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ARTICLE



Determinants of hygiene practices among mothers seeking delivery services from healthcare facilities in the Kampala metropolitan area, Uganda

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ABSTRACT

Our study aimed at assessing the determinants of hand hygiene and utilisation of bathing facilities in healthcare facilities (HCFs) in the greater Kampala metropolitan area, Uganda. Results indicate that 19.9% of the respondents wished to wash hands and failed while 39.3% faced challenges related to bathing. Failure to wash hands was associated with received information on hand washing (APR = 1.14, 95% CI: 1.06–1.24), using piped water (APR = 0.88, 95%CI: 0.78–0.98) or a well as the main water source at the HCF (APR = 1.21,95% CI: 1.03–1.42). Experiencing challenges of bathing was associated with accessing healthcare services at a hospital (APR = 0.89, 95% CI 0.81–0.97) and using public HCF (APR = 1.10, 95% CI: 1.01–1.120). There is urgent need to improve hand hygiene and bathing facilities though providing reliable water and soap.

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Introduction

Globally, Water, Sanitation and Hygiene (WASH) services in healthcare facilities (HCFs) remain sub-standard, and pose a serious public health concern that needs immediate action (Boyce 2019; WHO, and UNICEF 2019). In 2016, more than half of HCFs globally lacked hand hygiene facilities at points of care, as well as soap and water at toilets (Cronk and Bartram 2018). Only 57% of HCFs had hand hygiene facilities while 51% had alcohol-based hand rub at points of care (WHO, and UNICEF 2019). Availability of hand hygiene supplies differs by level of HCF. Indeed, recent statistics indicate that 84% of hospitals in sub Saharan Africa have hand hygiene facilities at points of care compared to 64% of other levels of HCFs (WHO, and UNICEF 2019). Hand hygiene and bathing facilities are often poorer for patients and caregivers (Rousham 2016). There is a scarcity of information on the hygiene status of HCFs in Uganda, however, a recent survey of 50 HCFs in rural south western Uganda indicated that only 38% of the HCFs had hand washing facilities at the toilets. Only 24% of the surveyed facilities had both soap and water for hand washing (Mulogo et al. 2018).

Availability of bathing and hand hygiene facilities has enormous public health benefits such as reduction in health care acquired infections (such as sepsis), reduced anti-microbial resistance and improved occupational health and safety of health care providers (Wasswa et al. 2015; WHO, and UNICEF 2015; Pokrywka et al. 2017; Bouzid et al. 2018; Currie et al. 2018; Dunne et al. 2018; Saito et al. 2018; Boyce et al. 2019). Hand washing is also closely linked with patient satisfaction, increased uptake of health care services (WHO, and UNICEF 2015; Bouzid et al. 2018) and is important for the recovery of certain patients as well as staff and carer givers in contact with infectious substances and or patients (Adams, et al. 2008; Mathur 2011; Lastinger et al. 2017; Alshehari et al. 2018). Good WASH practices at HCFs can have spill over effects at household level thereby averting the rising burden of diarrhoeal diseases (WHO, and UNICEF 2015).

Access to bathing facilities has so far attracted less global attention not only in low but even high-income economies. For instance, even 20 years after Chamberlain and Stowe (1982) highlighted insufficient bathing equipment, and unsatisfactory cleanliness and privacy of bathing facilities in UK hospitals, Monro and Mulley (2004) still indicated that bathrooms in 9 wards in 46 hospitals in the UK did not provide adequate privacy and lacked clear labels pertaining their purpose; five wards did not have locks on the bathroom or shower doors, and 10% of the showers were either broken or not working. Both Monro and Mulley (2004) and Chamberlain and Stowe (1982) indicated that both bathing and hand washing facilities did not favour use by patients with limited mobility. This could be worse in low income settings such as Uganda given the limited attention and investment towards WASH in HCFs. To put this into context, not even the global indicator for basic hygiene services that serves as a useful starting point in assessing hygiene status in HCFs incorporates the presence and availability of bathing facilities (WHO, and UNICEF 2019). Besides, bathing has enormous benefits spanning from mitigating health care associated infections to improving patients' sense of well-being (WHO, and UNICEF 2019). With such adequate facilities in place, mothers have privacy to among others change pads and cotton wool or any soiled dress after delivery, wash off delivery secretions and blood odour and overall to keep a good hygienic environment before being discharged.

