HAND HYGIENE AUDIT AMONG HEALTHCARE WORKERS IN THE UNIVERSITY OF BENIN TEACHING HOSPITAL (UBTH)

BY

ODIASE OSARUMWENSE JOHN MED1606108

OSIAGBON GIDEON MED1606133

DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, COLLEGE OF MEDICINE,

UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA

A ONE YEAR PROJECT PRESENTED TO THE DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF A BACHELOR OF MEDICINE AND BACHELOR OF SURGERY (MBBS) DEGREE

OCTOBER, 2025

HAND HYGIENE AUDIT AMONG HEALTHCARE WORKERS IN THE UNIVERSITY OF BENIN TEACHING HOSPITAL (UBTH)

BY

ODIASE OSARUMWENSE JOHN MED1606108

OSIAGBON GIDEON MED1606133

DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, COLLEGE OF MEDICINE,

UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA

DECLARATION

We hereby declare that this project work titled "**Hand hygiene audit among healthcare workers in the University of Benin Teaching Hospital (UBTH)**" was conducted under supervision and has not been submitted in part or in full for any purpose.

ODIASE JOHN OSARUMWENSE
MED1606108
09033158378

OSIAGBON GIDEON
MED1606133
07039040803

CERTIFICATION

This is to certify that this research work titled **"HAND HYGIENE AUDIT AMONG HEALTHCARE WORKERS IN THE UNIVERSITY OF BENIN TEACHING HOSPITAL (UBTH)"** will be conducted by **ODIASE JOHN OSARUMWENSE** with matriculation number **MED1606108** and **OSIAGBON GIDEON** with matriculation number **MED1606133** under supervision of **PROF. E.O OGBOGHODO** in the Department of Public Health and Community Medicine, College of Medicine, University of Benin as part of the requirements for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS).

_____ _____

SUPERVISOR
PROF. E.O OGBOGHODO
MBBS, MPH, FMCPH, FWACP,
FRSPH, DIPC
Associate Professor/Consultant
Department of Public Health and
Community Medicine
School of Medicine,
University of Benin,
Benin City, Edo state Nigeria.

HEAD OF DEPARTMENT
DR O.E. OBARISIAGBON
MBBS; MPH; FMCPH; CERT,
EPID.
Associate Professor/Consultant
Department of Public Health and
Community Medicine
School of Medicine,
University of Benin,
Benin City, Edo state Nigeria.

DEDICATION

This work is dedicated to God Almighty who made it possible, and to our parents, Mr Roland Agbnonmwinisoken Odiase and Mrs Patricia Isoken Odiase, late Mr. Osiagbon Sunday, and Mrs. Idiaghe Faith.

ACKNOWLEDGEMENTS

I wish to express my deepest gratitude to Almighty God for granting me the strength, wisdom, and resources needed to complete this project successfully.

My heartfelt appreciation goes to my supervisor, Prof. Esohe Olivia Ogboghodo, whose dedication, guidance, and mentorship were invaluable throughout the course of this work. I also want to thank the head of department Dr O. E. Obarisiagbon and other lecturers especially Dr Ojiebun for providing the knowledge and training that shaped my growth in public health and medical research.

I remain profoundly thankful to my parents, Mr Roland Agbnonmwinisoken Odiase and Mrs Patricia Isoken Odiase, for their unwavering love, prayers, and sacrifices, which have been the foundation of my journey. My sincere appreciation also goes to Vera Ekhator and Osaretin Okoyomon for their moral encouragement, financial support, and constant inspiration. I am equally indebted to my siblings: Mr Solomon Odiase, Stephan Osato Osahon, Osarugue Odiase, and Caleb Odiase for their unwavering support and care during this journey.

— Odiase John

I sincerely thank Almighty God for His grace, strength, and guidance throughout the completion of this project. His unwavering presence has been my greatest source of support.

