



## Major Article

# The barriers and facilitators to hand hygiene practices in Nigeria: A qualitative study

*“There are so many barriers ... the barriers are limitless.”*

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**Background:** Health care associated infections (HCAIs) are a global challenge and hand hygiene is the primary measure to reduce these. In developing countries, patients are between 2 and 20 times more likely to acquire an HCAI compared with developed countries. Estimates of hand hygiene in Sub-Saharan Africa suggests 21% concordance. There are few studies investigating barriers and facilitators and those published tend to be surveys. This study aimed to understand barriers and facilitators to hand hygiene in a hospital in Nigeria.

**Methods:** A theoretically underpinned in-depth qualitative interview study with thematic analysis of nurses and doctors working in surgical wards.

**Results:** There were individual and institutional factors constituting barriers or facilitators: (1) knowledge, skills, and education, (2) perceived risks of infection to self and others, (3) memory, (4) the influence of others and (5) skin irritation. Institutional factors were (1) environment and resources and (2) workload and staffing levels.

**Conclusions:** Our study presents barriers and facilitators not previously reported and offers nuances and detail to those already reported in the literature. Although the primary recommendation is adequate resources, however small local changes such as gentle soap, simple skills and reminder posters and mentorship or support could address many of the barriers listed.

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## BACKGROUND

Health care associated infections (HCAIs) are a global challenge and can have a devastating effect for patients. They contribute to longer hospital stays, a greater disease burden and high patient morbidity and mortality.<sup>1</sup> In developed countries, up to 15% of patients receiving care in acute care settings contract such infection, for instance, in the United States 1.7 million hospitalized patients develop an HCAI annually and one in 17 people die from these.<sup>2,3</sup> However, the burden is reported to be worse in developing countries

with exact estimates unknown due to poor monitoring and sparse accessibility of reliable data.<sup>2</sup> Compared with developed countries, patients in developing countries are between 2 and 20 times more likely to acquire an HCAI, and the proportion of infected patients in developing countries is greater than 25%.<sup>4</sup> Other authors suggest that for every 100 hospitalized patients, 6–7 will acquire a minimum of one HCAI in developed countries while 10 hospitalized patients will acquire at least one HCAI in developing countries.<sup>5</sup> Reasons for higher prevalence of HCAIs in developing countries have been ascribed to lack of infrastructure, reuse of instruments, dearth of skilled personnel and low concordance to infection prevention and control measures.<sup>6,7</sup>

Contaminated hands of health care professionals play a major role in the transfer of HCAIs.<sup>8</sup> Hand hygiene has been identified as the primary measure to reduce HCAIs.<sup>9</sup> It is cheap, efficient, and up to 30% of infections can be avoided through excellent hand hygiene practices<sup>10</sup>; although health care professionals do not still clean their hands as expected.<sup>11</sup> A systematic review of

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hand hygiene studies in both developed and developing countries reporting an overall baseline concordance of 34.1% before interventions, from 8 studies.<sup>12</sup> In our recent review of the literature, we found 9 studies reporting hand hygiene compliance rate in Sub Saharan Africa (SSA).<sup>13</sup> These studies including a total of 3,221 observed hand hygiene opportunities and 994 participants demonstrated a mean compliance rate of just 21.1% (range 9.2%–54%). Five of these studies included surgical wards in their observational studies. In Nigeria, surgical wards have the highest occurrence of HCAs when compared with other wards.<sup>14,15</sup> A subsequent observational study of 700 hand hygiene opportunities demonstrated 29.1% compliance among surgical health care staff in a Nigerian hospital (35.7% for doctors, 31.1% for nurses, and 10.7% for health care assistants<sup>16</sup>). Although barriers to hand hygiene practices are widely reported in developed countries (for example<sup>17–19</sup>), our review identified 27 studies investigating barriers in SSA, of these only thirteen were conducted in Nigeria and only 6 used qualitative methods (most used survey methods). This suggests that there is a dearth of literature exploring in any depth the barriers and facilitators to hand hygiene in SSA which prompted the study reported here. Findings from our review and a recent study suggest lack of infrastructure, lack of knowledge, time constraints, hand hygiene being insignificant and poorly aligned incentives as reasons for poor hand hygiene practices in developing countries.<sup>13</sup> These have been reported in more recent studies conducted in the region.<sup>20,21</sup>

Hand hygiene is a complex behavior, still behavior change theories are often omitted in attempts to improve health care professionals' hand hygiene practices.<sup>22</sup> Behavior change theories can both predict hand hygiene behaviors and offer promising ways of improving hand hygiene concordance.<sup>23–25</sup> Using the theoretical domains framework (TDF), an integrative framework of 33 psychological theories of behavior or behavior change,<sup>26</sup> our aim was to undertake a theoretically underpinned in-depth qualitative interview study to understand the barriers and facilitators to hand hygiene in a hospital in Nigeria. To the best of our knowledge and based on the methodological quality appraisal of studies included in our review,<sup>13</sup> this study was the first to undertake a theoretically underpinned approach to explore hand hygiene practices in surgical wards of sub-Saharan African hospitals.

## METHODS

Using an interpretivist approach, we undertook qualitative interviews in a bid to understand the thoughts, and nuanced experiences of health care professionals on what they considered as barriers and facilitators to hand hygiene in this context. This is pertinent as most previous studies of barriers and facilitators to hand hygiene in SSA relied on survey methods.

### Research question

What are the barriers and facilitators to hand hygiene practices among health care professionals in a hospital in Nigeria?