Access and utilisation of hand hygiene facilities also remains a challenge, most especially in low-income settings. Hand hygiene is one of the critical elements of infection prevention and control (IPC) activities (Kilpatrick et al. 2011; Mathur 2011; Rai et al. 2017; Currie et al. 2018; Sahoo et al. 2018), however, it remains lacking in many HCFs in low-income settings. A recent survey of 17 rural HCFs in Rwanda for example indicated that only 32% of hand washing locations had running water and soap, 33% of working sinks with taps had soap and 44% of sanitary facilities were in hygienic condition and accessible to patients (Huttinger et al. 2017). This study also revealed inequalities in access to hygiene facilities among staff, patients and caregivers (Huttinger et al. 2017).

In response to the increasing public health significance of inadequate bathing and hand hygiene conditions, the WHO spearheaded the development and implementation of essential environmental health standards in HCFs with the aim of reducing HCF acquired infections (Adams, et al. 2008). These standards include the provision of water for bathing and handwashing; close proximity of water points to users to encourage them to use water as often as required; and provision of a handwashing basin, soap and a jug of clean water on a trolley to be used for ward rounds and to encourage handwashing as often as needed between patient contacts (Adams, et al. 2008). In addition, these standards include availability of hygiene promotion materials such as constant reminders on the importance of IPC for staff, patients and carer givers. Despite these standards, the determinants of hand washing and bathing among mothers visiting HCFs remain under researched. Yet, improved hygiene service provision is associated with utilisation of maternity services (Bouzid et al. 2018) and reduces both maternal and neonatal morbidity and mortality (Schuster-Wallace et al. 2019).

In order to understand these determinants, this study was premised on the Knowledge, Attitude and Practice model (KAP). The KAP model is important for eliciting information on obstacles that

may impede the uptake of desired behaviours (Du Monde, Medicines 2016), such as bathing and hygiene practices. Findings from this study can be used to inform WASH programming in HCFs with special focus on the provision of bathing and hand hygiene facilities for IPC.

Materials and methods

Study area

This study was conducted in selected HCFs (Hospitals, Health Centre IVs and IIIs) within the Greater Kampala Metropolitan Area (GKMA) which includes Kampala, Wakiso and Mukono districts resident to more than 14% of the Ugandan population. Selection of this level of care was premised on their core mandate of delivering Maternal, New-born and Child Health (MNCH) Services. The three districts were selected based on WASH statistics within GKMA in addition to guidance of the key institutions supporting improvement of MNCH outcomes including; line ministries (Ministry of Health, Ministry of Water and Environment, Ministry of Gender and Kampala Capital City Authority-KCCA) and Implementing Partners such as WaterAid Uganda. A total of 63 HCFs was selected for the study in which 331 mothers were interviewed on issues pertaining WASH in HCFs.

Study design

This study was cross-sectional in nature and adopted quantitative data collection techniques.

Sample size determination and sampling procedure

A sample of 331 mothers seeking delivery and post-natal care services from 63 HCFs were interviewed within the GKMA. The sample size for this study was calculated using the Leslie Kish formula with an estimated prevalence of hand washing by caregivers at 25% based on Water Safety Plans (WSP 2012). Details of the sample size calculation are as indicated below:

$$n = \frac{Z^2 PQ}{\delta^2} \text{ Where}$$

n – Sample size

Z^2 – The standard normal deviate at 95% confidence (1.96)

P – Estimated prevalence of hand washing by caregivers was 25%

Q – 100% – P (or 1- P)

δ^2 – Maximum error estimated (5%)

From the formula, we obtained a calculated sample size of 288 respondents which we considered as a minimum for our study. Considering an estimated non-response rate of 15%, brought the final sample size to 331 respondents. A non-response rate of 15% was used because of the envisaged unstable condition of newly delivered mothers and neonates.