My deepest appreciation goes to my late father, Mr. Osiagbon Sunday, whose memory continues to inspire me every day. I also express profound gratitude to my mother, Mrs. Idiaghe Faith, for her endless love, prayers, and sacrifices. My heartfelt thanks go to my siblings, Osiagbon Mercy and Osiagbon Blessing, for their encouragement, understanding, and constant motivation throughout this academic journey.

I also wish to acknowledge my dear friends for their companionship and inspiration. Honourable mentions to Samuel Ukalike, Iyengunmwena Osadebamwen, Isichei Joan, Osondu Covenant and

Eloghosa Egharevba, whose support, friendship, and positive energy have been invaluable during this period.

To everyone who has, in one way or another, contributed to my success, I express my sincere gratitude.

— Osiagbon Gideon

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ABHR: Alcohol-Based Hand Rub

ENT: Ear, Nose, Throat

GDP: Gross Domestic Product

HAIs: Healthcare Acquired Infections

HCWs: HealthCare Workers

HH: Hand Hygiene

HIC: High Income Countries

IPC: Infection Prevention and Control

ICUs: Intensive Care Units

LMIC: Low- and Middle-Income Countries

SARA: Service Availability and Readiness Assessment

WHO: World Health Organization

DEFINITION OF TERMS

Audits: set of guidelines or criteria used to ensure the quality, consistency, and reliability of an activity

Compliance: act of adhering to and following laws, regulations, standards, and ethical practices set by governing bodies, industry groups, or an organization.

Covert observation: a type of research observation where participants are not aware that they are being observed.

Hand hygiene: the practices performed to keep hands clean and free from pathogens and other harmful microorganisms.

Healthcare associated infections: infections that patients acquire while receiving treatment for medical or surgical conditions in a healthcare facility

Microorganisms: small, often microscopic organisms found in the environment and capable of causing diseases.

Overt observation: a type of research observation where participants are aware that they are being observed.

ABSTRACT

BACKGROUND: Hand hygiene is a key component of infection prevention and control (IPC) strategies, proven to significantly reduce healthcare-associated infections (HAIs) and improve patient safety. Despite this, compliance with hand hygiene protocols among healthcare workers (HCWs) in many healthcare facilities remains suboptimal. This study assessed the knowledge, attitude, compliance, and determinants influencing hand hygiene practice among healthcare workers in the University of Benin Teaching Hospital (UBTH), Benin City, Edo State, Nigeria.

MATERIALS AND METHODS: A descriptive cross-sectional study design was employed in this study. The sample size was calculated using Cochran's formula for descriptive studies. A stratified random sampling technique was utilized for the study. Data were collected using a structured self-administered questionnaire adapted from WHO hand hygiene tools, the Hand Hygiene Belief Scale (HHBS), and WHO ward infrastructure checklist. Data were analyzed using IBM SPSS version 27.0. Descriptive statistics were presented as frequencies, means, and percentages, while inferential statistics including Chi-square test and binary logistic regression were used to determine associations, with statistical significance set at $p < 0.05$.

RESULTS: A total of 460 respondents participated in the study, with a mean age of 31.9 ± 7.7 years; 247 (53.7%) were females and 213 (46.3%) males. Almost all participants (457 [99.3%]) were aware of hand hygiene, and 359 (78.0%) had received formal training within the previous three years. However, only 170 (37.0%) demonstrated good knowledge, while 290 (63.0%) had poor knowledge. A positive attitude toward hand hygiene was observed in 349 (75.9%) respondents, yet only 210 (45.7%) demonstrated satisfactory compliance with the WHO's Five Moments for Hand Hygiene. Nurses (185 [40.2%]) recorded the highest compliance rates compared with other cadres.

Marital status (p = 0.033), profession (p = 0.027), and monthly income (p = 0.024) were significantly associated with knowledge. Logistic regression showed that being unmarried (AOR =

2.32; 95% CI: 1.36-3.94; p = 0.002), female (AOR = 1.62; 95% CI: 1.05-2.51; p = 0.031), and of the nursing profession (AOR = 2.54; 95% CI: 1.17-5.53; p = 0.019) independently predicted good knowledge. Facility assessment revealed inadequate availability of alcohol-based hand rubs (62 [13.5%]), inconsistent running-water supply, and incomplete handwashing infrastructure in several wards.