### Design

Evidence suggests that a theoretical approach to the assessment of barriers<sup>18,19,26</sup> is more effective in establishing a comprehensive understanding than a non-theoretical approach. We therefore used the TDF, a comprehensive set of potential clinical behavior determinants synthesized from all published models of behavior or behavior change,<sup>26</sup> to underpin our interview guide (see [Table 1](#)). Habitual behaviors are formed from repetition, (performing behaviors automatically once formed) and from situational cues associated with the

behaviour.<sup>27</sup> We recognized that health care professionals are unlikely to cite factors that impact on their hand hygiene behaviors such as automatic responses to cues like emotion, unless they are asked,<sup>18</sup> and that fundamental attribution error is likely (the tendency to assume an individual's behaviors are dependent on personal or dispositional causes, rather than on social and environmental stimuli) in these instances.<sup>28</sup> Hence the rationale behind underpinning this study with the TDF to uncover these cognitive biases. We also used our previous review on barriers and facilitators to hand hygiene in SSA to further inform areas of discussion.

### Participants

This study was conducted in 2 surgical wards (male and female) of a private teaching hospital in Southwest Nigeria. Participants were recruited through maximum variation, a purposive sampling approach which ensures the heterogeneity of the study sample,<sup>29</sup> and included doctors and nurses with varying years of clinical experience that are directly involved in patient care, who work in the surgical wards and comprehend and able to speak the English language. Health assistants were excluded from the interviews as they are unlikely to have the basic English language knowledge capacity required to engage in the interviews. Although English language is the language of instruction in Nigeria, only trained professionals like doctors and nurses were likely to be able to communicate in English as there are over 500 ethnic backgrounds in Nigeria, each having its own local language,<sup>30</sup> and there were no funds for translation for this study. There were 30 nurses and 15 doctors working on the surgical wards. We aimed to interview 15–20 based on estimates of 12 participants needed to reach data saturation.<sup>14,15</sup>

### Procedure

The matrons-in-charge of the 2 wards were approached with detailed information on research purpose and asked to circulate information about the study with staff on the ward (for instance, in staff meetings). Participant information sheet were distributed among potential participants, and they were asked to contact the researcher using the contact details provided if they had any questions or were interested in taking part. Potential participants had 48 hours to decide whether to participate or not during which any queries they had were clarified. No reminders were needed, and no incentives were offered. The voluntary rights of health care professionals to participation and withdrawal at any stage of the interviews was reiterated during recruitment. Both written and verbal (audio-recorded) consents were obtained prior to interview commencement. All interviews were conducted by YA, a female, Nigerian, nurse, mid-programme PhD student researcher with no pre-knowledge of participants. The researcher and participants agreed on a convenient date and time, and preferred location within the hospital environment and where participants could talk freely, privately, without noise or any form of distractions. This was mostly in the matron's office on the ward. All queries were clarified first before commencing the interviews. Interviews took place between April 2018 and May 2018. Participants were interviewed on 1 occasion only.

### Pilot test

The interview guide was piloted with nurses (n = 5) who resided in the UK who had worked or trained previously in Nigeria. Minor modifications made subsequently. As these participants did not currently work in Nigeria, they were not included in analysis.

**Table 1**  
Interview guide underpinned by the Theoretical Domains Framework (TDF)<sup>24</sup>

SN	TDF constructs	Definition <sup>24</sup>	Guide Questions
1.	Knowledge	An awareness of the existence of something	<ul style="list-style-type: none"> <li>• Can you describe your understanding of the need for hand hygiene?</li> <li>• When do you perform hand hygiene?</li> </ul>
2.	Skills	An ability or proficiency acquired through practice	<ul style="list-style-type: none"> <li>• Can you describe how to perform hand hygiene?</li> </ul>
3.	Social/professional role and identity	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting	<ul style="list-style-type: none"> <li>• Do you think hand hygiene guidelines are consistent with your professional standards of practice? How?</li> <li>• How will you describe the importance of performing hand hygiene to you as a person?</li> </ul>
4.	Beliefs about capabilities (self-efficacy)	Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use	<ul style="list-style-type: none"> <li>• Is performing hand hygiene easy or difficult for you? Why do you think so?</li> <li>• Can you describe any previous barriers or difficulties you've had performing hand hygiene?</li> <li>• Do you think you can improve your hand hygiene compliance despite the barriers? If yes, how do you intend to? If no, why do you think so?</li> </ul>
5.	Beliefs about consequences	Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation	<ul style="list-style-type: none"> <li>• What are the benefits of performing hand hygiene (to yourself, colleagues, patients, hospitals?)</li> </ul>
6.	Motivation and goals	A conscious decision to perform a behaviour or a resolve to act in a certain way; mental representations of outcomes or end states that an individual wants to achieve	<ul style="list-style-type: none"> <li>• Is there any need for you to increase your hand hygiene compliance?</li> <li>• What will be your reasons to increase your hand hygiene compliance?</li> <li>• Are there incentives to practising hand hygiene?</li> <li>• Do you have other things you would like to achieve that might interfere with increasing your hand hygiene compliance? If yes, what are they?</li> </ul>
7.	Memory, attention and decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between 2 or more alternatives	<ul style="list-style-type: none"> <li>• When do you consider it necessary to perform hand hygiene?</li> <li>• What factors influences your decision to perform hand hygiene? (Time, type of care, type of patient?)</li> <li>• Do you often remember or are you likely to forget to perform hand hygiene? When is this likely to happen?</li> </ul>
8.	Environmental context and resources (Environmental Constraints)	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, dependence and adaptive behaviour	<ul style="list-style-type: none"> <li>• What physical/resource factors (such as time, sink, water, alcohol gel) influence or hinder your hand hygiene practice?</li> <li>• Can you describe any competing tasks that may influence your hand hygiene practice?</li> </ul>
9.	Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings or behaviours	<ul style="list-style-type: none"> <li>• Does performing hand hygiene practice have any importance in your unit? How?</li> <li>• Can you describe how your colleagues' hand hygiene compliance influence (facilitate or hinder) hand hygiene compliance in your unit?</li> <li>• Do you look up to anyone as role models on hand hygiene practice?</li> </ul>
10.	Emotion (in terms of stress, burnout, anxiety, tiredness/cognitive overload, fear)	A complex reaction pattern, involving experiential, behavioural and physiological elements, by which the individual attempts to deal with a personally significant matter or event	<ul style="list-style-type: none"> <li>• Does hand hygiene practice induce emotional response? If yes, what?</li> <li>• How does emotion influence/affect hand hygiene practice?</li> </ul>
11.	Action planning (behavioural regulations)	Anything aimed at managing or changing objectively observed or measured actions	<ul style="list-style-type: none"> <li>• Are there any workplace measures in place to ensure you perform hand hygiene?</li> <li>• How will you describe these measures?</li> </ul>

