), to not clean (16%). No toilets met global standards for menstrual hygiene management or accessibility to people with limited mobility. The median number of users (including deliveries, non-deliveries, caregivers, and staff) per improved, usable (locked, functional, and private) toilet was 1 (range 0-6).

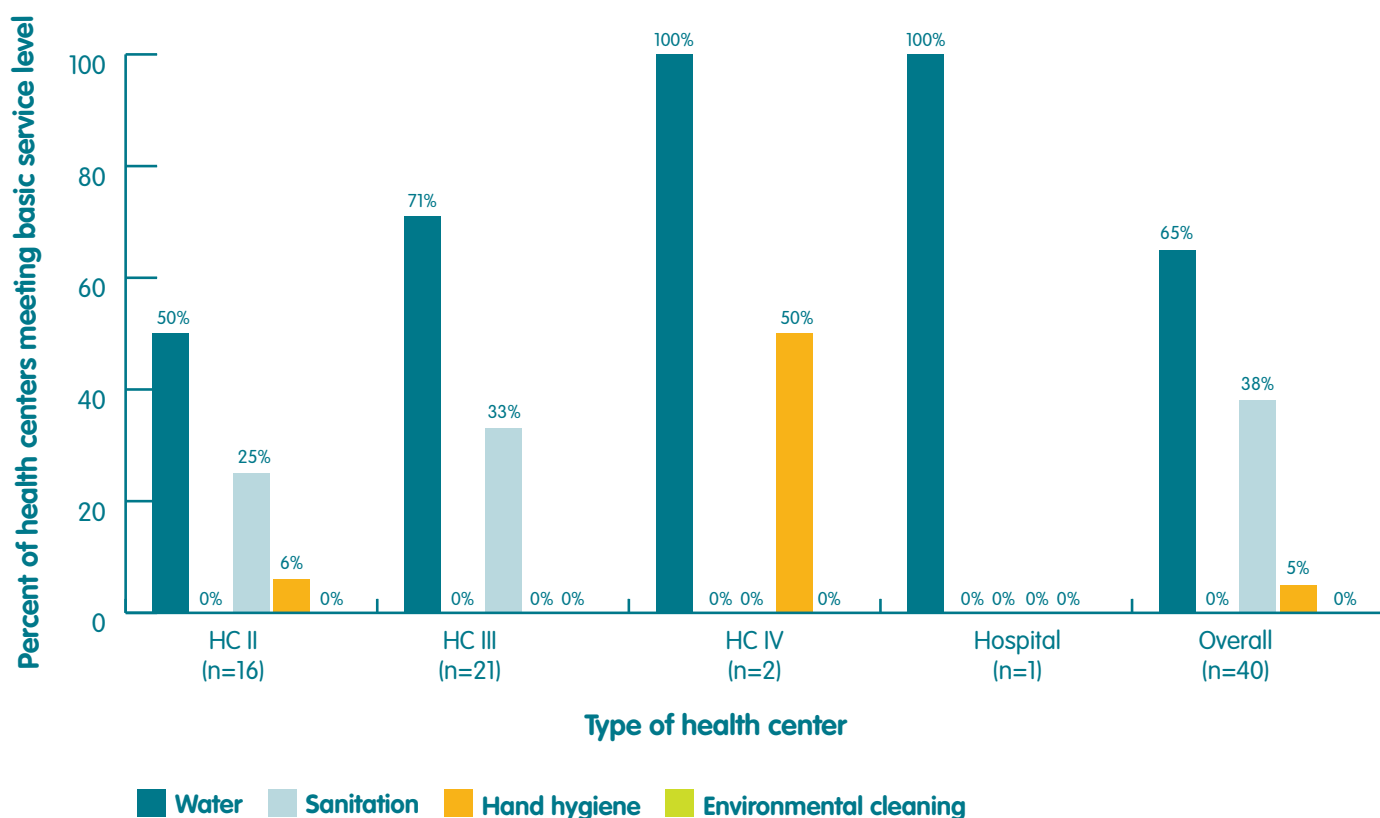
The overall coverage of rooms with handwashing stations with water present across the district was 38% (range 0-100) [Table 7.1.5]. When considering the requirement of soap in addition to water, median coverage was 25% (range 0-75) and when adding the requirement of single-use hand drying materials, coverage dropped to 0% (range 0-19). Health centers reported stock-outs of gloves in 43% of facilities and glove reuse in 10% of facilities. Providers regularly carried alcohol-based hand

sanitizer in 4 (10%) health centers.

Healthcare waste guidelines were present in 30 (75%) health centers, and heavy-duty gloves were used every time waste was handled in 20 (50%) health centers [Table 7.1.6]. Enumerators observed that the exterior of health centers were free from solid waste (63%), stagnant water (93%), animals (70%), and animal or human feces (90%), though fewer were well-fenced (38%). Sharps waste was safely disposed of (in a lined pit with a cover, an incinerator, or offsite) in 16 (40%) health centers, and infectious non-sharps waste was safely disposed of in 10 (25%) health centers. Waste from 13 (34%) health centers was disposed of off-site. The overall median coverage of rooms with at least one sharps container was 41% (range 18-100%), coverage of rooms with at least one waste bin was 52% (range 9-100%), coverage of rooms with separated waste bins for infectious non-sharps and general waste was 33% (range 0-100%), and coverage of rooms with adequate waste containers (i.e. proper segregation between sharps, infectious non-sharps, and non-infectious waste) was 25% (range 0-100%).

Figure 2 shows the percentage of health centers of each type (HC II, HC III, HC IV, and hospital) that met the 'basic service level' for water, sanitation, hand hygiene, and healthcare waste as defined by JMP. Table 7.1.7 provides definitions and frequencies for the subcategories that comprise each of the four broader categories. To qualify as meeting the basic service level, health centers had to meet all of the sub-indicators; for example, for water, the main source should be improved, available on premises, and available at the time of the survey. Figure 2 shows that water was the category in which the most health centers met the standard, while sanitation was the category in which the fewest health centers met the standard.

Figure 2: Health center JMP Basic Service Level (n=40)



3.2 Healthcare worker knowledge assessment (KAP)

Of the 74 healthcare providers that were interviewed, 54 (73%) were female [Table 7.2.1]. Respondents were spread across several staff types, including 7 (0%) clinical officers, 42 (57%) nurses, 17 (23%) midwives, and 8 (11%) other. The average length of time that the respondent had been working at the health center at the time of the assessment was 24 months.

Overall, knowledge of proper hand hygiene behaviors was high among healthcare providers [Table 7.2.2]. For example, 69 (93%) answered that hand hygiene should be performed after direct contact with a patient. Most (81%) of respondents answered that hands should be washed prior to putting on gloves, and only 23 (32%) correctly listed all six steps involved in handwashing without prompting. Knowledge about drinking water was equally high with 73 (99%) showing they knew that harmful contaminants in water may not be visible. Knowledge around waste disposal was slightly less high, with only 59 (80%) respondents answering that waste cannot be separated by type after it has been placed in waste bins.

Healthcare provider responses to attitude questions suggested that over half of clinical supervisors (64%) emphasized hand

hygiene, and some staff did not believe that their hand hygiene practices put patients at risk (27%) [Table 7.2.3]. The most common reasons given by healthcare providers for washing hands were protecting themselves (99%) and their patients (77%) from infection. Only 5 (7%) healthcare providers reported patient expectations for them to wash hands as a motivator for hand hygiene. All providers stated that they feel a personal responsibility for preventing infections among patients. For 16 providers who reported that they sometimes have difficulty performing hand hygiene, irregular or limited water supply (75%) was the most common reason cited for that difficulty. Some providers (22%) reported difficulty in treating drinking water, which the majority (81%) said was caused by a lack of drinking water treatment products. Some providers (19%) stated that they sometimes had difficulty segregating waste properly, and their reasons varied. Lack of time (43%), insufficient number of waste bins (64%), and inconveniently located waste bins (50%) were the most common challenges to waste segregation.

Questions about practices revealed that healthcare providers generally had positive perceptions of their ability to perform hand hygiene correctly; only 24% of providers said that they were sometimes unable to adhere to correct hand hygiene practices, and 80% of providers said that they washed their hands or used alcohol based hand sanitizer after touching every patient [Table 7.2.4]. However, 11% of respondents stated that they sometimes used medical instruments that are not disinfected or sterilized, and 19% reported not performing hand hygiene at times because of a lack of supplies. Additionally, the majority of providers (92%) reported that they always segregated general and infectious non-sharps waste correctly.

3.3 Cleaning staff knowledge assessment (KAP)

Of the 22 cleaning staff that were interviewed among health centers, 14 (64%) were female and 1 (5%) finished university [Table 7.3.1].

Cleaning staff knowledge of hand hygiene and basic infection prevention and control was generally high, particularly regarding hand hygiene after glove use, washing hands with soap and water, and environmental transmission of pathogens [Table 7.3.2]. However, some (23%) respondents stated incorrectly that if a room looked clean, it meant that no harmful germs were present. In addition, only 50% of respondents answered that hands should be washed prior to putting on gloves, and only 55% knew the proper personal protective equipment (PPE) to wear when handling infectious linen.

The majority of respondents (95%) felt that they were an important member of their health center's infection control team and that they would feel comfortable going to their health facility administrators if there was an issue they needed to resolve, but many staff reported shortages in cleaning supplies (32%) and personal protective equipment (41%) [Table 7.3.3]. In addition, only 55% felt that they had received adequate training on how to clean medical facilities.

Few (23%) cleaning staff had received training on infection prevention and control (aside from on-the-job training) [Table 7.3.4]. Most reported cleaning surfaces with water and detergent daily (91%) but 27% cleaned patient toilets less than once per day.

3.4 Hand hygiene observations

Hand hygiene, defined here as handwashing with soap and water or alcohol-based hand sanitizer (ABHS), before patient contact (203 opportunities) and after patient contact (205 opportunities) was observed among 46 healthcare providers [Table 7.4.1]. Glove use alone did not qualify as hand hygiene. About half (47%) of patient contacts were invasive, meaning they involved broken skin, and the rest were non-invasive. A greater proportion of patient contacts at HC IIIs were invasive than contacts at the HC IVs and hospital. The types of staff observed were midwives, nurses, clinical officers, and lab technicians.

Rates of hand hygiene after patient contact were higher than before patient contact. No providers practiced hand hygiene before patient contact; some providers used new gloves (37%) but none washed hands with soap or used ABHS [Table 7.4.2]. After patient contact, providers practiced hand hygiene in 16% of opportunities.

When considering hand hygiene practice before patient contact by type of procedure, almost all glove use took place (74/75 instances) before invasive procedures, while only 1 instance of new glove use occurred before a non-invasive procedure [Table 7.4.3]. After patient contact, similar rates of hand hygiene occurred after non-invasive (19%) and invasive (11%) procedures.