CONCLUSION: About a third of the health workers demonstrated good knowledge of hand hygiene, with marital status and profession identified as significant predictors. Half exhibited a positive attitude, which was associated with female gender, single marital status, paramedical profession, and longer years of practice. Approximately two-thirds were compliant with hand hygiene practices, with nurses showing the highest compliance rates. Awareness of guidelines, understanding the importance of hand hygiene, and belief in its role in preventing infections were key facilitators, while only a third of the wards had adequate infrastructure to support and sustain proper hand hygiene practices.

KEYWORDS: Hand hygiene, Compliance, Knowledge, Healthcare workers, UBTH

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Hand hygiene is a very important aspect of infection prevention and control (IPC), significantly reducing the transmission of healthcare-associated infections (HAIs) by up to 50%.[1] Microorganisms causing infections, especially respiratory and gastrointestinal infections (e.g., influenza and gastroenteritis) can be transmitted by healthcare workers hands during patient care. Hence, improved hand hygiene can reduce the spread of healthcare acquired infections (HAIs), including those with multi-resistant microorganisms.[1] HAIs negatively affect the quality of healthcare services, putting patients at greater health risks and increasing healthcare costs. Improvement in hand hygiene compliance is the most effective measure to reduce the incidence of HAIs in healthcare settings.[2]

Hand hygiene comprises of hand washing using soap and water to remove soil and transient microorganisms and hand washing using antiseptic solutions or alcohol-based hand rubs to kill microorganisms in addition to fingernail care.[3] HAIs are getting increased attention as there is evidence most of them can be prevented by strict hand hygiene practice.[4]

The concept of hand hygiene for preventing infections can be traced back to the early 1800s. In 1824, Ignaz Semmelweis, a Hungarian Obstetrician, observed a significantly higher mortality rate among women who delivered babies in wards staffed by physicians and medical students compared to those delivered by midwives. He hypothesized that the students were transferring infectious material from autopsies to women during childbirth.[5] Subsequently, he designed and implemented a mandatory hand-washing policy for physicians and medical students with chlorinated lime solution, resulting in a dramatic reduction in mortality rates.[5] Despite this early success, the importance of hand hygiene was not widely accepted as Semmelweis' seniors rejected his hypothesis. It was later

accepted during the late 19th century with the rise of the germ theory of disease by Louis Pasteur and concept antisepsis by Joseph Lister.[5]

Global health bodies like the World Health Organization (WHO) have played a significant role in improving hand hygiene in healthcare settings by formulating guidelines for hand hygiene. The WHO released its guidelines which provides healthcare workers (HCWs), hospital administrators and health authorities with a thorough review of evidence on hand hygiene and specific recommendations to improve hand hygiene practices and reduce pathogenic transmission of pathogenic microorganisms to patients and HCWs.[6]

The WHO guideline outlines key moments in hand hygiene in healthcare settings, including before clean/aseptic procedures, after contact with patient blood, body fluids, secretions excretions, and contaminated items, after moving from a contaminated body site during patient care, after having contact with a patient's surroundings, and before and after aseptic preparations of medications.[6] These guidelines also emphasize the importance of both handwashing with soap and water and using alcohol-based hand rub (ABHR) depending on the situation.[6]

HAIs affect patients receiving healthcare in a hospital or healthcare facility. These infections first appear 48 hours or more after hospitalization or within 30 days after completing healthcare.[7] HAIs initially only described those infections linked with short-term hospital admission, but the term currently includes infections developed in all settings where patients receive healthcare (e.g., long-term care, family medicine clinics, home care, and ambulatory care). Common types of HAIs include pneumonia, bloodstream infections, urinary tract infections, surgical site infections, gastrointestinal infections, and ear, nose, throat (ENT) infections.[8]

HAIs have significant impact as it increases the rate of in-hospital mortality, the length of extra hospital stays, and extra costs for medical care. Patients usually admitted to intensive care units