Data collection procedure

Exit interviews were conducted with mothers who had just sought delivery services from the study HCFs. Exit interview questionnaires were developed following guidelines documented by (Wilkinson, 1992). The study questionnaire was then uploaded on a mobile based application (Kobo Collect). Once the data were collected, they were synchronised to an online server. Printed questionnaires were also available in cases where the mobile app failed to operate.

Data management and analysis

Data were downloaded, cleaned and exported to STATA version 14.0 for exploration and analysis. Continuous variables were summarised using mean and standard deviation while categorical variables were expressed as frequencies and percentages. The main outcomes included wishing to wash hands but failing to do so and facing a challenge when attempting to bathe. These were both dichotomous coded '1' for yes and '0' for No. The covariates considered included location of facility (district and whether urban/rural), health facility characteristics (level, ownership, main water source), participant age, level of education, department where participant was recruited and whether they received information on hand hygiene during time at health facility.

To assess the factors associated with these outcomes, we used a modified Poisson regression with standard error variance and applied logarithm as the canonical link function. We used the modified Poisson instead of the ordinary logistic regression due to the higher proportion of the outcomes in which case odds ratios would over estimate the prevalence ratios (Newcombe 2006). Results were presented as prevalence ratios with 95% confidence intervals for factors associated with the outcomes of interest. Simpler models consisting of an outcome and one predictor were run at a time to obtain the crude prevalence ratios and their corresponding 95% confidence interval. Variables with p values less than 0.2 at bivariate level were added in the multivariable model. Backward selection was done by first removing variables with larger p values until only variables with significant values were retained in the model. Both crude and adjusted prevalence ratios (PR) have been reported in this article.

Ethical considerations

Ethical approval was obtained from Makerere University School of Public Health Higher Degrees and Ethics Committee. Administrative clearance was also obtained from Kampala, Wakiso and Mukono district local governments and from the administration of participating HCFs. All informed written consent discussions were done in the appropriate language (either English or Luganda) with a translator where necessary.

During the consent discussions, each section of the consent form was read exactly as it was written either by the study personnel or translator, and then further explained to the participant if necessary. All respondents were informed that participation was completely voluntary and that they could withdraw from the study at any time. Data collection tools were designed to ensure utmost confidentiality through use of unique codes (identification numbers) instead of names. All information gathered were treated as private by the study personnel and was only to be used for reporting purposes.

Results

Sociodemographic and service delivery characteristics

A total of 331 mothers with mean age 27.7 years (SD = 5.7 years) were included in the study. More than half of the mothers were recruited from government owned facilities 169 (51.1%) and mainly from hospitals 166 (50.2%). Nearly half 158 (47.7%) were picked from the delivery/maternity department and had been at the HCF for an average time of 22.7 hours (SD = 42.0) (Table 1)

Health education on water, sanitation and hygiene

One hundred eighty-eight respondents (56.8%) had heard information on infection and disease prevention while at the facility and this information was mainly on hand washing behaviour 54.3% (102/188), good personal and environmental hygiene 41.5% (78/188), and safe drinking water 31.4% (59/188). The main source of these information were the health workers 97.3% (183/188).

Table 1. Sociodemographic and service delivery characteristics.

Recruitment service delivery and sociodemographic characteristics	Distribution of respondents	Summary measure
Total	331	100%
District of recruitment		
Kampala	184	55.6%
Wakiso	101	30.5%
Mukono	46	13.9%
Rural-urban		
Urban	250	75.5%
Rural	81	24.5%
Facility type for recruitment		
Hospital	166	50.2%
Health centre IV	47	14.2%
Health centre III	118	35.6%
Ownership of facility for participant recruitment		
Public	169	51.1%
Private not for profit	162	48.9%
Age in years		
14–19	15	4.5%
20–24	87	26.3%
25–29	117	35.4%
30–34	73	22.1%
35+	39	11.8%
Mean (SD)		27.7 (5.7)
Recruitment location		
Out-patient department (OPD)	124	37.5%
In-patient department (IPD)	49	14.8%
Delivery/maternity ward	158	47.7%
Highest level of education		
None or primary	103	31.1%
Secondary	167	50.5%
Post-secondary/tertiary	61	18.4%
Time at facility		
Mean (SD)		22.7 (42.0)