3.5 In-depth interviews

We conducted 17 in-depth interviews – 6 with in-charges, 6 with health workers, and 5 with cleaners – at health centers of varying levels (HC II, HC III, HC IV, and a hospital). The interviews explored practices and challenges related to WASH and waste management.

3.5.1 Water supply

Access to adequate quantities of water varied by health center. Even at those facilities that had on-site water supply, there were times of the year (such as dry season) when water supply decreased, particularly when using rainwater catchment as the primary source of water. When water was not available on-site, cleaning staff were typically responsible for bringing it to the facility. Patients were sometimes expected to bring their own water to the health center. Many health centers had storage tanks that were either too small or broken. Water was typically used to wash hands, clean the health center, clean dirty linen, and for drinking.

Interviewees felt that water shortages had serious implications for the health center environment; as one health center director stated, "Shortage of water makes management of the health unit difficult." A lack of water affected hand hygiene, cleaning of patient care rooms, and cleaning of toilets in particular.

"The absence of water puts my life at risk because I work in latrines and wards which are always dirty and can easily spread infections to me." – Cleaner

In turn, where water supply was more reliable, respondents mentioned that having access to water enabled staff to perform hand hygiene.

The responsibility for addressing water supply issues varied by health center. Several respondents mentioned the sub-county's role in improving water supply at the health center, and the potential for using PHC funds to make repairs/improvements. To improve access to safe water, respondents suggested that water be made available on site, piped to patient care rooms, stored in improved containers, and treated.

3.5.2 Drinking water

The majority of respondents valued providing drinking water at their health centers, though not all health centers did so. Drinking water provision and treatment practices varied by health center. Providing and treating drinking water was commonly viewed as important; many respondents echoed the phrase "water is life" when explaining the importance of drinking water. Several mentioned that treating drinking water kills microorganisms that could be contaminating the water, and others mentioned that health centers should provide safe drinking water so that patients could take medicine and drink when they are thirsty.

"Of course we have to protect our patients because when patients come here we give them first line treatment and they have to swallow their medicine and if they don't provide that water people may end up drinking dirty water and end up getting other diseases which would otherwise have been prevented." – Director

When drinking water was treated, respondents reported either boiling water or using treatment products like Water Guard. Some respondents reported that their health centers lacked money for water treatment products and fuel to boil water. Others mentioned that insufficient water supply prevented them from providing drinking water for patients in all places where it was needed.

To improve safe drinking water provision, many respondents recommended that more containers and treatment products should be made available at health centers. Several also mentioned that patients might not know what water is for drinking, so drinking water containers should be clearly labeled and accessible to all.

3.5.3 Toilets

Respondents' views on toilets and latrines at their health center varied. Some respondents reported inadequate numbers of toilets and unclean toilets; one respondent mentioned not having any toilets that belong solely to their health center. Conversely, others reported having sufficient numbers of toilets that were always clean. In those health centers that did not have clean toilets, many cited insufficient water supply and lack of cleaners as reasons why they were not clean.

"Latrines are enough but they are not in adequate condition due to lack of cleaners. We don't have a desirable condition because of water." – Director

Several cited a difference in cleanliness between patient and staff toilets, where patient toilets were less clean than staff toilets. Staff reported that this was due to patients not knowing how to use a toilet, patients using materials other than toilet paper for wiping, and insufficient numbers of toilets for patients.

One health center reported that dry season water shortages left them unable to use their flush toilets.

“The challenge is that of water shortage, I told you. People have to line up for few facilities, the water toilets are closed and we use only those few rooms. The cost of fetching water is very high.” – Director

Recommendations to improve sanitation at health centers included increasing water supply, increasing the number of cleaners, and increasing the number of toilets.

3.5.4 Hand hygiene

Typical hand hygiene practice varied by health center. Some respondents reported ideal handwashing and glove use at their health centers, while others mentioned inadequacies in hand hygiene practices observed among staff at their health centers.

“We need to improve on the care we give to patients especially on infection prevention. We lack hand washing facilities for patients, and this affects the quality of our job.” – Director

“Our unit here can improve on water and the practices of hand washing. We have equipment to use but people reluctantly using it. Actually, hand washing is one of the areas that need great improvement.” – Director

Respondents said they were chiefly motivated to perform hand hygiene out of a desire to protect themselves from infections when performing risky procedures (such as giving injections and taking blood samples) and to protect patients from infections.

Respondents mentioned several barriers to hand hygiene. Several people mentioned that the attitudes of healthcare providers were the main challenge when considering adherence to hand hygiene guidelines. In addition, the ability for healthcare providers to perform hand hygiene was tied to the availability of water at health centers.

“These practices may sometimes be safe and [sometimes] at risk. Sometimes we don’t have water, we get it from very far so we may not wash our hands.” – Healthcare provider

Generally, respondents valued having handwashing stations in close proximity to where they were providing care, and the difficulty in performing hand hygiene when handwashing stations were far away.

“The healthcare provider has to wash hands, use gloves to do the procedures and then wash hands again. In deliveries also we have hand washing facility only that it is a bit at a distance, which I see that it is not good because someone has to move from the delivery room to go somewhere to access water so from the room he may touch different parts.” – Healthcare provider

“[Provide] hand washing facilities at all corners such that someone has no burden of moving long distances. At least in every room where patients are being held or procedures are carried out there should be a water tank.” – Healthcare provider

“Of course, when they are not there that means someone may not think of using it after the procedure.” – Healthcare provider

Respondents made several suggestions for improving hand hygiene, such as increasing the number of handwashing stations, securing soap so that it cannot be moved from handwashing stations, increasing water supply, increasing glove supply, and conducting trainings for healthcare providers on hand hygiene. When asked whether it would be beneficial to provide additional handwashing stations, respondents in health centers with good access to water said it would be helpful. At health centers that did not have sufficient access to water, respondents anticipated difficulty in maintaining handwashing stations.

“Since we have a challenge of water those stations will be difficult to fill. Providers may use them if we get enough water and soap can be maintained.” – Director

3.5.5 Cleaning

Perceptions of health center cleanliness varied by respondent. Several respondents reported that their health centers were very clean, while others mentioned issues maintaining cleanliness at their health centers. Cleaning was typically performed by dedicated cleaning staff who had received no formal training. One cleaner mentioned having attended an Ebola-related training. Several health centers reported having no dedicated cleaning staff.

Most cleaners had a typical routine of cleaning each room once or twice per day, including sweeping, mopping, dusting, as well as washing laundry. Outside of the standard routine, they also cleaned rooms when they were visibly dirty. Cleaners typically looked for visible contamination (blood and dirt) to assess whether a room required cleaning. Cleaners mentioned having Jik (bleach) but did not describe any specific disinfection practices.

Like sanitation and hand hygiene, health center cleanliness was tied to availability of water. Since cleaners were typically responsible for bringing water on-site for cleaning (as well as for other uses such as handwashing), the health centers' water access directly affected both the time burden required of cleaners for fetching water as well as their ability to complete their cleaning duties. Another main challenge included insufficient staff and supply shortages. Some cleaners reported feeling that lack of supplies impacted their safety.

"Also some cleaning materials may be out of stock. You cannot stop cleaning because materials are not there. You can risk yourself and clean the place." – Cleaner

Despite their challenges, cleaners reported feeling that they were a valuable part of the infection control team. To improve facility cleanliness, respondents recommended that health centers should improve water access, hire more cleaning staff, and conduct formal cleaner training.

3.5.6 Waste management

Most respondents participated in waste management in some capacity. Though some respondents reported that disposing of waste was easy for them because of the presence of separated, colored bins, other respondents cited several challenges to managing waste. Healthcare providers sometimes did not segregate waste correctly, either because of a shortage of bins or because of healthcare provider attitudes.

"Sometimes you find waste mixed up and it becomes difficult in segregating it." – Healthcare provider

"Also we find sometimes wastes mixed up... Some of our staffs are careless." – Director

Some health centers lacked incinerators, which meant that staff either had to dispose of sharps waste in pits or off-site. Several reported burning sharps waste in pits on-site. Some waste handlers (usually cleaning staff) reported lacking protective gear for handling waste, which caused several respondents to feel at risk.

"The working without protecting my face is also putting me at risk because I sometimes inhale smoke that makes me choke. I think this is dangerous to my life." – Cleaner

"When am burning of course there is that smoke you have to get a stick and put them together so as to make them burnt and so that smoke enters the body and causes choking and sometimes enters the eyes. I think this is the great risk." – Cleaner

Other respondents recognized the possible risk to the public posed by unprotected waste disposal areas.

"Sometimes children may pick sharps from the pit because they don't burn and they can get infections. This puts them at risk." – Cleaner

Additionally, a lack of safety boxes caused overuse of existing boxes, and some cleaners reported difficulty in handling safety boxes when they were overfilled. Respondents also described a lack of bin liners and resulting difficulties in keeping waste bins clean.

To improve waste management, respondents recommended that waste be transported off-site for disposal, incinerators be built, healthcare providers be trained in how to properly segregate waste and adding waste bins in some health centers.

3.5.7 HCF management

Respondents reported that many different kinds of stakeholders (the in-charge, the District Health Inspector’s office, the Chairman LCI, the sub-county, and local engineers) were responsible for managing the health center’s water source. Funding for the health centers typically came from the National Medial Stores budget and PHC funds. PHC funds were reported to arrive quarterly, although not every health center received PHC funds. One respondent mentioned that budgets are fixed at the beginning of the year, and that the money that is used throughout the year depends on the budget and the work plan. Respondents from at least two health centers mentioned receiving funds from donors, and that the donors had some say in how that money was spent.

Below is a summary of respondents’ views on which stakeholders have which roles and responsibilities.

Stakeholder	Role
Health center in-charge	Responsible for managing the water source
Health management committee, finance committee	Has some control over budget (depending on health center), helps decide priorities for health centers
District Health Office (DHO)	Provides supplies, some funding (respondents vary on this point), guidelines for minimum standards, capacity building, support supervision
District Health Inspector (DHI)	Manages water source, conducts WASH-related activities
Local council chairman	Manages water
Sub-county/health assistants	Responsible for water access
Engineers	Manages water
National MOH	Provides guidelines for minimum standards, capacity building, mentorship

3.6 Focus group discussions

We conducted three focus group discussions with patients at three public health centers (one HC III, one HC IV, and one hospital). The patient focus groups explored patients’ perceptions of facility cleanliness, patients’ awareness of healthcare provider hand hygiene practices, and whether the health facility’s WASH environment played a role in patients’ healthcare-seeking behavior.