(ICUs) are more susceptible to HAIs, and both HAIs and ICU admission significantly predict in-hospital mortality.[9]

The WHO has an acceptable overall hand hygiene rate higher than 90% however, healthcare settings achieve only half this rate.[6,10]. Several factors are responsible for this subpar rate, including factors that facilitate, and those that hinder hand hygiene compliance among healthcare workers. Facilitators and barriers include knowledge, skills, and education, perceived risks of infection to self and others, memory, the influence of others, skin irritation, environment and resources, workload, and staffing levels.[11]

In addition to audits, hygiene initiatives are a major way of improving compliance of healthcare workers towards proper hand hygiene. Successful hand hygiene initiatives have been launched in the past including the save lives: clean your hands campaign in 2009, and the "clean care is safer care" in 2005, both led by the WHO.[12,13] These initiatives are aimed at improving hand hygiene practices in healthcare settings, leading to a reduction in the number of HAIs.

The WHO has a hand hygiene audit tool which provides a standardized method for assessing hand hygiene compliance across different healthcare settings. Standardization ensures consistency in measurement and for global comparison of results. The audit tool can be used to observe hand hygiene compliance rates, and can guide improvements in hand hygiene practices by identifying specific areas that need attention.[6]

1.2 STATEMENT OF PROBLEM

Health-care associated infections (HAIs) are threats in healthcare settings as they contribute to increased morbidity, mortality and antimicrobial resistance across the globe. Hand hygiene (HH) has been shown to be the simplest and most important intervention to reduce HAIs.[14] Despite the established benefit of hand hygiene in preventing and reducing the prevalence of HAIs, hand hygiene compliance rates among healthcare workers often fall below desired levels. This lack in compliance with hand hygiene protocols poses a major threat to patient safety and healthcare outcomes resulting in HAIs which eventually lead to increased morbidity, mortality, and economic burden.[15]

Out of every 100 patients in acute-care hospitals, seven patients in high income countries (HIC) and 15 patients in low- and middle-income countries (LMIC) will acquire at least one health care-associated infection during hospital stay.[16] In Nigeria, the number of HAIs is about 848,000 with 93,600 excess deaths in a year. This number of cases and deaths puts the economic costs associated with HAIs to be about US$ 4.5 billion equating to 0.94% of gross domestic product (GDP) in 2022.[17]

The compliance of healthcare workers towards hand hygiene remains suboptimal around the world, with an average of 59.6% compliance levels in intensive care units. The issue affects both high income and low income countries alike.[16] Poor compliance rates will increase the burden on the healthcare institution, prolong hospital stay, and increase economic burden on the patient and society. Poor compliance with hand hygiene practices among healthcare workers is one of the leading causes of healthcare associated infections. It significantly contributes to complications throughout the continuum of care and presents a serious risk to patients in hospitals, including their families and the society at large.[18]

A gap exists in the knowledge and attitude of healthcare workers regarding hand hygiene protocols especially in public facilities as poor knowledge and attitude levels have been recorded.[19,20] This contributes to inconsistent compliance in hand hygiene practices, putting patients' health at risk. Healthcare workers have reported very low knowledge levels regarding hand hygiene with only about 10.6% having good knowledge score.[20] The healthcare workers are either not aware of the steps in handwashing or the technique involved, or even when it should be carried out.[21] This poor knowledge levels can result in a poor compliance rates. Thus, it is important to improve the healthcare workers' knowledge towards hand hygiene as a way of improving hand hygiene compliance.