### Ethical approval

Ethical approval was granted by the host university, University of Hull (Ref 279) and the hospital's Research Ethics Committee.

### Analysis

Interviews were transcribed verbatim and analyzed in NVivo (Version 12). Inductive analysis was thematic following Braun and Clark's 6 step process<sup>31</sup> and drew upon reflexive thematic analysis processes<sup>32</sup> as an approach suitable for flexible exploration of the participant's experiences. This was an inductive approach which involved familiarizing with the data by reading the transcripts and identifying any frequently emerging interesting ideas, in relation to the research question. These ideas were highlighted as likely codes, from which a

list of initial codes and data were generated. These codes were then reviewed for relevance and potential themes identified. The relationship between the themes were considered from which the main and subthemes emerged. The themes were consequently reviewed against the entire dataset to ensure that they captured the entire dataset and that they were the most relevant to the research question. This led to the refining, renaming and a narrative report on the titles of the themes and subthemes to ensure their accuracy and to fully depict how much the themes captured the dataset.<sup>31</sup>

Analysis was concurrent to collection until saturation was achieved. We established saturation when 3 concurrent interviews were conducted, and no new codes identified.<sup>33</sup> Initial inductive coding was undertaken by YA to generate candidate themes. JD and MG independently coded 16 transcripts. Discussion of initial codes led to a convergent coding framework refined by YA.

## RESULTS

Sixteen Interviews were conducted and took between 14.38 and 40.06 minutes (mean duration 20 minutes).

### Characteristics of the sample

Four doctors and 12 nurses participated in the interviews. There were 4 men and 12 women; length of clinical experience ranged from 4 months to 35 years. Table 2 describes the characteristics of the interview participants.

### Findings

There were 2 broad themes with a total of 8 subthemes; individual (subthemes include knowledge and skills, confidence, perceived risks, memory, the influence of others and skin irritation) and institutional (subthemes include environment and resources; workload and staffing levels) barriers and facilitators to hand hygiene practices. These are illustrated in Figure 1 and each is presented in turn below. The extent to which each posed either a barrier or facilitator and any variation between professional group is included in the narrative for each subtheme.

#### Theme 1: Individual barriers or facilitators

This theme related to barriers and facilitators at individual level and included 6 subthemes which are described in turn.

#### Knowledge, skills, and education

Around half of participants demonstrated good knowledge of when hand hygiene should be conducted, for example:

*“...when you resume work, before starting your procedures... before medication . . . before attending to your patients . . . in between patient contact . . . to wash your hands.”* Alice (Nurse)

*“Ok, there are standard ways to wash the hands. You wash your palms. . . in between your fingers. . . inside of your palm, and rub like this (describes rubs hands palm to palm step) and then you wash the back, you wash down and then with your hands stretched like this (describing right palm over left dorsum with fingers interlaced step), you then try to clean up . . .”* Brian (Dr)

However approximately half were unaware of how or when to conduct hand hygiene:

*“I can’t really remember the techniques, but I know we have techniques we use in hand hygiene practice. I don’t follow the procedure.”* Alice (Nurse)

*“There is no special procedure for hand hygiene.”* Peppa (Nurse)

Two participants (both of whom were doctors) used methylated spirit as a means of protection after a needle stick injury.

*“They tell you to use spirit as a crude way...methylated spirit to perform hand hygiene then you go assuming you’ve done something right. That’s the way it is here.”* Andrew (Dr)

Participants spoke of substituting glove use for hand hygiene or changing gloves without cleaning hand between. For example:

*“Perhaps you were actually on gloves with the other person, you might just change the gloves and wear another and say to yourself, let me just be on gloves instead of going back and forth [to wash hands].”* Chloe (Nurse)

*“At times, you tend to just wear gloves, remove them and wear another to attend to the patients. So, you would have attended to a number of patients before you come back to the wash basins and our sinks are very far from where the patients are.”* Emily (Nurse)

*“The access to sinks . . . the sink is usually far away from patients, you see a patient, you walk a distance to wash your hands, you come back and continue the cycle of seeing patient and walking distance . . . there are so many barriers . . . the barriers are limitless.”* George (Dr)

However, there were times when the choice to wear gloves was determined by environmental factors (e.g., no water or alcohol-based hand-rub). When asked about the “five moments of hand hygiene”, a participant said:

*“I’ve not seen it.”* Tara (Nurse)

There was no local policy for hand hygiene, and many were unaware of the WHO guidelines on hand hygiene. Participants tended to depend on posters to inform their practice.