3.6.1 WASH environment

In general, patients’ perceptions of the WASH environment were very good. Patients were happy with the cleanliness of the health centers.

“The environment is very good, the compound is clean, wards are clean, and one can comfortably sleep.”
– Patient

“For sure cleanliness at this health facility is good all lanes are swept, and even you can’t enter before washing your hands.” – Patient

Several respondents mentioned how clean they viewed the healthcare providers to be and how this view influenced their likelihood of coming to the health center.

“Providers are clean. This stimulates us to come because the doctors are very clean and caring.” – Patient

At one health center, respondents noted that there were some problems with healthcare provider hand hygiene.

“The hand hygiene that they have is not well. They don’t wash hands before handling us but can only sometimes put on gloves.” – Patient

Patients also reported feeling unable to ask healthcare providers to perform hand hygiene and alluded to perceived power and education differentials between patients and healthcare providers.

“We fear them. We can ask them and they may ask us if we are the ones who taught them.” – Patient

"When you ask them they may be annoyed and give you wrong drugs. Me I can never ask them." – Patient

Patients from one health center reported bringing their own drinking water. At another, patients mentioned having confidence in the health center's drinking water treatment practices; for example, one patient stated, "I take the water without any fear because I know it is either treated or boiled."

At two health centers, patients did not see any issues with health center latrines. However, in one health center respondents reported issues with the quantity of latrines available to patients.

"Me I think the environment here is not good because they have no latrines to help patients and this can cause many diseases." – Patient

"...you may find a health center has no latrine and even the water may be in shortage and this makes patients experience difficulties in easing themselves. A good health center should have both latrines and toilets such that in case there is no water the patients can use a pit latrine." –Patient

"The environment is good. It is free from dirt. I say it is good and has trained people. We like coming to it." – Patient

4. Conclusions

The majority of health centers had access to improved water on site, though 22% of health centers did not have on-site access. Water quality was a concern, as over half of main water sources tested were contaminated with *E. coli*. In-depth interviews revealed that when interruptions (caused by seasonal availability or other factors) occurred, the burden of fetching water usually fell to cleaning staff. Respondents thought that water shortages negatively affected health centers, making handwashing, cleaning, and other activities more difficult.

Provision of drinking water for patients was moderately common, though was less common for staff. However, when considering the location and type of drinking water stations, median coverage data revealed that containers were not of the correct type or located in all rooms where they were needed. Interviews and KAP data revealed that healthcare providers were knowledgeable about why drinking water treatment is important, though water quality testing revealed some *E. coli* contamination in drinking water and low rates of chlorination. The main barrier to drinking water treatment was a lack of drinking water treatment products, but in health centers without adequate water access, water supply was a barrier as well.

While the number of latrines was not an issue at many health centers, at some health centers, numbers of latrines and cleanliness of latrines were inadequate. During focus group discussions, some patients mentioned discomfort when health centers did not have latrines. In interviews, respondents explained that latrines were unclean because of a lack of water and insufficient numbers of cleaners. JMP scores were very low in the sanitation category, which can be explained by the low numbers of latrines separated between staff and patients, latrines equipped for menstrual hygiene management, and latrines accessible for people with limited mobility.

Hand hygiene data revealed discrepancies between knowledge, perceptions, and practice. Patient perceptions of healthcare provider hand hygiene were generally good, though they did not feel able to ask healthcare providers to perform hand hygiene. KAP and interview data showed that knowledge of many aspects of hand hygiene was high, and many healthcare providers believed (or at least reported) that their hand hygiene practice adhered to guidelines. However, hand hygiene observations revealed a striking gap between reported practice and observed practice. KAP, interview, and observation data showed that healthcare providers were motivated to perform hand hygiene to protect themselves more than to protect patients, as hand hygiene rates were higher after patient contact than before. The differences in rates of hand hygiene before/after invasive and non-invasive procedures showed that healthcare providers prioritized hand hygiene and glove use before/after risky procedures, which the interview data supported. In the KAP, the vast majority (81%) of providers showed they knew that hands should be washed before putting on gloves, but no healthcare providers washed hands before glove use during the hand hygiene observations. There are several possible reasons for this discrepancy, particularly between knowledge and practice; coverage of handwashing stations with soap and water were very low (25%), so washing hands was likely inconvenient for providers, though interview data showed that improvements in water access are needed before handwashing stations can be managed sustainably. Some respondents did not think that their clinical supervisors emphasized hand hygiene and very few reported that they wash hands because supervisors expect them to, so low rates of adherence could be caused by health center norms and culture. The gap between reported and observed practice revealed either social desirability bias in the KAP data or a lack of awareness of how low rates of hand hygiene adherence actually was. Additionally, since a lack of supplies likely contributed to the low rates of adherence, more information is needed about availability of and supply chains for soap, gloves, and single-use hand drying supplies.

Cleanliness of some health centers was high; one patient focus group discussant even mentioned that health provider cleanliness motivated them to want to come to the health center. Other health centers had problems maintaining cleanliness, as revealed by cleanliness coverage data. Reasons for a lack of cleanliness varied, but respondents often cited water access, numbers of cleaning staff, and lack of cleaning supplies. KAP data revealed some gaps in knowledge that could be addressed through a formal training of cleaners, something that most cleaning staff had never received at the time of the assessment. However, KAP and interview data showed that cleaning staff felt that they were an important part of the infection control team.

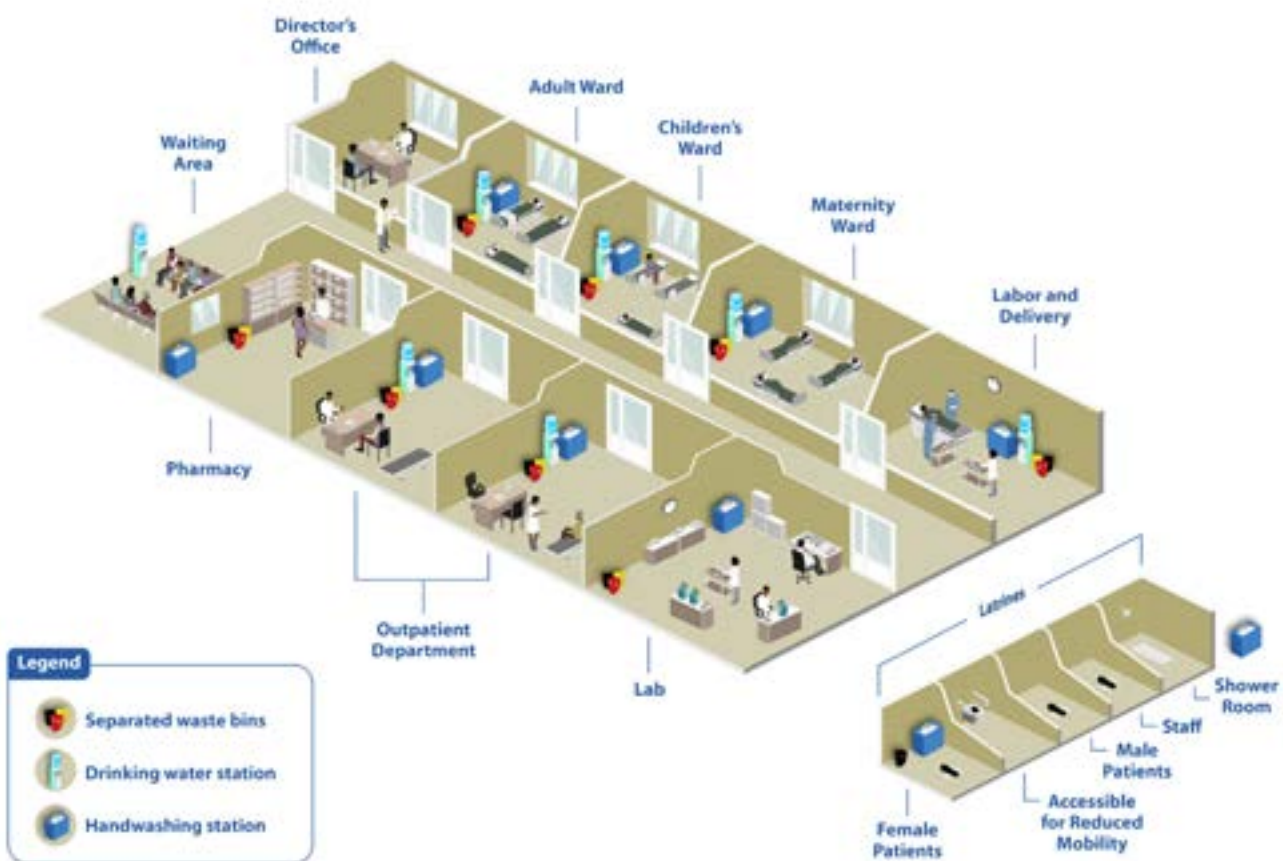
Only a quarter of patient care rooms in the district have adequate coverage of waste bins, and rates of safe disposal of sharps and non-sharps infectious waste were low; this showed that health centers need to improve the entire waste disposal system. KAP and interview data revealed fairly high knowledge of waste management, and only 19% reported difficulty in segregating waste. Additionally, the majority of KAP respondents stated that proper waste management was important to the health center administration. In practice, however, general and infectious non-sharps waste were correctly segregated in 33% of rooms. This difference between reported and observed waste segregation practice showed either social desirability bias in the KAP data or a lack of awareness of actual waste segregation practice.

Another contextual factor to consider is the Ebola outbreak in neighboring Democratic Republic of Congo. As Kabarole is a neighboring district, numerous infection prevention and control (IPC) promotion efforts have taken place between the time of the assessment (August 2018) and the time of writing (May 2019). WASH coverage and knowledge, attitudes, and practices of healthcare providers have likely been influenced by these IPC activities.

5. Recommendations

We base recommendations on the goal of “full coverage” for water, sanitation, hygiene, and waste management infrastructure in healthcare facilities. The image below is a pictorial representation of what full coverage might look like in an HCF, with waste bins, handwashing stations, and drinking water stations shown. Drinking water should be available in all areas where patients take oral medication, stay overnight, and wait to see healthcare providers. Handwashing stations should be available in every room where patients and healthcare workers interact via physical contact, in every room where medications or lab specimens are handled, and within 5 meters of latrines. Waste bins (segregated by color and type) should be present in every room where waste is generated.

While the recommendations in this report highlight the changes to practice and infrastructure that are needed in health centers and health posts in order to meet national and international standards, we want to emphasize that in order to sustain these changes, it is also critical to adjust the supporting environment (such as accountability structures, financing, capacity building, and dissemination of policies/standards).