The effects of poor knowledge of HH and infection prevention and control (IPC) can have untold consequences to healthcare workers and patients. Such consequences include increased severity of primary illness, increased cost of care with unquantifiable impact on the quality of their lives.[22]

Resource constraints significantly hinders the effectiveness of hand hygiene audits in healthcare facilities. These constraints manifests in different forms such as inadequate personnel for audits, insufficient funding, and limited availability of resources. Each of these contributes to the poor hand hygiene compliance rates among healthcare workers. Budget constraints limit the ability to carry out comprehensive hand hygiene monitoring. Data from the Nigerian health sector indicates that about 5% of the national budget is allocated to healthcare.[23]

With limited funding hospitals struggle to make tools such as electronic monitoring systems, hand hygiene stations, and audit software available for effective hand hygiene audits.[23] Poor funding reduces the frequency of HH audits, allowing non-compliance rates to persist unnoticed.[19]

Another important issue is the inconsistent availability of hand supplies, such as alcohol-based hand rubs (ABHR) and handwashing stations. A WHO report showed that facilities in Sub-Saharan Africa are lagging on hand hygiene services. Out of the 73% of healthcare facilities in the region

overall have ABHR or water and soap at points of care, only 37% have hand washing facilities with water and soap at the toilets.[24] Unavailability of hand hygiene supplies serves as major barrier to hand hygiene compliance among healthcare workers.

As fundamental as hand hygiene is in preventing HAIs in clinical practice, various barriers significantly impact compliance among healthcare workers in public facilities.[25] Identifying and removing these factors is important to improving hand hygiene and ensuring maximum patient safety.[25]

As patient care involves all categories of healthcare workers, it is important that all healthcare workers irrespective of their department comply to necessary hand hygiene practices. However, the compliance rates towards hand hygiene differs among various categories of healthcare workers within the same institution.[26] This disparity results in poor patient care and outcomes with a potential increase in HAIs.[26]

Despite the importance of hand hygiene audit tools in improving hand hygiene practices, lack of regular hand hygiene audits among healthcare facilities seems to be a problem hampering hand hygiene compliance rate. Regular audits will result in improved awareness and action to improve hand hygiene practices among healthcare workers.[6]

1.3 JUSTIFICATION OF STUDY

Healthcare facilities are involved in providing effective heath care delivery to individuals with different illnesses. These facilities as result are high-risk areas where both the care providers and patients are exposed to numerous microorganisms and infections. Hence, hand hygiene practices among healthcare workers (HCWs) play an important role in care providers and patient safety.[27] It is therefore important to systematically assess hand hygiene compliance among healthcare workers to identify specific areas for improvement. Statistics from this study will provide objective data that will guide regulatory bodies formulate strategies and policies towards infection prevention and control (IPC).

Evaluation of hand hygiene practices and related perception and knowledge at healthcare facilities is a vital element of the strategy to improve hand hygiene.[28] Continuous monitoring is essential in measuring the changes induced by implementation and to ensure that the interventions have been effective enough.[28] This study will clearly identify hand hygiene compliance gaps at UBTH, as a way of supporting the implementation of Nigeria's National Infection Prevention and Control Strategy.[29] The findings will inform policy recommendations for institutional hand hygiene training and monitoring protocols, ultimately reducing HAI rates and improving patient outcomes.

This study will be beneficial as it will provide better understanding of hand hygiene practices among healthcare workers, identify specific barriers to compliance and development of targeted interventions, improve patient safety and reduce HAIs through better hand hygiene practices, as well as to evaluate healthcare workers' knowledge on hand hygiene and the readiness of the hospital facility to implement hand hygiene protocols.

Due to lack of regular hand hygiene audits in healthcare settings in our environment, this study will improve awareness levels on the need for regular audits. Healthcare workers and the leadership of healthcare facilities will be exposed on the need for more HH audits as a result of this study. This

study will also improve healthcare facilities readiness to support hand hygiene protocols as these facilities will provide more facilities needed for hand hygiene practices.

In addition, this study is in line with global priorities, such as the WHOs Save lives: Clean Your Hands" initiative, and will provide actionable recommendations for improving HH practices in healthcare facilities. By generating data on HH compliance among healthcare workers, this study has the potential to influence policy, inform training programmes, and ultimately reduce HAIs, thereby improving patient safety and healthcare quality.

Assessing the hand hygiene protocols among healthcare workers will provide valuable insights into hand hygiene compliance in the context of public healthcare settings in Benin City. This study will also serve as a guide to inform future research and policy making on infection prevention and control.