**Table 2**  
Characteristics of interview participants

SN	Pseudonyms	Length of experience (Years)	Gender (Male (M)/ Female (F))	Profession (Nurse (N)/ Doctor (D))
1	Alice	0.5	F	N
2	Andrew	4	M	D
3	Anna	25	F	N
4	April	35	F	D
5	Betty	1	F	N
6	Brian	3	M	D
7	Chloe	6	F	N
8	Chris	3	M	N
9	Emily	4	F	N
10	George	10	M	D
11	Kate	3	F	N
12	Kim	7	F	N
13	Lisa	12	F	N
14	Mya	0.3	F	N
15	Peppa	3	F	N
16	Tara	5	F	N

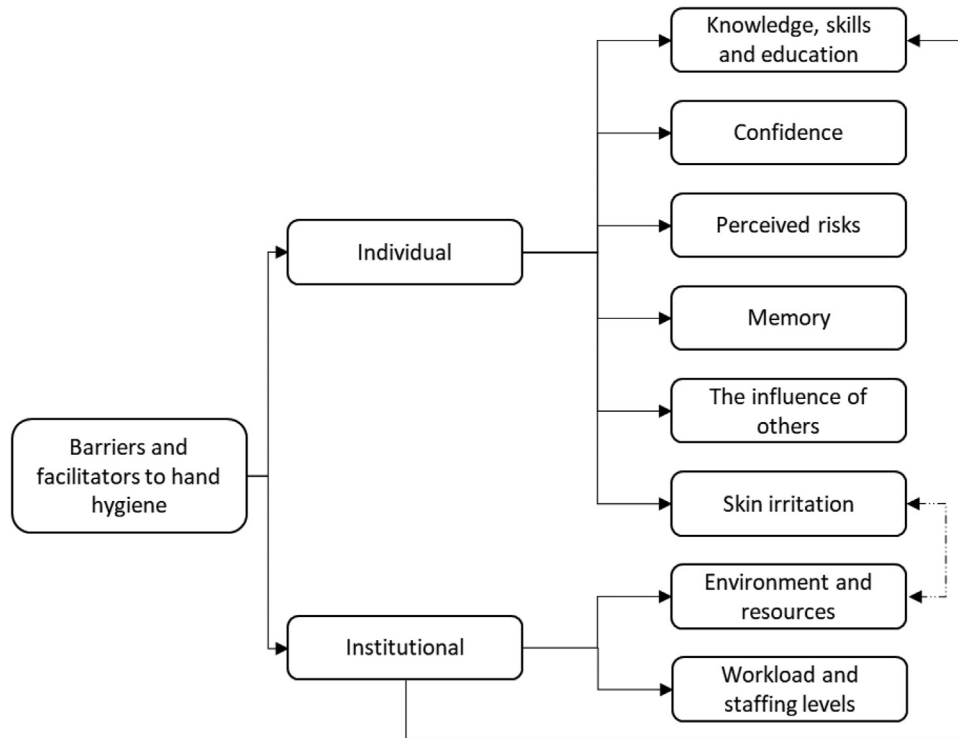


Fig 1. Barriers and facilitators to hand hygiene.

*"It's not like the hospital has its own policy on handwashing . . . no we don't, no we don't."* Tara (Nurse)

*"Each ward will have at least one poster by the sink".* Chris (Nurse)

*"It was when you started this research that I learnt there actually is a guideline on hand hygiene which I've never seen before."* April (Dr)

Participants sometimes remembered hand hygiene training they had during their medical and nurse education, many said they had not been offered any training since, some had never had training. An exception was 3 participants, who had infection prevention training during a recent Ebola outbreak.

*"I have never been formally trained on how to perform hand hygiene."* Emily (Nurse)

*"Well, apart from my knowledge from medical school and the periodic training I had during the Ebola disease outbreak, I can't think of any formal training on hand hygiene before."* Andrew (Dr)

Some participants recognised their role in supporting educating patients and non-qualified staff; this was considered a facilitator to hand hygiene in these groups.

*"Some of them [patients] come from the villages and see us do these things, they can even ask why this, and we educate them. Hand hygiene . . . they see us, and they've learnt from us."* Chris (Nurse)

*"The non-medical staff on the ward like the ward assistants, we still have to teach them about hand hygiene. So, our practice influences theirs too."* George (Dr)

**Confidence**

Practitioners recognized the value of confidence as a facilitator and suggested that this came through practice and time.

*"It's easy . . . when you get used to it, after a while, it becomes easy"*. George (Dr)

*"The more I do it . . . the easier it becomes."* Kate (Nurse)

**Perceived risk for infection**

Recognition of the need to protect themselves, their family members, patients, and colleagues was a facilitator to good hand hygiene and was mentioned by most participants. This linked with the sub-theme "emotion", when there was a fear of contracting diseases this generally prompted hand hygiene. Other features of this theme were the lack of compensation and salary in the event of the staff member being ill or unable to work.

*"In our healthcare setting . . . there is no insurance for you and you're on your own if anything happens to you so one has to be protective of oneself."* Kate (Nurse)

*". . . the hospital will continue to run if anything happens to you . . . so we need to protect our lives ourselves."* Kim (Nurse)

*"They [patients] develop what is called nosocomial infections, hospital acquired infections, we need to be careful that we are not the direct culprit transmitting the infections to our patients."* April (Dr)

*"My family who are non-medicals and they don't know what I've touched in the hospital."* Andrew (Dr)

The type of contact, unit or patient condition also indicated a level of risk that influenced hand hygiene behaviours; the greater the perceived risk to self or others the more the practitioner was likely to engage in hand hygiene.

*"It is very important in our unit . . . this is a surgical ward. We take care of patients' wounds . . . some are infected."* Anna (Nurse)

*"There was a time I was in a unit where you see infectious patients . . . you are in an infectious environment . . . because of what is at stake . . . because of the environment I find myself."* Andrew (Dr)

### Memory

Several participants mentioned memory as a barrier or a facilitator to hand hygiene, some saying they sometimes forget, some saying they never forget and several saying that hand hygiene is an automatic behavior. For example:

*"It is likely I forget to wash my hands before attending to others . . . I may be attending to one patient, and they are bringing another patient in . . . I rush."* Lisa (Nurse)

*"I don't forget, I remember all the time".* Anna (Nurse)

*"You know what you do every day . . . becomes part of you."* Mya (Nurse)

### The influence of others

Here some participants spoke about the positive influence of senior colleagues who they sought to model their own practice on.