Water

- Provide improved on-site water supply to the remaining HCFs (in the interim, increase funding allocation for bringing water to the HCF from off-site sources).
- Increase storage capacity for those HCFs that have interruptions to water supply.
- Address water quality issues. One way to do so would be by providing drinking water treatment supplies/training to address water quality issues and treating drinking water in safe storage containers (containers with lids and taps).
- Label which sources are potable and which are not potable.
- Ensure all stakeholders agree on who has responsibility for managing water supply both at the HCF and at the district.

Sanitation

- Ensure there is at least one toilet suitable for menstrual hygiene management (private, for women only, has a bin with a lid, has soap and water for washing) accessible by female patients.
- Ensure there is at least one toilet accessible for patients with limited mobility (no stairs or steps, handrails for support, door at least 80 cm wide, door handle and seat within reach of someone in a wheelchair or on crutches).
- Conduct patient outreach for proper use of latrines, including information on recommended washing/wiping materials.
- Increase number of latrines where needed.

Handwashing

- Ensure soap is present next to all handwashing stations at all times in a secure manner.
- Provide covered handwashing stations with taps in all rooms where they are needed.
- Consider the provision of alcohol-based hand sanitizer and single-use hand drying materials.
- Ensure provision of handwashing stations, including soap, next to latrines (likely by securing the handwashing station to the ground and securing the soap to the station).

Waste management

- Ensure the correct color-coded bins (clearly labeled by type of waste) are present in all necessary rooms.
- Ensure correct segregation of waste between color-coded bins, and that bins are emptied regularly.
- Ensure safe elimination of sharps waste and non-sharps infectious waste in covered, lined pits or incinerators that are inaccessible to the public.

Environment

- Fence the exterior of HCFs (to keep animal waste of HCF grounds) and fence waste disposal areas (to prevent accidental injury or exposure to infectious waste).
- Ensure solid waste is cleared from HCF compounds regularly and that patients are aware of exactly where to dispose of their own personal waste.

Infection prevention and control

- Put infection control guidelines into place and ensure staff are systematically trained on guidelines.
- Develop cleaning protocols for cleaning staff, train cleaning staff on protocols, and provide adequate PPE for cleaning and waste handling.
- Ensure regular supplies of gloves to ensure adequate use and prevent reuse between patients.
- Train healthcare providers on: (1) hand hygiene practices (critical moments for hand hygiene), particularly focusing on invasive vs. non-invasive procedures and (2) waste segregation.
- Train cleaners on proper cleaning procedures (what to clean, when to clean it, what to clean it with) and use of personal protective equipment, among other topics (see [Soapbox Collaborative's TEACH CLEAN materials](#)).

Additional efforts to influence the WASH and IPC culture at health centers are also needed, as many of the assessed deficiencies, particularly relating to hand hygiene adherence, relate to health center norms and management.

6 References

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7. Appendix

7.1 Health Center Assessment Tables

7.1.1 Health center characteristics, median (range) or frequency (%)

	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
Healthcare facility characteristics (interview data)					
Median outpatient consultations (per month)	350 (75-783)	600 (120-6002)	1518 (1435-1600)	450	488 (75-6002)
Median admissions (per month)	0 (0-25)	0 (0-235)	15 (0-30)	180	0 (0-235)
Median deliveries (per month)	N/A	20 (0-60)	64 (10-118)	40	5 (0-118)
Median number of days in facility (per visit)					
Admissions	2 (2-2)	3 (3-5)	3 (3-3)	2	3 (2-5)
Women for deliveries	N/A	2 (1-3)	2 (2-2)	2	2 (1-3)
Median number of carers typically accompanying for the following events:					
Admissions	2 (2-2)	1 (1-2)	2 (2-2)	3	2 (1-3)
Women for deliveries	N/A	2 (1-3)	3 (2-3)	3	2 (1-3)
Patients sometimes share beds	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Patients sometimes sleep on the floor	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Median health center staff					
Doctors	0 (0-1)	0 (0-2)	1 (0-2)	2	0 (0-2)
Midwives	0 (0-1)	3 (1-5)	6 (4-7)	10	2 (0-10)
Environmental health staff (health assistants)	0 (0-1)	1 (0-1)	2 (1-3)	0	0 (0-3)
Nurses	3 (1-4)	5 (2-14)	9 (7-10)	7	3 (1-14)
Cleaning staff (including porters)	2 (0-5)	2 (0-3)	5 (0-10)	7	2 (0-10)
Clinical officers	0 (0-1)	2 (1-5)	4 (2-5)	4	1 (0-5)
Lab technicians	0 (0-1)	1 (1-3)	3 (2-3)	3	1 (0-3)
Other Staff	1 (0-4)	3 (0-13)	5 (5-5)	31	2 (0-31)
Number (%) of HCFs with electricity	7 (44)	19 (90)	2 (100)	1 (100)	29 (73)
If yes, main electricity source					
Electricity grid system	7 (100)	15 (79)	2 (100)	1 (100)	25 (86)
Solar energy	0 (0)	4 (21)	0 (0)	0 (0)	4 (14)
If yes, has interruptions in electricity	3 (43)	9 (47)	1 (50)	0 (0)	13 (45)

7.1.2 Health center water characteristics, frequency (%) or median (range)

Main water source characteristics (interview data)	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
Main water source type					
Piped water (including gravity flow schemes)	5 (31)	13 (62)	2 (100)	0 (0)	20 (50)
National Water service (n=20)	1 (6)	0 (0)	0 (0)	N/A	13 (65)
Rainwater harvest	5 (31)	5 (24)	0 (0)	0 (0)	10 (25)
Borehole	2 (13)	1 (5)	0 (0)	1 (100)	4 (10)
Protected hand dug well	1 (6)	2 (10)	0 (0)	0 (0)	3 (8)
Protected spring	1 (6)	0 (0)	0 (0)	0 (0)	1 (3)
Surface water	1 (6)	0 (0)	0 (0)	0 (0)	1 (3)
Unprotected hand dug well	1 (6)	0 (0)	0 (0)	0 (0)	1 (3)
Piped water source (n=20)					

Surface water	3 (60)	8 (62)	0 (0)	N/A	11 (55)
Protected spring	0 (0)	2 (15)	0 (0)	N/A	2 (10)
Protected hand dug well	0 (0)	1 (8)	0 (0)	N/A	1 (5)
Do not know	2 (40)	2 (15)	2 (100)	N/A	6 (30)
Main source accessible on facility premises	11 (69)	17 (81)	2 (100)	1 (100)	31 (78)
Method water is brought on-site to facility (n=9)					
Someone from the health facility goes to get water	3 (60)	2 (50)	N/A	N/A	5 (56)
A paid vendor brings water to the health facility	2 (40)	2 (50)	N/A	N/A	4 (44)
Interruptions to water access - main source	11 (69)	17 (81)	1 (50)	0 (0)	29 (73)
Low water table	1 (9)	2 (12)	0 (0)	N/A	3 (10)
Locked / restricted access	1 (9)	1 (6)	0 (0)	N/A	2 (7)
Seasonal availability	6 (55)	11 (65)	1 (100)	N/A	18 (62)
Inability to pay	1 (9)	1 (6)	0 (0)	N/A	2 (7)
Mechanical breakdown	2 (18)	8 (47)	0 (0)	N/A	10 (34)
Planned construction	1 (9)	1 (6)	0 (0)	N/A	2 (7)
Other	1 (9)	2 (12)	0 (0)	N/A	3 (10)
Seasonal shortages (n=29)	6 (55)	12 (71)	1 (100)	N/A	19 (66)
Water is not available during 3 or more months of the year	2 (33)	6 (50)	0 (0)	N/A	8 (42)
Water is not available during 1-2 months of the year	3 (50)	3 (25)	0 (0)	N/A	6 (32)
Water is not available during than 1 month of the year or less	1 (17)	3 (25)	1 (100)	N/A	5 (26)
Facility pays for water from this source	3 (19)	10 (48)	1 (50)	0 (0)	14 (35)
Main water source characteristics, if onsite or within 500m	HC II (n=12)	HC III (n=19)	HC IV (n=2)	Hospital (n=1)	Overall (n=34)
Water is available from the main source on the day of the assessment (observed)	10 (83)	17 (89)	2 (100)	1 (100)	30 (88)
Free from <i>E. coli</i> contamination (n=37)	7 (47)	9 (43)	0 (0)	N/A	16 (43)
Detectable total chlorine residual (n=28)	1 (11)	4 (24)	0 (0)	0 (0)	5 (18)
Secondary water source characteristics	HC II (n=8)	HC III (n=18)	HC IV (n=0)	Hospital (n=1)	Overall (n=27)
Health facility uses water from a secondary source	8 (50)	18 (86)	0 (0)	1 (100)	27 (68)
Secondary water source type (n=27)					
Rainwater harvest	1 (13)	9 (50)	N/A	0 (0)	10 (37)
Borehole	1 (13)	3 (17)	N/A	0 (0)	4 (15)
Unprotected hand dug well	3 (38)	1 (6)	N/A	0 (0)	4 (15)
Piped water	0 (0)	1 (6)	N/A	1 (100)	2 (7)
Protected hand dug well	0 (0)	2 (11)	N/A	0 (0)	2 (7)
Protected spring	1 (13)	1 (6)	N/A	0 (0)	2 (7)
Surface water	1 (13)	0 (0)	N/A	0 (0)	1 (4)
Unprotected spring	1 (13)	0 (0)	N/A	0 (0)	1 (4)
Do not know	0 (0)	1 (6)	N/A	0 (0)	1 (4)
Location of secondary source (n=27)					
Within grounds of facility	2 (25)	10 (56)	N/A	1 (100)	13 (48)
Within 500m of facility	2 (25)	3 (17)	N/A	0 (0)	5 (19)
More than 500m from facility grounds	4 (50)	5 (28)	N/A	0 (0)	9 (33)
Median number of months (range) per year secondary source is typically used	2 (1-12)	3 (1-8)	N/A	1 (1-1)	3 (1-12)
When the secondary source is used					
Supplement to the primary source	2 (25)	8 (44)	N/A	1 (100)	11 (41)
When the primary source is not available	4 (50)	10 (56)	N/A	0 (0)	14 (52)
Both as a supplement and when primary source is unavailable	2 (25)	0 (0)	N/A	0 (0)	2 (7)