About 4 in 10 mothers (42.9%) admitted seeing information, education and communication (IEC) materials such as posters; most of which were about hand washing 88.7% (126/142), good hygiene behaviour 63.4% (90/142) and treatment of drinking water 57.0% (81/142) (Table 2)

Water sources and mothers' perceptions on water safety

Most respondents indicated that piped water 280 (84.6%) was the main water at the HCF with 219 (66.2%) indicating that piped water is piped into rooms. Half 50% (79/158) of those from the labour ward indicated that main source of water was running water from the showers. Overall, 65.3% (216/331) perceived that quality of water to be safe for use; mainly because it was bottled water 40.7% (88/216) or because they thought it was treated (through chlorination or boiling) 30.6% (66/216) (Table 3).

Mothers perceptions on sanitation at the healthcare facilities

Majority 73.1% (242/331) of the respondents used a latrine facility while at the facility. More than half 58.6% (194/331) believed latrine drop holes were sufficient for patient population. Two thirds, 68.3% (226/331) of the mothers felt satisfied with water available at the toilet facilities. About 7 in 10, 71.9% (238/331) opined that latrines were suitable for use by pregnant women while only 39.9% (132/331) believed the latrines are suitable for people with special requirements such as elderly and other disadvantaged people.

Table 2. Health education on water, sanitation and hygiene.

Variables	Distribution of respondents	Percentage (%)
Heard information on infection or disease prevention for child or self (n = 331)		
No	143	43.2
Yes	188	56.8
Type of information obtained (n = 188)		
Hand washing behaviour	102	54.3
Good baby, personal and environmental hygiene	78	41.5
Drinking safe water (e.g. through boiling)	59	31.4
Immunisation	13	6.9
HIV/AIDS prevention and testing	13	6.9
New-born umbilical cord care practices	12	6.4
Breast feeding practices	12	6.4
Use of mosquito net	10	5.3
Preparing safe and well-prepared food	09	4.8
Others	13	6.9
Sources of the information (n = 188)		
Health worker	183	97.3
Posters	38	20.2
Television	14	7.5
Radio	7	3.7
Village health team (VHT) member	6	3.1
Seeing posters or IEC materials at the facility		
No	189	57.1
Yes	142	42.9
Information on IEC materials (n = 142)		
Hand washing	126	88.7
Treatment of drinking water	82	57.8
Behaviours of good hygiene	90	63.4
Environmental cleanliness	81	57.0
Others	9	6.3

Hand washing and personal hygiene

Regarding hand washing to prevent cross infection in HCFs, mothers believed hand washing after using toilet 91.2% (302/331), before and after taking a meal 75.5% (250/331) and after touching dirty materials 71.3% (236/331) as the major points for hand washing. About 19.9% (66/331) indicated failing to wash hands while at the HCF mainly due to lack of water 50.0% (33/66) and lack of soap 51.5% (34/66). About 39.3% of the mothers cited challenges that limit them to bath at the HCF. These challenges included dirty bathrooms, 24.0% (30/125) risk of infection 21.6% (27/125) and lack of appropriate bathrooms 19.2% (24/125). Only 36.0% (119/331) recalled seeing health workers attending to them washing hands regularly (Table 4).

Association between failure to wash hands with individual and healthcare facility characteristics

Mothers who had received information on hand washing were 14% more likely to report getting frustrated when attempting to wash hands (APR = 1.14, 95%CI:1.06–1.24). Mothers who reported piped water as the main water source at their HCF were 12% less likely to report being frustrated with hand washing (APR = 0.88, 95%CI:0.78–0.98). Those who reported wells as the main water source at the HCF were 21% more likely to be frustrated with hand washing situation compared to those who reported other sources (APR = 1.21,95%CI: 1.03–1.42); Mothers who had used a sanitary facility during their time at HCF were 10% less likely to report being frustrated; failing to wash hands (APR = 0.90, 95%CI: 0.83–0.98) (Table 5)

Table 3. Water sources and mothers' perceptions on water safety.