*"Matron . . . she is very good at the procedure . . . I look up to her."* Chris (Nurse)

*"A dermatologist that was here. She used to really wash her hands . . . she was way ahead in the game . . . a whole new level that I try to attain."* George (Dr)

For some, the patients' opinions on their hand hygiene practice mattered to them. In other cases, practitioners engaged in hand hygiene to reassure and out of respect to patients:

*"[Engage in hand hygiene] so the public sees us with integrity and dignity, and they respect us."* Kim (Nurse)

*"Before you see a patient you wash your hands, that means you respect that patient . . . [it] boosts their confidence . . . they can trust us with their health."* Brian (Dr)

Participants pride in the positive reputation of the hospital and their wishes to continue the reputation acted as a facilitator to hand hygiene.

*"People will talk very well of the hospital because they know it's very clean. The nurses are very clean people, they wash their hands from time to time."* Anna (Nurse)

### Skin irritation

Skin Irritation was cited as a barrier by a small number of participants. This was due mainly because of the lack of appropriate soap

which was substituted with more acidic locally made alternatives combined with the frequency of washing.

*"First is the inadequate provision of appropriate soap. Like now, you know in Nigeria, a lot of people are making liquid soap . . . the acidic content of the soap . . . some will have too much acid and caustic soda . . . I would avoid using it."* Alice (Nurse)

*"Some of us react to the liquid soap provided . . . they cause harm to the hands."* Mya (Nurse)

### Theme 2: Institutional barriers or facilitators

Institutional barriers or facilitators were those arising from the hospital systems, infrastructure, or culture.

#### Environment and resources

There was consensus among participants that the facilities, including soaps, water, sinks, taps, alcohol-based hand-rub and hand drying facilities were barriers to optimal practice. Some participants identified how dirty the general environment was.

*"Our environment is usually dirty."* George (Dr)

*"Our environment is dusty."* Anna (Nurse)

More than half of participants identified a lack of liquid soap stating that bar soaps were provided.

*"We use whatsoever soap that is available in the hospital. . . both bar and liquid soap depending on what is available."* Alice (Nurse)

Some participants noted that when liquid soaps are provided, they are heavily diluted without any standard measure of dilution. This is closely linked to saving money and hospital finances.

*"Liquid soaps are available at times, but it would have been diluted and be very watery . . . I don't know the ratio of soap to water all I know is that it's always very watery."* Lisa (Nurse)

*"You know the problem with hospital economy, and they have to water down the liquid soap . . . because of the economy they are trying to cut cost."* George (Dr)

*"If it finishes before time, we won't get another one, so we have to maximise what we have."* Peppa (Nurse)

*". . . when there is no soap, we can take an empty bottle of detergent and put water inside, shake thoroughly and use that to wash your hands."* Betty (Nurse)

A number of problems were reported with the sinks, sometimes they were blocked and left unrepaired, often they were dirty and usually there were too few and inconveniently placed; all of these issues deterred handwashing.

*"Blocked sinks . . . the hospital maintenance department too might say they're too busy to come and fix it."* Kim (Nurse)

*"Some are dirty, and you don't want to wash your hands in a dirty sink."* Tara (Nurse)

*"The sink is usually far away from the patients. You see a patient; you walk a distance to wash your hands then come back and continue*



the cycle of seeing patient and walking distance to perform hand hygiene.” Emily (Nurse)

The majority of participants reported times where there was no running water. When this was the case the health assistants had to take turns in fetching buckets of water, for example:

*“We may not have running water and we just have to depend on another source.”* Betty (Nurse)

*“At times, before our orderlies [ward assistants] can get a bowl of water, you will just be hanging your hands there and you won’t be able to do other things. . . . just [waiting] for them to get water.”* Emily (Nurse)

*“We have water storage but if it finishes and it isn’t your ward’s turn yet then you resort to ward assistant fetching water in buckets or from other wards. . . . and they are not on duty every time.”* Kim (Nurse)

Several participants identified a lack of automated or elbow-operated taps; many discussed a lack of disposable towels.

*“We don’t have the elbow-operated taps.”* Chloe (Nurse)

*“We have towels we hang by the basin, that’s what everybody uses.”* Emily (Nurse)

Most of the participants who spoke about cloth towels said they bring their own towel to work to limit their exposure to infections.

*“I just use my clean hand towel that I brought from home.”* April (Dr)

*“I have my own personal towel but it’s not good.”* Kate (Nurse)

Nearly all participants said they did not have access to alcohol-based hand-rub. One participant said they only got hand-rub when the hospital was being inspected and another said they had to choose between hand-rub and soap.

*“There was a time I went to meet one of the matrons that we needed handwashing liquid soap and alcohol-based hand-rub. You know what she told me? She asked me to choose one of the two, that we can’t have the two. So, I picked the liquid soap and left. Even when they supply, they give us small bottles and . . . we know it’s either it’s about to expire or it has expired.”* Kate (Nurse)

The environmental barriers to hand hygiene were summarized by 1 participant who said:

*“When the desirable is not available, the available becomes desirable. Ensure . . . there is something that is protecting your hands.”* Brian (Dr)

### Workload and staffing levels

The majority of participants identified heavy workload or staff shortage as barriers to hand hygiene.