Water availability	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
Water source is made available by tap in all patient care areas (reported)					
Yes, in all patient care areas	2 (13)	3 (14)	1 (50)	0 (0)	6 (15)
Yes, in some patient care areas	1 (6)	11 (52)	1 (50)	1 (100)	14 (35)
No	13 (81)	7 (33)	0 (0)	0 (0)	20 (50)
In the past two weeks, there has been enough water at the health facility for the following activities:					
Drinking	9 (56)	18 (86)	1 (50)	1 (100)	29 (73)
Handwashing	15 (94)	18 (86)	2 (100)	1 (100)	36 (90)
Delivery services	N/A	17 (94)	2 (100)	1 (100)	20 (95)
Other medical activities	12 (75)	19 (90)	2 (100)	1 (100)	34 (85)
Cleaning	15 (94)	19 (90)	2 (100)	1 (100)	37 (93)
Laundry	9 (56)	15 (71)	2 (100)	1 (100)	27 (68)
Water storage	HC II (n=14)	HC III (n=18)	HC IV (n=2)	Hospital (n=1)	Overall (n=35)
Water is regularly stored at the facility (reported)					
If yes, sufficient water to meet the needs of the facility for 2 or more days is stored (n=35)	9 (64)	10 (56)	2 (100)	1 (100)	22 (63)
There are regularly used high-capacity (500L or more) water storage containers on-site					
If yes, median estimated total storage capacity (range) of large water storage containers, in liters (n=20)	2000 (2000-2000)	5000 (240-20000)	10000 (10000-10000)	30000 (30000-30000)	5000 (240-30000)
There are unused high-capacity water storage containers on-site (n=35)					
If yes, unused because container is broken (n=6)	0 (0)	2 (67)	0 (0)	N/A	2 (33)
If yes, unused because tap is broken (n=6)	1 (50)	1 (33)	1 (100)	N/A	3 (50)
If yes, unused because gutters are broken (n=6)	2 (100)	1 (33)	1 (100)	N/A	4 (66)

7.1.3 Health center drinking water access and quality, frequency (%) or median proportion (range)

Drinking water provision (interview data)	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
Drinking water is provided to patients					
Free drinking water was provided to patients during the last 2 weeks (n=30)	8 (80)	17 (94)	1 (100)	1 (100)	27 (90)
Drinking water is provided to staff					
Free drinking water was provided to staff during the last 2 weeks (n=18)	6 (86)	8 (80)	N/A	1 (100)	15 (83)
Drinking water, aggregate district-level coverage	HC II	HC III	HC IV	Hospital	Overall
Total patient care areas needing a drinking water station (observed)					
Number with an appropriate ^a drinking water station	1	9	1	0	11
Number with an appropriate ^a drinking water station with water	1	9	1	0	11
Drinking water, average coverage within healthcare facilities (observation data)	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
Drinking water is available at the facility at time of visit					
Median number of rooms that should have a drinking water station, across all facilities	2 (1-9)	6 (3-13)	9 (5-13)	13	5 (1-13)
Coverage of rooms with an appropriate ^a drinking water station	0% (0-33)	0% (0-29)	4% (0-8)	0%	0% (0-.33)

Coverage of rooms with an appropriate ^a drinking water station with water	0% (0-33)	0% (0-29)	4% (0-8)	0%	0% (0-.33)
Facility has at least one drinking water station accessible to people with limited mobility	2 (20)	8 (44)	0 (0)	1 (100)	11 (37)
All tested drinking water containers at the facility are free from <i>E. coli</i> contamination (n=30)	8 (89)	16 (89)	2 (100)	0 (0)	26 (87)
All tested drinking water containers at the facility have detectable free chlorine residual	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
At least one tested drinking water container at the facility had detectable free chlorine residual	2 (13)	4 (19)	0 (0)	1 (100)	7 (18)

^a Appropriate drinking water stations are either a piped tap or a covered container with a tap

7.1.4 Health center toilet/latrine characteristics, median (range) or frequency (%) shown

Toilets, aggregate district-level characteristics	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
Facility has at least one toilet or latrine	14 (88)	20 (95)	2 (100)	1 (100)	37 (93)
Total number of toilets in district	37	81	10	6	134
Toilet locations:					
Inside a patient care room	1 (3)	0 (0)	0 (0)	0 (0)	1 (1)
Inside the facility, but not in a patient care room	3 (8)	18 (22)	3 (30)	6 (100)	30 (22)
Outside, within the facility grounds	33 (89)	63 (78)	7 (70)	0 (0)	103 (77)
Toilet characteristics:					
Not separated by user type (i.e. staff, patients)	18 (49)	19 (23)	7 (70)	2 (33)	46 (34)
Not separated by user sex	21 (57)	54 (67)	6 (60)	0 (0)	81 (60)
Private (can be locked from the inside and cannot see inside from outside)	19 (51)	64 (79)	6 (60)	6 (100)	95 (71)
Functional handwashing station with soap and water within 5 meters of the toilet					
No handwashing station	20 (54)	62 (77)	1 (10)	0 (0)	83 (62)
Handwashing station, no water	0 (0)	1 (1)	0 (0)	3 (50)	4 (3)
Handwashing station with water, no soap	3 (8)	9 (11)	8 (80)	1 (17)	21 (16)
Yes, handwashing station with soap and water	14 (38)	9 (11)	1 (10)	2 (33)	26 (19)
Unlocked or a key is easily available	32 (86)	65 (80)	9 (90)	2 (33)	108 (81)
Observations of unlocked toilets	HC II (n=32)	HC III (n=65)	HC IV (n=9)	Hospital (n=2)	Overall (n=108)
Toilet type					
Flush/pour-flush toilet	4 (13)	5 (8)	4 (44)	0 (0)	13 (12)
Pit latrine	25 (78)	38 (58)	4 (44)	0 (0)	67 (62)
VIP latrine (ventilated pit latrine)	3 (9)	20 (31)	1 (11)	2 (100)	26 (24)
EcoSan toilet	0 (0)	2 (3)	0 (0)	0 (0)	2 (2)
Functional	32 (100)	63 (97)	9 (100)	2 (100)	106 (98)
Cleanliness of usable* toilets (n=70)					
NOT CLEAN: strong smell / presence of feces / stagnant puddle / used TP materials on floor	3 (20)	6 (13)	2 (40)	0 (0)	11 (16)
SOMEWHAT CLEAN: some smell / traces of feces on the floor, drop hole, or walls / some rubbish	6 (40)	29 (60)	0 (0)	0 (0)	35 (50)
CLEAN: no strong smell, no significant number of flies or mosquitos, no visible feces or traces of feces, no rubbish	6 (40)	13 (27)	3 (60)	2 (100)	24 (34)
Functional, improved latrine designated for menstrual hygiene management ^a (n=16)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Functional, improved latrine designated for reduced mobility ^b (n=41)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Toilet facility availability and characteristics (observation data)	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
At least one improved, usable* toilet available	5 (31)	12 (57)	2 (100)	1 (100)	20 (50)
At least one improved, usable* toilet designated for staff	1 (6)	8 (38)	1 (50)	0 (0)	10 (25)
At least one improved, usable* toilet accessible by patients	5 (31)	12 (57)	2 (100)	1 (100)	20 (50)
At least one improved, usable* toilet designated for female patients	0 (0)	1 (5)	0 (0)	0 (0)	1 (3)

At least one improved, usable* toilet designated for male patients	0 (0)	1 (5)	0 (0)	0 (0)	1 (3)
Median number of daily users (inpatients, deliveries, staff, and caregivers) per improved, usable* toilet (among facilities with improved toilets for patients) (n=29)	0 (0-0)	1 (0-3)	2 (1-3)	6	1 (0-6)

^aMenstrual hygiene management requirements include: a bin with a lid inside the cubicle, water for washing inside the cubicle, and soap inside the cubicle

^bReduced mobility accessibility requirements include: accessible without stairs or steps, handrails for support, a door that is at least 80cm wide, a door handle within reach for someone using a wheelchair or crutches/sticks, and a raised seat

*Usable refers to being unlocked, functional, and private

7.1.5 Health center handwashing infrastructure and supplies, frequency (percent) or median percent (range) shown

Hand hygiene supplies	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
Facility experiences glove stock outs (reported)	7 (44)	8 (38)	2 (100)	0 (0)	17 (43)
Gloves ever re-used between patients (reported)	3 (19)	1 (5)	0 (0)	0 (0)	4 (10)
Providers regularly carry alcohol hand rub/sanitizer (reported)	1 (6)	2 (10)	1 (50)	0 (0)	4 (10)
District-level hand hygiene coverage	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
Number of rooms that should have a handwashing station (observed)	56	203	31	16	306
Coverage of rooms with an appropriate ^a handwashing station with water available	50% (0-100)	33% (0-83)	41% (36-45)	19%	38% (0-100)
Coverage of rooms with an appropriate ^a handwashing station with water and soap available	42% (0-75)	22% (0-50)	26% (15-36)	19%	25% (0-75)
Coverage of rooms with single-use hand drying materials	0% (0-0)	0% (0-0)	0% (0-0)	19%	0% (0-19)
Coverage of rooms with an observed glove box/pack	45% (0-60)	20% (0-83)	35% (15-55)	25%	24% (0-83)
Coverage of rooms with observed alcohol hand rub / sanitizer	0% (0-50)	0% (0-22)	3% (0-5)	6%	0 (0-50)
All functional toilets have a handwashing station with soap and water within 5 meters	5 (31)	2 (10)	0 (0)	1 (100)	8 (20)
Median proportion of toilets that have a handwashing station with soap and water within 5 meters	0% (0-100)	0% (0-100)	6% (0-11)	33%	0% (0-100)

^aAppropriate handwashing stations are either a piped tap or a covered container with a tap

7.1.6 Distribution of healthcare facility waste management and facility cleanliness practices, median (range), frequency (%) or median proportion (range) shown

General information	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
Healthcare waste management guideline or SOP present (observed)	8 (50)	19 (90)	2 (100)	1 (100)	30 (75)
Everyone who handles waste always uses heavy-duty gloves (e.g. not standard medical gloves) when handling waste (reported)	8 (50)	11 (52)	0 (0)	1 (100)	20 (50)
Exterior of the facility is:					
Well-fenced	3 (19)	9 (43)	2 (100)	1 (100)	15 (38)
Free from solid waste	12 (75)	11 (52)	1 (50)	1 (100)	25 (63)
Free from stagnant water	15 (94)	19 (90)	2 (100)	1 (100)	37 (93)
Free from animals	8 (50)	17 (81)	2 (100)	1 (100)	28 (70)
Free from animal and human feces	12 (75)	17 (81)	2 (100)	1 (100)	32 (80)
Facility has on-site waste disposal areas	14 (88)	21 (100)	2 (100)	1 (100)	38 (95)
Waste disposal, aggregate district-level coverage	HC II (n=17)	HC III (n=53)	HC IV (n=4)	Hospital (n=2)	Overall (n=77)