Variables	Distribution of respondents	Percentage (%)
Common source of water used at the facility (n = 331)		
(a) Piped water^a	280	84.6
Piped into rooms	219	66.2
Piped into yard/facility	94	28.4
Public tap	21	6.3
(b) Water from well	22	6.5
Protected facility owned well	15	4.5
Borehole at the facility	7	2.1
(c) Surface water	61	18.4
(d) Rain water	61	18.4
(e) Water trucks	7	2.1
(f) No water	2	0.6
Source of water in labour/maternity ward (n = 158)		
Running water from the shower	79	50.0
Water in containers from tap inside bathing area	27	17.1
Water in container from outside source	23	14.6
Others	29	18.4
Perception of the quality of water (n = 331)		
Safe	216	65.3
Unsafe	43	13.0
Do not know	72	21.7
Reasons for perceiving water as safe (n = 216)		
Bought in shops (bottled)	88	40.7
Water is clean/clear	25	11.6
Safe	37	17.1
Treated (chlorinated or boiled)	66	30.6
Reasons for perceiving water as unsafe (n = 43)		
Not treated or boiled	35	81.4
Don't trust it	6	14.0
Others (not clean, just bought)	2	4.6

^aMultiple responses allowed

Challenge in bathing and associated factors

Respondents recruited from hospitals were 11% less likely to have encountered challenges with bathing (APR = 0.89, 95%CI 0.81–0.97) compared to those in health centre IIIs. Mothers in government HCFs were 12% more likely to encounter challenges with bathing compared to those in private facilities (APR = 1.12, 95%CI: 1.01–1.20) (Table 6)

Discussion

Our study shows that more than half of mothers to have heard information on IPC and disease prevention while at the HCFs. HCFs are characterised by a heavy workload (Ataiyero et al. 2018; Kakyō and Xiao 2019), implying that health care providers may not have sufficient time to sensitise patients and care takers. Similarly, patients also do not want to wait for long at HCFs which implies they do not have time for health education sessions. Health education sessions in HCFs are often conducted as a one-off during patient enrolment, and therefore, some patients miss the information shared by the health care providers in such sessions. It is therefore important that sensitisation campaigns are promoted during the routine medical visits, treatment, and diagnosis programs at major HCFs.

The current study reports that more than half of the mothers mentioned to have received information on hand hygiene. This is so because hand hygiene is considered as a critical pillar for infection control in HCFs (Bouziid et al. 2018), and is important in reducing the transmission of diarrheal diseases (Labrague et al. 2018). Only a few mothers mentioned that they wished to wash hands but failed mostly attributing this to lack of soap and water. The lack of soap in these HCFs is

Table 4. Hand washing and personal hygiene.

Variables	Distribution of respondents	Percentage (%)
Knowledge of critical times for hand washing (<i>n</i> = 331) ^a		
After using the toilet	302	91.2
Before preparing your food	159	48.0
Before feeding/breastfeeding the baby	159	48.0
Before and after taking meal	250	75.5
After anal cleansing the baby	138	41.7
After touching dirty materials	236	71.3
Ever wished to wash your hands while at this facility but failed (<i>n</i> = 331)		
No	265	80.1
Yes	66	19.9
Reasons for failing to wash hands (<i>n</i> = 66) a		
Inadequate/lack of water	33	50.0
Inadequate/lack of soap	34	51.5
I was in a hurry	2	3.0
Others	12	18.2
Challenges limiting bathing of women (<i>n</i> = 331)		
No	201	60.7
Yes	130	39.3
Challenges encountered (<i>n</i> = 125) a		
Dirty bathrooms	30	24.0
Risk of infection	27	21.6
Few bathrooms	19	15.2
No bathroom	24	19.2
No water or less water	19	15.2
Others	06	4.8
Recalling hand washing by the care giver		
Regularly	119	36.0
Sometimes	61	18.4
Never	112	33.8
Do not know	39	11.8

^aMultiple responses allowed

to limited funding for WASH as well as IPC services. On the other hand, lack of water may have resulted from rationing due to fear of accruing high bills. Mothers who failed to wash hands also pointed out being in a hurry as a key reason. Failure to wash hands could partly be attributed to the location of the hand washing facilities. Some hand washing facilities are located far away from the points of care implying that mothers have to dedicate more time walking to and from the hand washing stations yet some of them might not be feeling well post-delivery and therefore, would only want to go at their homes in the shortest time possible.