*“The major thing is the workload, if I am to care for a patient and another patient is demanding for my care at the same time . . . it may skip my mind to wash my hands before attending to others that need my attention.”* Lisa (Nurse)

*“We are short staffed. We are very, very short staffed.”* Emily (Nurse)

*“It is the problem of this country. In developed climes, you have like a doctor to about 25 or 250 people, in Nigeria it’s a doctor to nothing less than 10,000 people. So, you can imagine . . . you want to be*

*scrubbing [hand hygiene] per person or Nigerians will be dying because of your negligence.”* Brian (Dr)

## DISCUSSION

This study explored the barriers and facilitators to hand hygiene in a Nigerian private teaching hospital through theoretically underpinned in-depth qualitative interviews. Sixteen semi-structured interviews with 4 doctors and twelve nurses resulted in 2 key themes and 8 sub themes; (1) Individual factors (sub-themes include knowledge, skills and education, confidence, perceived risks, memory, the influence of others and skin irritation) and (2) Institutional factors (sub-themes include environment and resources and workload and staffing levels). Subsumed within these themes, reported in the results section, are unique findings which have not been reported elsewhere. These include participants being told to choose between soap and gel, diluting soap to make it last longer, the opportunity costs of personnel carrying water to units, practitioner fears of infecting their families, bringing resources to work from home to support hand hygiene, and the dirty or dusty nature of the environment generally.

Our study reported here concurs with existing literature relating to barriers and facilitators to hand hygiene in sub-Saharan African countries<sup>13,16,21</sup> and offers additional detail, nuances and barriers and facilitators not previously reported. For example, several studies report skin irritation as a problem<sup>34–37</sup> and 1 acknowledged participant preference for commercial compared with hospital prepared hand sanitisers.<sup>36</sup> Our study added to these findings also identifying a complete absence of hand gel (other than when the hospital was being inspected) and reported locally made soaps made with caustic soda (an ingredient that can cause skin burns). Unlike other studies, our participants talked about heavily diluting liquid soaps so they would last longer, were less likely to run out and to save money. The literature describes infrastructural deficits with lack of water,<sup>21,38–42</sup> leaking and blocked sinks.<sup>37,43–45</sup> Our participants repeatedly reported the environment was dirty or dusty, a similar finding in a recently published study.<sup>20</sup> Again, insufficient hand hygiene resources such as running water have been previously reported in developing countries,<sup>13,16,20</sup> with one-third of health care settings lacking basic hand hygiene facilities at the point of care.<sup>21</sup> A recent study found that 50% of the health care facilities lacked piped water, 39% lacked handwashing soap, 39% lacked adequate infectious waste disposal, and 73% lacked sterilisation equipment.<sup>46</sup>

Unlike other studies, our participants also described a process whereby when there was no running water the care assistants had to spend their whole shift transporting water in buckets. This resulted in the opportunity cost of less direct patient care. Previous studies identify some practitioners’ fear of contracting an infection as a facilitator to hand hygiene.<sup>38,41,47</sup> Our participants reported similarly but their fears were not restricted to the infection itself but also the lack of sick benefit or income if participants were unable to work. They reported having no health insurance. In addition to fears about becoming infected themselves, as identified in other studies, our participants feared infecting their friends or family.<sup>21</sup> Organizations need to consider occupational hazards of hospital environment when fixing the pay of the employees.<sup>48</sup>

This work is one of few qualitative studies conducted in SSA. Our previous review of the literature<sup>13</sup> identified 21 surveys or observational studies and only 6 qualitative studies involving interviews<sup>43,49,50</sup> or focus groups.<sup>37,51,52</sup> Only 2 of these qualitative studies were conducted in Nigeria.<sup>37,51</sup> It is likely that our iterative qualitative approach resulted in the depth and nuanced understanding of barriers and facilitators presented here. For instance, when early interview participants identified lack of running water as a

barrier, the researcher asked additional questions specifically about how this was managed on the wards which generated novel findings in this study. There is also evidence that a theoretical approach may result in the identification of more barriers to hand hygiene than a non-theoretical approach.<sup>18</sup> This may be because the intention to clean hands is driven by sub-conscious influences such as habit or reward; explicit theoretical questioning may increase the conscious awareness of these influences.<sup>18</sup> However, there are limitations to our study. Our intention was to conduct interviews at public hospitals in Nigeria, however, staff working in these hospitals were engaged in strike action for an extended period of time; we therefore engaged with a private teaching hospital. It is likely that hand hygiene resources and the infrastructure generally was more generous in this hospital than in public hospitals, potentially resulting in fewer barriers being reported. We did not include health assistants in interviews as they were unlikely to speak English; they are likely to have different and potentially greater barriers than other (educated) groups. We acknowledge this selection bias and recommend their inclusion in future studies. Finally, we sought to understand barriers in the surgical ward environment as these wards have the highest occurrence of HCAs in Nigeria.<sup>14,15</sup> Our results may not be transferable to other hospital wards and departments.

Future research should consider and compare the barriers and facilitators to hand hygiene practice across different practitioner groups and in different hospital environments in SSA. Interventions designed to address identified barriers should be developed and tested for impact on compliance with hand hygiene. We recommend a multicenter study, conducted in public hospitals which might uncover more barriers in SSA hospitals. Using in-depth research methodologies such as focus group discussions, the perceptions of hospital administrators on hand hygiene could be explored which could eventually enhance the provision of hand hygiene facilities. There is need to improve staff welfare relating to prompt payment of salaries, compensation in event of occupational hazards and maintaining the World Health Organisation minimum patient to health care professional density. Prioritizing adequate funding of health systems in SSA countries is critical to enhancing patient safety in this region.

## CONCLUSIONS

Hand hygiene has been identified as the primary measure to reduce HCAs.<sup>2</sup> Our study had identified multiple barriers to this. Strategies should be sought to address barriers to support best practice.