1.4 RESEARCH QUESTIONS

1. What is the level of knowledge and attitude of healthcare workers in the University of Benin Teaching Hospital regarding hand hygiene protocols?

2. What is the overall compliance rate with hand hygiene protocols among healthcare workers in the University of Benin Teaching Hospital?

3. What are the key barriers and facilitators to hand hygiene compliance in the University of Benin Teaching Hospital?

4. How does the compliance rate vary across different categories of healthcare workers in the University of Benin Teaching Hospital (e.g., doctors, nurses, support staff)?

5. How prepared is the University of Benin Teaching Hospital to support and sustain hand hygiene practices?

1.5 OBJECTIVES

1.5.1 GENERAL OBJECTIVE

To assess the hand hygiene compliance among healthcare workers in the University of Benin Teaching Hospital with an aim of proffering recommendations that will improve hand hygiene practices among healthcare workers.

1.5.2 SPECIFIC OBJECTIVES

1. To assess the knowledge and attitude of healthcare workers on hand hygiene protocols in the University of Benin Teaching Hospital.

2. To determine the overall compliance rate with hand hygiene protocols among healthcare workers in the University of Benin Teaching Hospital.

3. To evaluate the barriers and facilitators influencing hand hygiene compliance in the University of Benin Teaching Hospital**.**

4. To analyze the differences in compliance rates across various categories of healthcare workers in the University of Benin Teaching Hospital.

5. To evaluate the readiness of the University of Benin Teaching Hospital to support hand hygiene practices.

CHAPTER TWO

LITERATURE REVIEW

2.0 BRIEF OVERVIEW

The role of hand hygiene in the prevention and control of infections within healthcare settings cannot be overemphasized. It is easy to perform yet effective, checkmating the spread of infections from healthcare workers to patients and vice versa. This literature review explores the knowledge and attitude levels of healthcare workers regarding had hygiene, as well as their compliance to hand hygiene guidelines. Factors that facilitate and hinder hand hygiene practice have also been reviewed in a bid to understand how best to promote hand hygiene, while tackling the barriers to be as minimal as possible.

2.1 KNOWLEDGE AND ATTITUDE OF HEALTHWORKERS ON HAND HYGIENE PROTOCOL

A 2018 descriptive cross-sectional study conducted in three hospitals in Al-Qassim, Saudi Arabia was aimed at assessing the knowledge, attitudes, and practices regarding hand hygiene guidelines among health-care workers. A total of 354 healthcare workers participated in the study by filling a self-administered questionnaire. The study revealed an average knowledge score of 63%. Participants were unable to clearly distinguish which actions prevented transmission to the patient versus actions that prevented transmission to the health-care workers. The level of knowledge significantly increased with age as healthcare workers over the age of 30 had higher scores than those younger than 30. On their attitude towards hand hygiene, nearly all participants reported positive attitude as well as adhering to the guidelines regularly.[30]

In 2023, a descriptive cross-sectional study aimed to determine the knowledge, attitude and practice (KAP) of hand hygiene and predictors for poor hand hygiene practice among healthcare workers who care for children with leukaemia in Saudi Arabia. Data was collected from a total of 190 participants using a self-administered questionnaire. Results showed that slightly above half of the participants (53.7%) had good knowledge of hand washing while the remaining had poor knowledge (46,3%). Most of the participants were able to correctly identify the number of steps involved in hand hygiene, however only 18.4% answered correctly regarding the duration of handwashing according to the World Health Organization's (WHO's) recommendations. About 88.9% were able to correctly identified the constituents of hand rubs with 47.9% correctly answering that hand rubs were no more effective against germs than handwashing and 11.6% correctly answered that handwashing and hand rubs should not be used in sequence. The attitude assessment showed that only 51.6% participants had positive attitude. About 64% strongly agreed that healthcare workers must adhere to correct hand hygiene practices at all times while 65.3% strongly agreed that the prevention of hospital-acquired infection is a valuable part of the role of healthcare workers.[31]