Total number of waste disposal areas observed	17	53	4	2	77
Flat ground	3 (18)	9 (17)	0 (0)	0 (0)	12 (16)
Unlined pit	11 (65)	22 (41)	2 (50)	0 (0)	35 (45)
Lined pit	2 (12)	3 (6)	0 (0)	0 (0)	5 (6)
Lined pit with cover	0 (0)	8 (15)	1 (25)	1 (50)	10 (13)
Unlined pit with cover	1 (6)	7 (13)	1 (25)	0 (0)	9 (12)
Low-temperature incinerator	0 (0)	4 (7)	0 (0)	1 (50)	5 (6)
The waste area is fully fenced (inaccessible to the public)	1 (6)	8 (15)	1 (25)	2 (100)	12 (16)
For facilities that have incinerators, there is a pit dedicated for ash (n=5)	N/A	2 (50)	N/A	0 (0)	2 (40)
Number of months disposal area has been in use	24 (3-240)	36 (4-240)	48 (36-74)	72 (60-84)	36 (3-240)
Waste disposal practices	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
Sharps are safely disposed (lined pit with cover, incinerator, or off-site)	6 (38)	7 (33)	2 (100)	1 (100)	16 (40)
Infectious non-sharps are safely disposed (lined pit with cover, incinerator, or off-site)	5 (31)	2 (10)	2 (100)	1 (100)	10 (25)
Off-site waste disposal	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
Waste is disposed of off-site (n=40)	6 (38)	5 (26)	2 (100)	0 (0)	13 (34)
Sharps	6 (38)	3 (15)	2 (100)	0 (0)	11 (28)
Private waste disposal company	2 (33)	1 (33)	2 (100)	N/A	5 (45)
Municipal waste disposal	1 (17)	0 (0)	0 (0)	N/A	1 (9)
Health center	2 (33)	1 (33)	0 (0)	N/A	3 (27)
Hospital	2 (33)	1 (33)	0 (0)	N/A	3 (27)
Infectious non-sharps	5 (31)	0 (0)	2 (100)	0 (0)	7 (18)
Private waste disposal company	2 (40)	0 (0)	2 (100)	0 (0)	4 (57)
Municipal waste disposal	1 (20)	0 (0)	0 (0)	0 (0)	1 (14)
Health center	1 (20)	0 (0)	0 (0)	0 (0)	1 (14)
Hospital	1 (20)	0 (0)	0 (0)	0 (0)	1 (14)
General	3 (19)	1 (5)	0 (0)	0 (0)	3 (8)
Private waste disposal company	2 (67)	0 (0)	0 (0)	0 (0)	2 (67)
Municipal waste disposal	1 (33)	0 (0)	0 (0)	0 (0)	1 (33)
Waste storage	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)
Sharps waste is sometimes stored before disposal	9 (56)	6 (29)	2 (100)	0 (0)	17 (43)
If yes, stored in a location potentially accessible to the public (n=9)	8 (89)	3 (50)	0 (0)	N/A	11 (65)
If yes, location inaccessible to the public (fenced, locked) (n=17))	1 (11)	3 (50)	2 (100)	N/A	6 (35)
Infectious non-sharps waste is sometimes stored before disposal	5 (31)	2 (10)	2 (100)	0 (0)	9 (23)
If yes, stored in a location potentially accessible to the public (n=9)	5 (100)	0 (0)	0 (0)	N/A	5 (56)
If yes, location inaccessible to the public (fenced, locked) (n=9)	0 (0)	2 (100)	2 (100)	N/A	4 (44)
Separate waste storage areas for infectious (sharps and non-sharps) and general waste (n=9)	4 (80)	1 (50)	0 (0)	N/A	5 (56)
District-level coverage of waste containers and cleanliness in patient care areas	HC II (n=56)	HC III (n=205)	HC IV (n=31)	Hospital (n=16)	Overall (n=308)
Total number of rooms that should have appropriate waste containers	56	205	31	16	308
Rooms with at least one waste container present	30 (54)	112 (55)	19 (61)	5 (31)	166 (54)
Rooms with at least one sharps container present	25 (45)	84 (41)	11 (35)	4 (25)	124 (40)
Rooms with at least two waste bins	23 (41)	78 (38)	16 (52)	4 (25)	121 (39)

Rooms with two waste bins that are separated for infectious non-sharps and non-infectious waste	18 (32)	63 (31)	13 (42)	4 (25)	98 (32)
Rooms where all waste bins are covered	23 (41)	96 (47)	19 (61)	4 (25)	142 (46)
Rooms where all waste bins are lined	15 (27)	56 (27)	7 (23)	5 (31)	83 (27)
Rooms where no waste bins including sharps containers are more than 75% full	27 (48)	94 (46)	15 (48)	5 (31)	141 (46)
Rooms with adequate waste coverage ^a	16 (29)	54 (26)	9 (29)	4 (25)	83 (27)
Rooms with floor free of solid and liquid waste (n=268)	49 (88)	123 (69)	13 (50)	8 (89)	193 (72)
Rooms with all work surfaces free of solid and liquid waste (n=268)	45 (80)	124 (70)	16 (62)	9 (100)	194 (72)
Waste containers and cleanliness in patient care areas, average coverage within healthcare facilities (observation data)	HC II (n=56)	HC III (n=205)	HC IV (n=31)	Hospital (n=16)	Overall (n=308)
Number of rooms per facility that should have appropriate waste containers*	3 (1-11)	10 (6-17)	16 (11-20)	16	8 (1-20)
Coverage of rooms that have at least one sharps container	50% (18-100)	40% (22-67)	36% (35-36)	25%	41% (18-100)
Coverage of rooms that have at least one waste bin	55% (9-100)	50% (35-88)	60% (55-65)	31%	52% (9-100)
Coverage of rooms where waste is properly segregated for infectious non-sharp and non-infectious waste	40% (0-100)	30% (12-67)	45% (35-55)	25%	33% (0-100)
Coverage of rooms that have adequate waste coverage ^a	29% (0-100)	25% (12-67)	31% (25-36)	25%	25% (0-100)
Median proportion of patient care areas with floor free of solid and liquid waste	70% (17-100)	46% (6-79)	27% (17-37)	29%	51% (6-100)
Median proportion of patient care areas with all work surfaces free of solid and liquid waste	50% (33-100)	39% (13-74)	41% (37-45)	32%	50% (13-100)

^aAdequate waste coverage is 2 covered containers separated for infectious and non-infectious waste and a sharps container

7.1.7 Status of health centers meeting JMP basic service level, frequency (%) shown

	HC II (n=16)	HC III (n=21)	HC IV (n=2)	Hospital (n=1)	Overall (n=40)	Public Facilities Only (n=30)
Water						
Meets JMP basic service level	8 (50)	15 (71)	2 (100)	1 (100)	26 (65)	17 (57)
Main source is improved	14 (88)	21 (100)	2 (100)	1 (100)	38 (95)	28 (93)
Main source is on-premises	11 (69)	17 (81)	2 (100)	1 (100)	31 (78)	22 (73)
Water is available at the time of the survey	10 (83)	17 (89)	2 (100)	1 (100)	30 (88)	20 (67)
Sanitation						
Meets JMP basic service level	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Improved, usable sanitation facilities are available	9 (56)	17 (81)	1 (100)	1 (100)	29 (73)	20 (67)
At least one improved, usable toilet dedicated for staff	2 (13)	12 (57)	1 (50)	1 (100)	15 (38)	13 (43)
At least one improved, usable toilet suitable for MHM	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
At least one improved, usable toilet accessible by people with limited mobility	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Hand hygiene						
Meets JMP basic service level	4 (25)	1 (33)	0 (0)	0 (0)	5 (13)	0 (0)
Functional hand hygiene facilities (with water and soap or alcohol handrub) are available at a randomly selected point of care	6 (38)	9 (43)	0 (0)	0 (0)	15 (38)	10 (33)
Functional hand hygiene facilities (with water and soap or alcohol handrub) are available at least one toilet	6 (38)	3 (14)	1 (50)	1 (100)	11 (28)	1 (3)
Health care waste						
Meets JMP basic service level	1 (6)	0 (0)	1 (50)	0 (0)	2 (5)	1 (3)

Waste in a randomly sampled consultation room is properly separated into three bins and none of the bins are more than 75% full	5 (31)	5 (24)	1 (50)	0 (0)	11 (28)	10 (33)
Infectious waste is properly treated or disposed*	5 (31)	7 (33)	2 (100)	1 (100)	15 (38)	6 (20)
Sharps waste is properly treated or disposed**	6 (38)	10 (48)	2 (100)	1 (100)	19 (48)	10 (33)
Environmental cleaning						
Meets JMP basic service level	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Cleaning SOPs are available	0 (0)	0 (0)	1 (50)	0 (0)	1 (3)	1 (3)
Staff with cleaning responsibilities have been trained	2 (13)	2 (10)	0 (0)	1 (100)	5 (13)	0 (0)

*Methods considered to meet the basic service level for disposal/treatment of infectious waste include autoclaving; incineration; burning in a protected pit; burial in a lined, protected pit; and collection for medical waste disposal off-site.

**Methods considered to meet the basic service level for disposal/treatment of sharps waste include autoclaving; incineration; burning in a protected pit; burial in a lined, protected pit; and collection for medical waste disposal off-site.