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## References

- Zimlichman E, Henderson D, Tamir O, Franz C, Song P, Yamin CK, et al. Health care-associated infections: a meta-analysis of costs and financial impact on the US health care system. *JAMA Intern Med.* 2013;173:2039–2046.
- Chernet AZ, Dasta K, Belachew F, Zewdu B, Melese M, Ali MM. Burden of Healthcare-Associated Infections and Associated Risk Factors at Adama Hospital Medical College, Adama, Oromia, Ethiopia. *Drug, healthcare and patient safety.* 2020;12:177–185.
- Haque M, Sartelli M, McKimm J, Abu Bakar M. Health care-associated infections – an overview. *Infection and drug resistance.* 2018;11:2321–2333.
- Allegranzi B, Nejad SB, Combescure C, Graafmans W, Attar H, Donaldson L, et al. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. *The Lancet (British edition).* 2011;377:228–241.
- Allegranzi B, Nejad SB, Pittet D. The Burden of Healthcare-Associated Infection. In: Pittet D, Boyce JM, Allegranzi B, eds. *Hand Hygiene.* 2017:1–7.
- Rosenthal VD. Health-care-associated infections in developing countries. *Lancet North Am Ed.* 2011;377:188.

- Maki G, Zervos M. Health Care–Acquired Infections in Low- and Middle-Income Countries and the Role of Infection Prevention and Control. *Infect Dis Clin North Am.* 2021;35:827–839.
- Dixit D, Hagtvedt R, Reay T, Ballermann M, Forgie S. Attitudes and beliefs about hand hygiene among paediatric residents: a qualitative study. *BMJ Open.* 2012;2.
- World Health Organisation. *Hand Hygiene: Why, How & When?* 2009. Accessed 02 Feb, 2022. [https://www.who.int/gpsc/5may/Hand\\_Hygiene\\_Why\\_How\\_and\\_When\\_Brochure.pdf](https://www.who.int/gpsc/5may/Hand_Hygiene_Why_How_and_When_Brochure.pdf).
- Weston D, Weston D. *Fundamentals of infection prevention and control : theory and practice.* Chichester, West Sussex: John Wiley & Sons; 2014.
- Graf K, Chaberny IF, Vonberg R. Beliefs about hand hygiene: A survey in medical students in their first clinical year. *Am J Infect Control.* 2011;39:885–888.
- Kingston L, O'Connell NH, Dunne CP, O'Connell NH. Hand hygiene-related clinical trials reported since 2010: a systematic review. *J Hosp Infect.* 2016;92:309,320–320.
- Ataiyero Y, Dyson J, Graham M. Barriers to hand hygiene practices among health care workers in sub-Saharan African countries: A narrative review. *Am J Infect Control.* 2019;47:565–573.
- Ige OK, Adesanmi AA, Asuzu MC. Hospital-acquired infections in a Nigerian tertiary health facility: An audit of surveillance reports. *Niger Med J.* 2011;52:239–243.
- Iliyasu G, Dayyab FM, Abubakar S, Inuwa S, Tambuwal SH, Tihamiyu AB, et al. Laboratory-confirmed hospital-acquired infections: An analysis of a hospital's surveillance data in Nigeria. *Heliyon.* 2018;4:e00720.
- Ataiyero Y, Dyson J, Graham M. An Observational Study of Hand Hygiene Compliance of Surgical Healthcare Workers in a Nigerian Teaching Hospital. *Journal of Infection Prevention.* 2022.
- Larson E. A tool to assess barriers to adherence to hand hygiene guideline. *Am J Infect Control.* 2004;32:48–51.
- Dyson J, Lawton R, Jackson C, Cheater F. Does the use of a theoretical approach tell us more about hand hygiene behaviour? The barriers and levers to hand hygiene. *J INFECT PREV.* 2011;12:17–24.
- Fuller C, Michie S, Savage J, McAteer J, Besser S, Charlett A, et al. The Feedback Intervention Trial (FIT)—Improving Hand-Hygiene Compliance in UK Healthcare Workers: A Stepped Wedge Cluster Randomised Controlled Trial. *PLoS One.* 2012;7:1–10.
- Tu R, Elling H, Behnke N, Tseka JM, Kafanikhale H, Mofolo I, et al. A qualitative study of barriers and facilitators to adequate environmental health conditions and infection control for healthcare workers in Malawi. *H2Open Journal.* 2022;5:11–25.
- Tantum LK, Gilstad JR, Bolay FK, Horng LM, Simpson AD, Letizia AG, et al. Barriers and Opportunities for Sustainable Hand Hygiene Interventions in Rural Liberian Hospitals. *Int J Environ Res Public Health.* 2021;18:8588.
- Srigley JA, Corace K, Hargadon DP, Yu D, MacDonald T, Fabrigar L, et al. Applying psychological frameworks of behaviour change to improve healthcare worker hand hygiene: a systematic review. *J Hosp Infect.* 2015;91:202–210.
- Huis A, van Achterberg T, de Bruin M, Grol R, Schoonhoven L, Hulscher M. A systematic review of hand hygiene improvement strategies: a behavioural approach. *Implement Sci.* 2012;7:92.
- Smith JD, Corace KM, MacDonald TK, Fabrigar LR, Saedi A, Chaplin A, et al. Application of the Theoretical Domains Framework to identify factors that influence hand hygiene compliance in long-term care. *J Hosp Infect.* 2018;101:393–398.
- Fuller C, Savage J, Besser S, Hayward A, Cookson B, Cooper B, et al. The dirty hand in the latex glove: a study of hand hygiene compliance when gloves are worn. *Infect Control Hosp Epidemiol.* 2011;32:1194–1199.
- Michie S, Johnston M, Abraham C, Lawton R, Parker D, Walker A. Making psychological theory useful for implementing evidence based practice: a consensus approach. *QUAL SAF HEALTH CARE.* 2005;26–33.
- Kurz T, Gardner B, Verplanken B, Abraham C. Habitual behaviors or patterns of practice? Explaining and changing repetitive climate-relevant actions. *WIREs Clim Change.* 2015;6:113–128.
- Ross L. The intuitive psychologist and his shortcomings: distortions in the attribution process. *Adv Exp Soc Psychol.* 1977;10:173–220.
- Palinkas A, Lawrence, Horwitz M, Sarah, Green A, Carla, Wisdom P, Jennifer, Duan, Naihua, Hoagwood Kimberly. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research.* 2015;42:533–544.
- Blench R. *An atlas of Nigerian languages.* Cambridge; 2019.
- Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative res in psychol.* 2006;3:77–101.
- Braun V, Clarke V. Thematic analysis. In: Cooper H, Camic PM, Long DL, Panter AT, Rindskopf D, Sher KJ, eds. *APA Handbook of Research Methods in Psychology Vol 2: Research Designs: Quantitative, Qualitative, Neuropsychological, and Biological.* American Psychological Association; 2012:57–71.
- Francis JJ, Johnston M, Robertson C, Glidewell L, Entwistle V, Eccles MP, et al. What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychology & health.* 2010;25:1229–1245.
- Omogbai JJ, Azodo CC, Ehizele AO, Umoh A. Hand hygiene amongst dental professionals in a tertiary dental clinic. *Afj clin exp microbiol.* 2011;12:9–14.
- Tobi K, Enyi-Nwafor K. Hand washing practices and compliance among health care workers in the intensive care unit of a teaching hospital in Nigeria. *Nigerian Medical Practitioner.* 2013;63:82–89, 63:82–9.
- Schmitz K, Kempker RR, Tenna A, Stenehjem E, Abebe E, Tadesse L, et al. Effectiveness of a multimodal hand hygiene campaign and obstacles to success in Addis Ababa. *Ethiopia. Antimicrob Resist Infect Control.* 2014;3:8.