Bathing is one of the key activities recommended for newly delivered mothers. Availability of bathing facilities provides room for changing pads and cotton wool or any soiled clothing after delivery; removing bad blood odour and delivery secretions. Our study revealed that nearly 4 in 10 mothers experienced challenges in accessing inclusive bathing facilities for body washing. Mothers attributed this to a lack of appropriate bathing facilities, inadequate safe water, and inadequate number of bathrooms as well as the poor sanitary condition of bathing facilities.

In their study about the WASH status of childbirth environments across low and middle-income countries in HCFs, Gon et al. (2016) point out that access to water and sanitation during childbirth is poor across low- and middle-income countries, and that mothers are not guaranteed access to basic WASH infrastructure during delivery (Gon et al. 2016). The results in our study indicate that individuals who had received information on hand washing were more likely to report frustration when attempting to wash hands at the HCFs. Possession of knowledge and or being aware of a given action can trigger practice (Revans 2017). Similarly, individuals who knew about hand washing, its importance and consequences of not washing hands could potentially be in position to demand for

Table 5. Association between failure to wash hands with individual and HCFs characteristics.

Characteristic	Frustrated not to wash hands		Crude PRs (95% CI)	Adjusted PRs (95% CI)	P value
	Yes	No			
Participant recruitment					
District					
Kampala	34 (18.5)	150 (81.5)	1		
Mukono	11 (23.9)	35 (76.1)	1.05 (0.94–1.17)		
Wakiso	21 (20.8)	80 (79.2)	1.02 (0.94–1.11)		
Urban/rural					
Rural	21 (25.9)	60 (74.1)	1		
Urban	45 (18.0)	205 (82.0)	0.94 (0.86–1.02)		
Healthy facility level					
Health centre III	33 (28.0)	85 (72.0)	1		
Health centre IV	10 (21.3)	37 (78.7)	0.95 (0.84–1.06)		
Hospital	23 (13.9)	143 (86.1)	0.89 (0.82–0.96) **		
Ownership of facility					
Private not for profit	33 (20.4)	129 (79.6)	1		
Public	33 (19.5)	136 (80.5)	0.99 (0.92–1.07)		
Section of recruitment					
Maternity/labour	24 (15.2)	134 (84.8)	1		
Inpatient ward	6 (12.2)	43 (87.8)	0.97 (0.88–1.07)		
Outpatient department	36 (29.0)	88 (71.0)	1.12 (1.04–1.21) **		
Individual characteristics					
Age in years					
14–19	2 (13.3)	13 (86.7)	1		
20–24	11 (12.6)	76 (87.4)	0.99 (0.84–1.17)		
25–29	24 (20.5)	93 (79.5)	1.06 (0.90–1.25)		
30–34	16 (21.9)	57 (78.1)	1.08 (0.91–1.28)		
35+	13 (33.3)	26 (66.7)	1.18 (0.97–1.42)		
Educational level of the mothers					
None or primary	21 (20.4)	82 (79.6)	1		
Secondary	40 (24.0)	127 (76.0)	1.02 (0.95–1.12)		
Tertiary	5 (8.2)	56 (91.8)	0.90 (0.82–0.98) *		
Received hand washing information at health facility					
No	35 (15.3)	194 (84.7)	1	1	
Yes	31 (30.4)	71 (69.6)	1.13 (1.04–1.22) **	1.14 (1.06–1.24)	0.001
Main source of water at facility					
Piped water					
No	22 (43.1)	29 (56.9)	1	1	
Yes	44 (15.7)	236 (84.3)	0.81 (0.73–0.90) ***	0.88 (0.78–0.98)	0.017
Water from well					
No	55 (17.8)	254 (82.2)	1	1	
Yes	11 (50.0)	11 (50.0)	1.27 (1.10–1.47)**	1.21 (1.03–1.42)	0.019
Surface water					
No	53 (19.6)	217 (80.4)	1		
Yes	13 (21.3)	48 (78.7)	1.01 (0.92–1.11)		
Used a sanitary facility while at facility					
No	25 (28.1)	64 (71.9)	1	1	
Yes	41 (16.9)	201 (83.1)	0.92 (0.84–0.99)*	0.90 (0.83–0.98)	0.013