7.2 Healthcare Provider Knowledge, Attitudes, and Practices (KAP) Assessment Tables

7.2.1 Healthcare providers KAP, frequency (%) or median (range) shown

	HC II (n=18)	HC III (n=45)	HC IV (n=4)	Hospital (n=7)	Overall (n=74)
Sex					
Male	6 (33)	11 (24)	1 (25)	2 (29)	20 (27)
Female	12 (67)	34 (76)	3 (75)	5 (71)	54 (73)
Education					
Clinical officer school/technical training	1 (6)	5 (11)	1 (25)	1 (14)	8 (11)
Nursing school	12 (67)	38 (84)	3 (75)	5 (71)	58 (78)
Other	5 (28)	2 (4)	0 (0)	1 (14)	8 (11)
Job					
Clinical officer	1 (6)	4 (9)	1 (25)	1 (14)	7 (9)
Nurse	13 (72)	24 (53)	3 (75)	2 (29)	42 (57)
Midwife	0 (0)	14 (31)	0 (0)	3 (43)	17 (23)
Other	4 (22)	3 (7)	0 (0)	1 (14)	8 (11)
Time working at facility (in months)	36 (1-120)	24 (1-192)	30 (1-48)	60 (2-84)	24 (1-192)

7.2.2 Healthcare provider knowledge assessment, frequency (%) correctly answered shown

	HC II (n=18)	HC III (n=45)	HC IV (n=4)	Hospital (n=7)	Overall (n=74)
Hand Hygiene					
Hands should be washed before putting on gloves (True)	12 (67)	39 (87)	3 (75)	6 (86)	60 (81)
If my hands are not visibly dirty, there is no need to wash my hands prior to patient contact (False)	18 (100)	42 (93)	3 (95)	6 (86)	69 (93)
There is no need to wash hands or use alcohol hand rub before taking vitals (False)	15 (83)	37 (82)	4 (100)	5 (71)	61 (82)
Hand hygiene should be performed after direct contact with a patient (True)	16 (89)	42 (93)	4 (100)	7 (100)	69 (93)
Hand hygiene should be performed after touching a patients' bedding (True)	17 (94)	41 (91)	4 (100)	7 (100)	69 (93)
Health staff can wear the same pair of gloves for multiple patients as long as there is no visible contamination on the gloves (False)	16 (89)	44 (98)	4 (100)	7 (100)	71 (96)

If a room looks clean, it means no harmful germs are present (False)	18 (100)	44 (98)	4 (100)	7 (100)	73 (99)
Hand hygiene should be performed before direct contact with a patient (True)	15 (83)	41 (91)	3 (75)	6 (86)	65 (88)
You cannot acquire an infection from touching the area that patients have been in (False)	18 (100)	42 (93)	4 (100)	7 (100)	71 (96)
What are the necessary steps involved in washing hands?					
Use both soap and water	18 (100)	45 (100)	4 (100)	7 (100)	74 (100)
Rub hands together for 20 seconds	10 (56)	29 (64)	3 (75)	7 (100)	49 (66)
Rub between fingers	8 (44)	30 (67)	3 (75)	6 (86)	47 (64)
Clean under fingernails	6 (33)	23 (51)	2 (50)	3 (43)	34 (46)
Rinse hands	10 (56)	33 (73)	3 (75)	7 (100)	53 (72)
Dry with clean towel or air dry	11 (61)	32 (71)	2 (50)	6 (86)	51 (69)
Correctly listed all 6 steps	2 (11)	17 (38)	2 (50)	2 (29)	23 (31)
Drinking Water					
Water that is visibly free of particles cannot cause illness to those who drink it (False)	16 (89)	43 (96)	4 (100)	7 (100)	70 (95)
If drinking water comes from a safe, improved source, it is okay to store it in an uncovered container (False)	17 (94)	42 (93)	4 (100)	7 (100)	70 (95)
If water looks clean, there is no need to treat it before drinking (False)	18 (100)	44 (98)	4 (100)	7 (700)	73 (99)
Waste					
It is fine to dispose of used gauze in the same waste bin as paper and other general waste (False)	18 (100)	44 (98)	4 (100)	7 (100)	73 (99)
Waste can be segregated by type after placing it in waste bins (False)	13 (72)	38 (84)	2 (50)	6 (86)	59 (80)
Non-infectious, general waste comprises 80-90% of all healthcare waste (True)	7 (39)	20 (44)	3 (75)	6 (86)	36 (49)

7.2.3 Healthcare provider attitudes assessment, frequency (%) shown

	HC II (n=18)	HC III (n=45)	HC IV (n=4)	Hospital (n=7)	Overall (n=74)
Hand Hygiene					
I have a very low risk of acquiring infections from my patients	6 (33)	11 (24)	2 (50)	0 (0)	19 (26)
The importance of hand hygiene is emphasized by my clinical supervisors	10 (56)	29 (64)	2 (50)	6 (86)	47 (64)
The hand hygiene of staff at this health facility put patients at risk	4 (22)	14 (31)	2 (50)	0 (0)	20 (27)
I would feel uncomfortable reminding a fellow healthcare worker to perform hand hygiene	1 (6)	7 (16)	2 (50)	1 (14)	11 (15)
Handwashing posters remind me to perform hand hygiene (n=67)	12 (86)	38 (90)	4 (100)	7 (100)	61 (91)
I feel a personal responsibility to prevent infections among the patients I care for	18 (100)	45 (100)	4 (100)	7 (100)	74 (100)
Preventing the spread of infections in this hospital is important to our health facility administrators	18 (100)	40 (89)	4 (100)	7 (100)	69 (93)
My health facility has adequate resources such as handwashing supplies, handrub, gloves, and cleaning products to prevent the spread of infections among patients	11 (61)	32 (71)	2 (50)	7 (100)	52 (70)
I wash my hands at work because:					
It protects me from getting an infection	18 (100)	44 (98)	4 (100)	7 (100)	73 (99)
It protects my patients from acquiring new healthcare infections	11 (61)	37 (82)	3 (75)	6 (86)	57 (77)
It is expected of me by my clinical supervisors	0 (0)	2 (4)	1 (25)	0 (0)	3 (4)

I learned the importance of hand hygiene in school	0 (0)	5 (11)	1 (25)	0 (0)	6 (8)
My patients expect me to	1 (6)	4 (9)	0 (0)	0 (0)	5 (7)
Other	0 (0)	1 (2)	0 (0)	0 (0)	1 (3)
My coworkers at this hospital always wash their hands before and after patient contact	16 (89)	38 (84)	3 (75)	7 (100)	64 (86)
I sometimes have difficulty performing hand hygiene	3 (17)	11 (24)	1 (25)	1 (14)	16 (22)
The following reasons make hand hygiene difficult for me (select all that apply): (N=16)					
Lack of time (overburdened by work)	2 (67)	3 (28)	1 (100)	0 (0)	6 (38)
Irregular or limited water supply	2 (67)	9 (82)	0 (0)	1 (100)	12 (75)
No facility for hand washing	2 (67)	4 (36)	0 (0)	0 (0)	6 (38)
Inconveniently located handwashing facilities	0 (0)	2 (18)	0 (0)	0 (0)	2 (13)
Inaccessible hand washing facilities	1 (33)	2 (18)	1 (100)	0 (0)	4 (25)
Lack of person to fill water stations	1 (33)	1 (9)	0 (0)	1 (100)	3 (19)
Lack of institutional safety climate or culture of personal accountability of healthcare workers	0 (0)	0 (0)	1 (100)	0 (0)	1 (6)
Lack of institutional priority for hand hygiene	0 (0)	1 (9)	0 (0)	0 (0)	1 (6)
Absence of hand washing guidelines in health facility	0 (0)	1 (9)	0 (0)	0 (0)	1 (6)
Other	0 (0)	1 (9)	0 (0)	0 (0)	1 (6)
Drinking Water					
It is difficult for me to treat drinking water	4 (22)	8 (18)	4 (100)	0 (0)	16 (22)
The following reasons make drinking water treatment difficult for me: (N=16)					
Lack of time (overburdened by work)	1 (25)	1 (13)	2 (50)	N/A	4 (25)
Irregular or limited water supply	2 (50)	3 (38)	1 (25)	N/A	6 (38)
Lack of drinking water treatment products	3 (75)	8 (100)	2 (50)	N/A	13 (81)
Dislike the taste of treated water	0 (0)	1 (13)	2 (50)	N/A	3 (19)
Lack of institutional priority for drinking water treatment	0 (0)	1 (13)	0 (0)	N/A	1 (6)
Other	1 (25)	1 (13)	0 (0)	N/A	2 (13)
If I had enough supplies (including water treatment products and water supply), I would feel capable of treating drinking water	11 (61)	41 (91)	3 (75)	62 (84)	62 (84)
Waste					
My coworkers at this health facility always segregate waste properly	15 (83)	35 (78)	3 (75)	7 (100)	60 (81)
My colleagues and I always have access to adequate personal protective equipment (including gloves, masks, etc.)	9 (50)	30 (67)	2 (50)	7 (100)	48 (65)
Proper waste management is important to our health facility administrators	18 (100)	40 (89)	4 (100)	7 (100)	69 (93)
I would feel uncomfortable reminding a fellow healthcare worker to properly segregate waste	2 (11)	6 (13)	3 (75)	1 (14)	12 (16)
It is difficult to properly sort waste every time I generate it	2 (11)	10 (22)	2 (50)	0 (0)	14 (19)
The following reasons make waste management difficult: (n=14)					
Lack of time (overburdened by work)	0 (0)	4 (40)	2 (100)	N/A	6 (43)
Insufficient number of waste bins – unable to segregate waste by type	2 (100)	5 (50)	2 (100)	N/A	9 (64)
Inconveniently located waste bins	1 (50)	5 (50)	1 (50)	N/A	7 (50)
Bins are often left full and are not emptied frequently enough	0 (0)	2 (20)	0 (0)	N/A	2 (14)
Lack of institutional priority for waste management	0 (0)	0 (0)	1 (50)	N/A	1 (7)
Absence of waste management guidelines in health facility	0 (0)	1 (10)	1 (50)	N/A	2 (14)
Other	0 (0)	2 (20)	0 (0)	N/A	2 (14)

7.2.4 Healthcare providers practices assessment, frequency (%) shown

	HC II (n=18)	HC III (n=45)	HC IV (n=4)	Hospital (n=7)	Overall (n=74)
I am sometimes unable to adhere to correct hand hygiene practices	4 (22)	10 (22)	2 (50)	2 (29)	18 (24)
Gloves are always available when I need them	17 (94)	39 (87)	4 (100)	7 (100)	67 (91)
Sometimes I don't perform hand hygiene simply because I forget it	4 (22)	9 (20)	2 (50)	0 (0)	15 (20)
Medical instruments I use are always disinfected or sterilized	15 (83)	41 (91)	3 (75)	7 (100)	66 (89)
I always wash my hands or use alcohol handrub after removing gloves	17 (94)	41 (91)	3 (75)	7 (100)	68 (92)
I wash my hands before touching every patient	16 (89)	30 (67)	2 (50)	6 (86)	54 (73)
Sometimes I don't perform hand hygiene because there are no supplies	1 (6)	10 (22)	2 (50)	1 (14)	14 (19)
I don't usually wash my hands after touching patients if I only touched unbroken skin	2 (11)	2 (4)	1 (25)	0 (0)	5 (7)
I wash my hands or use alcohol handrub after touching every patient	16 (89)	33 (73)	3 (75)	7 (100)	59 (80)
I always drink treated water when I am at the health facility	15 (83)	36 (80)	3 (75)	7 (100)	61 (82)
I help to ensure the provision of safe drinking water for patients	14 (78)	38 (84)	1 (25)	7 (100)	60 (81)
In patient care rooms, I always separate infectious non-sharps waste from general non-infectious waste into different waste bins	16 (89)	41 (91)	4 (100)	7 (100)	68 (92)