37. Uneke CJ, Ndukwe CD, Oyibo PG, Nwakpu KO, Nnabu RC, Prasopa-Plaizier N. Promotion of hand hygiene strengthening initiative in a Nigerian teaching hospital: implication for improved patient safety in low-income health facilities. *Braz J Infect Dis.* 2014;18:21–27. 18:21-7.
38. Alex-Hart B, Opara PI. Observed Hand Washing Practices among Health Workers in Two Critical Paediatrics Wards of a Specialist Hospital. *AM J INFECT DIS.* 2014;10:95–99.
39. Amissah I, Salia S, Craymah JP. A study to assess hand hygiene knowledge and practices among health care workers in a teaching hospital in Ghana. *Int J Sci Res.* 2016;5:301–307.
40. Ango UM, Awosan KJ, Adamu H, Salawu S, Sani MM, Ibrahim AH. Knowledge, attitude and practice of hand hygiene among healthcare providers in semi-urban communities of sokoto state. *Nigeria.* 2017;26:1–9.
41. Opara PI, Alex-Hart BA. Handwashing practices among medical students in Port Harcourt, Nigeria. *The Nigerian health journal.* 2009;9:16–20.
42. Yawson AE, Hesse AAJ. Hand hygiene practices and resources in a teaching hospital in Ghana. *J Infect Dev Ctries.* 2013;7:338–347.
43. Holmen IC, Seneza C, Nyiranzayisaba B, Nyiringabo V, Bienfait M, Safidar N. Improving hand hygiene practices in a rural hospital in Sub-Saharan Africa. *Infect Control Hosp Epidemiol.* 2016;37:834–839.
44. Bello S, Effa EE, Okonkon EE, Oduwole OA. Handwashing practice among health-care providers in a tertiary hospital in southern Nigeria. *International Journal of Infection Control.* 2013;9.
45. Allegranzi B, Sax H, Bengaly L, Richet H, Minta DK, Chraiti M, et al. Successful implementation of the World Health Organization hand hygiene improvement strategy in a referral hospital in Mali, Africa. *Infect Control Hosp Epidemiol.* 2010;31:133–141.
46. Cronk R, Bartram J. Environmental conditions in health care facilities in low- and middle-income countries: coverage and inequalities. *Int J Hyg Environ Health.* 2018;221:409–422.
47. Ekwere TA, Okafor IP. Hand hygiene knowledge and practices among healthcare providers in a tertiary hospital, South West Nigeria. *Int J Infection Control.* 2013;9.
48. Akhigbe OJ, Ifeyinwa EE. Compensation and employee loyalty among health workers in Nigeria. *Arch Business Res.* 2017;5:10–26.
49. Mearkle R, Houghton R, Bwonya D, Lindfield R. Barriers to hand hygiene in ophthalmic outpatients in Uganda: a mixed methods approach. *J Ophthalmic Inflamm Infect.* 2016;6:11.
50. Owusu-Ofori A, Jennings R, Burgess J, Prasad PA, Acheampong F, Coffin SE. Assessing hand hygiene resources and practices at a large African teaching hospital. *Infect Control Hosp Epidemiol.* 2010;31:802. 808 7p.
51. Ibeneme S, Maduako V, Ibeneme GC, Ezuma A, Ettu TU, Onyemelukwe NF, et al. Hand Hygiene Practices and Microbial Investigation of Hand Contact Swab among Physiotherapists in an Ebola Endemic Region: Implications for Public Health. *BIOMED RES INT.* 2017;1–13.
52. Samuel Almedom AM, Hagos G, Albin S, Mutungi A. Promotion of handwashing as a measure of quality of care and prevention of hospital-acquired infections in Eritrea: the Keren study. *Afr Health Sci.* 2005;5:4–13.