Note *** p -value < 0.001, ** p -value < 0.01, * p -value < 0.05, ^ p -value < 0.2

such services (hand washing facilities). Frustration would then be brought about by failure to access the hand washing facilities or any of the requirements such as water and soap whilst individuals without this prior knowledge are at many times less likely to demand for the hand washing facilities implying that even in absence, such individuals will not get frustrated (Rusca et al. 2017). Studies have been conducted globally to assess the impact of knowledge on general practices and attitudes towards hand hygiene. For example, Ogwezzy-Ndisika and Solomon (2019) reported that 70% of mothers had a higher exposure to hand hygiene information and knowledge, which directly translated into practice. Similarly, Uneke et al. (2014) and Borah and Kakati (2016) report an improvement in knowledge and attitudes of health workers and households respectively on hand washing as a result of hand hygiene promotion campaigns. Contrary, a framework developed by

Table 6. Challenge in bathing and associated factors.

Variable	Faced challenges with bathing/showering		Crude PRs (95% CI)	Adjusted PRs (95% CI)	P value
	Yes	No			
Participant recruitment					
District					
Kampala	60 (32.6)	124 (67.4)	1		
Mukono	20 (43.5)	26 (56.5)	1.09 (0.97–1.21)		
Wakiso	50 (49.5)	51 (50.5)	1.13 (1.04–1.22) **		
Urban/rural					
Rural	42 (51.9)	39 (48.2)	1		
Urban	88 (35.2)	162 (64.8)	0.89 (0.82–0.97)*		
Healthy facility level					
Health centre IIs	62 (52.5)	56 (47.5)	1	1	
Health centre IV	18 (38.3)	29 (61.7)	0.91 (0.81–1.02)	0.91 (0.81–1.02)	0.114
Hospital	50 (30.1)	116(69.9)	0.85 (0.79–0.92) **	0.89 (0.81–0.97)	0.008
Ownership of facility					
Private not for profit	48 (29.6)	114 (70.4)	1	1	
Public	82 (48.5)	87 (51.5)	1.15 (1.06–1.23) **	1.12 (1.01–1.20)	0.021
Section of recruitment					
Maternity/labour	66 (41.8)	92 (58.2)	1		
Inpatient department	17 (34.7)	32 (65.3)	0.95 (0.85–1.06)		
Outpatient department	47 (37.9)	77 (62.1)	0.97 (0.90–1.06)		
Individual characteristics					
Age in years					
14–19	3 (20.0)	12 (80.0)	1		
20–24	36 (41.4)	51 (58.6)	1.18 (0.98–1.42) ^		
25–29	47 (40.2)	70 (59.8)	1.17 (0.98–1.40) ^		
30–34	30 (41.1)	43 (58.9)	1.18 (0.98–1.42) ^		
35+	14 (35.9)	25 (64.1)	1.13 (0.93–1.39)		
Educational level of the mothers					
None or primary	48 (46.6)	55 (53.4)	1		
Secondary	68 (40.7)	99 (59.3)	0.96 (0.88–1.04)		
Tertiary	14 (23.0)	47 (77.0)	0.84 (0.75–0.93) **		
Main source of water at facility					
Piped water					
No	28 (54.9)	23 (45.1)	1		
Yes	102 (36.4)	178 (63.7)	0.88 (0.80–0.97)*		
Water from well					
No	118 (38.2)	191(61.8)	1		
Yes	12 (54.6)	10 (45.4)	1.18 (0.97–1.29) ^		
Surface water					
No	110 (40.7)	160 (59.3)	1		
Yes	20 (32.8)	41 (67.2)	0.94 (0.86–1.04)		

Note *** p -value < 0.001, ** p -value < 0.01, * p -value < 0.05, ^ p -value < 0.2

Muleme et al. (2017) reveals that knowledge does not directly translate into practice. Therefore, there is need to design public health interventions with a multifaceted approach to contain a framework on knowledge, attitude and practices while targeting multiple social aspects with the support of influential persons such as health professionals, religious leaders among others.