7.3 Cleaning Staff Knowledge, Attitudes, and Practices (KAP) Assessment Tables

7.3.1. Cleaning staff KAP demographics, frequency (%) or median (range) shown

	HC II (n=10)	HC III (n=10)	HC IV (n=1)	Hospital (n=1)	Overall (n=22)
Sex					
Male	4 (40)	3 (30)	1 (100)	0 (0)	8 (36)
Female	6 (60)	7 (70)	0 (0)	1 (100)	14 (64)
Education					
Finished university	0 (0)	1 (10)	0 (0)	0 (0)	1 (5)
Finished secondary school	4 (40)	8 (80)	1 (100)	0 (0)	13 (59)
Finished primary school	2 (20)	0 (0)	0 (0)	0 (0)	2 (9)
No formal schooling	2 (20)	1 (10)	0 (0)	1 (100)	4 (18)
Other	2 (20)	0 (0)	0 (0)	0 (0)	2 (9)
Training					
Infection prevention training	5 (50)	7 (70)	0 (0)	1 (100)	13 (59)
Vocational school	1 (10)	2 (20)	0 (0)	0 (0)	3 (14)
Other training	0 (0)	1 (10)	0 (0)	0 (0)	1 (5)
No additional training mentioned	4 (40)	0 (0)	1 (100)	0 (0)	5 (23)
Time working at facility (in months)	44 (12-132)	46 (8-120)	107	72	48 (8-132)

7.3.2. Cleaning staff knowledge assessment, frequency (%) that selected correct answer shown

	HC II (n=10)	HC III (n=10)	HC IV (n=1)	Hospital (n=1)	Overall (n=22)
If a room looks clean, it means no harmful germs are present (False)	7 (70)	8 (80)	1 (100)	1 (100)	17 (77)
Hands should be washed before putting on gloves (True)	6 (60)	4 (40)	0 (0)	1 (100)	11 (50)
Hands should be washed after removing gloves (True)	9 (90)	10 (100)	1 (100)	1 (100)	21 (95)
What are the necessary steps involved in washing hands? (Enumerators did not read answers)					
Use both soap and water	10 (100)	10 (100)	1 (100)	1 (100)	22 (100)
Rub hands together for 20 seconds	4 (40)	5 (50)	0 (0)	1 (100)	10 (45)
Rub between fingers	4 (40)	5 (50)	0 (0)	1 (100)	10 (45)
Clean under fingernails	2 (20)	2 (20)	0 (0)	1 (100)	5 (23)

Rinse hands	3 (30)	6 (60)	0 (0)	1 (100)	10 (45)
Dry with clean towel or air dry	5 (50)	6 (60)	1 (100)	1 (100)	13 (59)
Correctly listed all six handwashing steps	1 (10)	2 (20)	0 (0)	1 (100)	4 (18)
You cannot acquire an infection from touching the area that patients have been in (False)	10 (100)	7 (70)	1 (100)	1 (100)	19 (86)
Cleaning the environment is an effective way to prevent the spread of harmful germs (True)	9 (90)	10 (100)	1 (100)	1 (100)	21 (95)
Cleaning equipment should be cleaned and dried after every use (True)	10 (100)	10 (100)	1 (100)	1 (100)	22 (100)
Waste bins should be completely full before disposal (False)	8 (80)	10 (100)	1 (100)	1 (100)	20 (91)
Infectious and non-infectious waste can be mixed together after removal from the clinical area (False)	9 (90)	10 (100)	1 (100)	1 (100)	21 (95)
Heavy duty gloves should be worn when disposing of sharps containers (True)	10 (100)	10 (100)	1 (100)	1 (100)	22 (100)
Which method of cleaning hands is recommended after exposure to body fluids? (Washing with soap and water)	9 (90)	7 (70)	1 (100)	1 (100)	18 (82)
What should be worn when handling infectious linen? (All of the above: Heavy duty gloves, plastic apron, and closed-toe shoes)	4 (40)	7 (70)	1 (100)	0 (0)	12 (55)
Sharps waste includes items that can cause cuts and puncture wounds (True)	10 (100)	10 (100)	1 (100)	1 (100)	22 (100)
Most injuries are the result of carelessness when handling or disposing of sharps waste (True)	6 (60)	8 (80)	1 (100)	0 (0)	15 (68)
Following a sharps injury the wound should be sucked to remove germs (True)	9 (90)	10 (100)	1 (100)	1 (100)	21 (95)

7.3.3. Cleaning staff attitudes assessment, frequency (%) shown

	HC II (n=10)	HC III (n=10)	HC IV (n=1)	Hospital (n=1)	Overall (n=22)
I feel that I am an important member of the infection control team at the health facility	9 (90)	10 (10)	1 (100)	1 (100)	21 (95)
It is easy for me to do all the tasks that are expected of me at work	9 (90)	9 (90)	1 (100)	1 (100)	20 (91)
I have access to adequate cleaning supplies to perform the tasks required of me for my job	6 (60)	8 (80)	0 (0)	1 (100)	15 (68)
I have access to adequate personal protective equipment to perform the tasks required of me for my job	6 (60)	6 (60)	0 (0)	1 (100)	13 (59)
There are times when my colleagues do not properly segregate waste	2 (20)	5 (50)	1 (100)	0 (0)	8 (36)
Preventing the spread of infections in this health facility is important to our facility administrators	8 (80)	10 (10)	1 (100)	1 (100)	20 (91)
I would feel comfortable going to my health facility administrators if I had an issue I needed to resolve	10 (10)	9 (90)	1 (100)	1 (100)	21 (95)
I have received sufficient training on how to clean medical facilities	3 (30)	8 (80)	0 (0)	1 (100)	12 (55)
I know what ratio of bleach: water is necessary for disinfection	7 (70)	6 (60)	1 (100)	1 (100)	15 (68)
I feel that I am at risk because of lack of sufficient protective equipment	7 (70)	7 (70)	1 (100)	0 (0)	15 (68)
I feel that the administration of this facility values my importance as a member of the infection control team	9 (90)	10 (10)	0 (0)	1 (100)	20 (91)

7.3.4. Cleaning staff practices assessment, frequency (%) shown

	HC II (n=10)	HC III (n=10)	HC IV (n=1)	Hospital (n=1)	Overall (n=22)
I have received training on infection prevention and control (aside from on-the-job training)	1 (10)	3 (30)	0 (0)	1 (100)	5 (23)

I clean and dry my cleaning equipment after using it	10 (100)	9 (90)	1 (100)	1 (100)	21 (95)
I wear heavy duty gloves when I dispose of sharps containers	10 (100)	10 (100)	1 (100)	1 (100)	22 (100)
I clean the floors and surfaces of every room in the health facility with water and detergent every day	9 (90)	9 (90)	1 (100)	1 (100)	20 (91)
I collect infectious non-sharps waste from every room every day	10 (100)	10 (100)	1 (100)	1 (100)	22 (100)
How often do you clean the toilets used by patients at the health facility?					
At least once per day	6 (60)	8 (80)	1 (100)	1 (100)	16 (73)
2-4 times per week	1 (100)	2 (20)	0 (0)	0 (0)	3 (14)
Once per week	1 (100)	0 (0)	0 (0)	0 (0)	1 (5)
Less than once per week	1 (100)	0 (0)	0 (0)	0 (0)	1 (5)
No patient toilets	1 (100)	0 (0)	0 (0)	0 (0)	1 (5)

7.4 Hand hygiene observations

7.4.1. Characteristics of hand hygiene observations, frequency (%) shown

	HC III	HC IV	Hospital	Total
Characteristic				
Type of patient contact	n=294	n=80	n=34	n=408
Invasive	163 (55)	18 (23)	10 (29)	191 (47)
Non-invasive	131 (45)	62 (77)	24 (71)	217 (53)
Type of healthcare worker observed	n=34	n=8	n=4	n=46
Midwife	7 (21)	2 (25)	0 (0)	9 (20)
Nurse	9 (26)	2 (25)	1 (25)	12 (26)
Clinical officer	3 (9)	2 (25)	2 (50)	7 (15)
Lab technician	15 (44)	2 (25)	1 (25)	18 (39)

7.4.2. Overall hand hygiene practice, frequency (%) shown

	HC III	HC IV	Hospital	Total
Overall				
Practice BEFORE patient contact	n=146	n=40	n=17	n=203
Handwashing with soap OR alcohol handrub	0 (0)	0 (0)	0 (0)	0 (0)
Handwashing with soap	0 (0)	0 (0)	0 (0)	0 (0)
Alcohol handrub	0 (0)	0 (0)	0 (0)	0 (0)
New gloves	61 (42)	9 (23)	5 (29)	75 (37)
None of the above	85 (58)	31 (78)	12 (71)	128 (63)
Practice AFTER patient contact	n=148	n=40	n=17	n=205
Handwashing with soap OR alcohol handrub	13 (9)	7 (18)	12 (71)	32 (16)
Handwashing with soap	12 (8)	7 (18)	6 (35)	25 (12)
Alcohol handrub	1 (1)	0 (0)	6 (35)	7 (3)
None of the above	135 (91)	33 (83)	5 (29)	173 (84)

7.4.3. Hand hygiene compliance by type of patient contact, frequency (%) shown

	HC III	HC IV	Hospital	Total
Practice BEFORE patient contact				
Invasive	81	n=9	n=5	n=95
Handwashing with soap OR alcohol handrub	0 (0)	0 (0)	0 (0)	0 (0)

Handwashing with soap	0 (0)	0 (0)	0 (0)	0 (0)
Alcohol handrub	0 (0)	0 (0)	0 (0)	0 (0)
New gloves	60 (74)	9 (100)	5 (1)	74 (78)
None of the above	21 (26)	0 (0)	0 (0)	21 (22)
Non-invasive	n=65	n=31	n=12	n=108
Handwashing with soap OR alcohol handrub	0 (0)	0 (0)	0 (0)	0 (0)
Handwashing with soap	0 (0)	0 (0)	0 (0)	0 (0)
Alcohol handrub	0 (0)	0 (0)	0 (0)	0 (0)
New gloves	1 (2)	0 (0)	0 (0)	1 (1)
None of the above	64 (98)	31	12 (100)	107 (99)
Practice AFTER patient contact				
Invasive	n=82	n=9	n=5	n=96
Handwashing with soap OR alcohol handrub	4 (5)	2 (22)	5	11 (11)
Handwashing with soap	4 (5)	2 (22)	0 (0)	6 (6)
Alcohol handrub	0 (0)	0 (0)	5 (100)	5 (5)
None of the above	78 (95)	7 (78)	0 (0)	85 (89)
Non-invasive	66	31	n=12	n=109
Handwashing with soap OR alcohol handrub	9 (14)	5 (16)	7 (58)	21 (19)
Handwashing with soap	8 (12)	5 (16)	6 (50)	19 (17)
Alcohol handrub	1 (2)	0 (0)	1 (8)	2 (2)
None of the above	57 (86)	26 (84)	5 (42)	88 (81)

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