Mothers who reported piped water as the main water source for the HCF, were less likely to report frustration due to hand washing unlike those who mentioned wells as the main sources of water. This could be attributed to the fact that for newly delivered mothers, piped water may be more reliable to newly delivered mothers compared to other sources. There is growing awareness on the safety of different water sources across the globe (Wang et al. 2018). Unlike in high-income countries, low-income countries have a variety of water sources many of which are of questionable quality (physical, chemical and microbiological) (Shrestha et al. 2018). Different studies globally have reported associations of un-wholesome water (poor quality) with infectious diseases (Datta et al. 2011; Yerpude et al. 2014). Surface water sources such as wells if unprotected are at many times contaminated thus increasing chances of their contribution to ill health (Usman et al. 2016). On the contrary, piped water is increasingly being considered as safe water due to the complex processes

undertaken during water treatment and presence of residual chlorine (Sikder et al. 2018). Therefore, individuals who mentioned piped water as the main water source, were perhaps more convinced about the safety of the water and thus could easily wash their hands as opposed to those with wells as the main water sources at the HCF. For Mukono and Wakiso districts, there were a few lower level HCFs with wells located in low lying areas, and sometimes many kilometers away from the HCF. This is in line with a study by (Lapworth et al. 2017). Such unimproved water sources located away from the premises of the HCFs result into scarcity of water due to long distances coupled with the questionable safety of water, which influence the hand washing behaviour of patients.

Our study also indicates that mothers who used sanitary facilities during their time at the HCFs were less likely to report being frustrated with washing hands. There is a likelihood that the mothers perceived facilities to be sanitary and the environment was conducive for hand washing at the time when the study was conducted.

Regarding bathing, the study found that respondents from hospitals were less likely to encounter challenges associated with bathing compared to those from health centre IIIs and IVs. This is possibly because there are more WASH facilities and reliable flowing water at hospitals in comparison to the situation at health centres (III and IV). Water service status was associated with the level of HCF due to the fact that hospitals and health centre IVs receive more WASH funding (primary health care funds part of which caters for WASH/IPC) compared to lower level HCFs possibly due to the high volume of patients and staff. In addition, hospitals and health centre IVs are often located in urban areas. Urban areas are usually a priority for large water supply projects, and institutions such as HCFs are considered a priority in such areas. Water shortages were common in some lower level HCFs which necessitated going out to buy from the neighbourhood and thus limiting bathing routines.

Mothers in public HCFs were more likely to encounter challenges in bathing than those in private HCFs. This is so given the limited financing for WASH in public health HCFs. Most respondents indicated that generally HCFs were cleaned two to three times daily (in the morning before start of any other activity, at lunch time and in the evening), but more often during rainy and busy days. When water was not available, the cleaning routine would reduce and therefore affecting the cleanliness of the bathrooms

Conclusion and recommendations

A considerable proportion of respondents were frustrated with hand washing and bathing conditions at the HCFs. This therefore calls for deliberate actions to invest in improving hand hygiene and bathing facilities in HCFs. Additionally, there is need to make WASH a priority for the already existing IPC committees, and/or institutionalisation of active HCF WASH committees so as to improve operation and maintenance of existing WASH facilities. On the global WASH in HCFs policy framework, revising the global indicator for basic hygiene services to incorporate the presence and availability of bathing facilities would be critical guidance to countries currently in the process of drafting their local WASH in HCFs national guidelines.

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Declaration of interest statement

The authors declare no conflict of interest

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