In a 2023 descriptive cross-sectional study, the level of knowledge, attitude, and practice of healthcare workers towards hand hygiene was assessed in Uganda. The study used a convenient non-probability sampling technique to collect data from 50 respondents using a self-administered semi-structured questionnaire. Results showed that majority of the health workers (88%) had good knowledge about hand washing techniques, and 72% knew when hand washing should be carried out. Most of the participants also displayed high knowledge on the dangers that come without hand washing. Positive attitude toward the importance of hand washing was seen in all participants, while 62% had positive attitude toward recommending hand washing to other health workers (HW).[32]

A 2021 descriptive cross-sectional study was conducted in Southwest Nigeria to determine the knowledge, attitude and practice of hand hygiene among healthcare workers in a tertiary health

facility. A total of 368 healthcare workers were recruited for the study and data was collected using a set of self-administered modified WHO questionnaire. About 98.95% of the respondents had a good knowledge of hand hygiene. Also, all the respondents were aware of hand washing practices while 82% knew that hand washing could prevent respiratory tract infections and 96% knew that hand hygiene could prevent diarrhea diseases. On their attitude towards hand hygiene, about 46% of participants acknowledged that the importance of hand hygiene is of high priority within the institution.[33]

A descriptive cross-sectional study design was employed in a 20 study conducted at Ahmadu Bello University Teaching Hospital (ABUTH) that assessed the knowledge, attitude, and practice of proper hand washing among healthcare workers in ABUTH. A total of 116 healthcare workers were selected for the study using a two-stage stratified sampling technique. The respondents were selected from professional cadres including nurses, doctors, laboratory technologists, and supportive staff. Data was collected using a semi-structured interviewer-administered questionnaire and an observational checklist. On knowledge of hand hygiene, 72.4% of respondents had good knowledge with doctors and nurses demonstrating better knowledge compared to other healthcare workers. A positive attitude towards hand washing was observed in 62.0% of respondents. The use of self-reported data and direct observation provided a comprehensive assessment of hand washing practice.[34]

In 2022, a descriptive cross-sectional design was conducted in Asaba to assess the knowledge and investigate the hand washing practices of healthcare workers. A total of 247 healthcare workers were selected from different healthcare professions using systematic random sampling. Data was collected using a semi-structured interviewer-administered questionnaire. The study found out that 91.9% of respondents had good knowledge of hand washing. The use of systematic random sampling ensured that all professional groups were fairly represented in the study.[35]

In determining the knowledge and practices of hand hygiene among healthcare workers in Kano a 20 descriptive cross-sectional study surveyed a total of 302 healthcare workers. A three-stage sampling technique was used to obtain respondents and data was collected using a semi-structured, self-administered pre-tested questionnaire. The healthcare workers that participated in the study include doctors, nurses, and clinical assistants. Results showed that 36.1% of respondents had good knowledge, 39.7% had fair knowledge and 24.2% had poor knowledge. About 78% respondents were reported to be practicing correct hand hygiene. The relatively large sample size provided rich data especially as it explored two major specialist hospitals.[36]

2.2 COMPLIANCE RATE WITH HAND HYGIENE PROTOCOL AMONG HEALTHCARE WORKERS

A systematic review and meta-analysis aimed at evaluating hand hygiene compliance rates among healthcare workers and determining the effectiveness of intervention strategies designed to improve compliance in Eastern Mediterranean region (EMR) was conducted in 2024. The review included 42 studies gotten from major databases with a total of 12,532 healthcare workers observed for hand hygiene compliance. Data were collected using direct observation which included both overt (visible) and covert (hidden) observation methods. Compliance with the WHO's five moments for hand hygiene was the standard measurement tool. The meta-analysis revealed that the overall hand hygiene compliance rate across the studies was 32% with significant heterogeneity. The compliance rate was slightly higher among nurses (30%) compared to physicians (26%). Cultural and resource-based challenges specific to EMR were not sufficiently explored possibly limiting the applicability pf the findings to other regions.[37]

The aim of a 2022 descriptive cross-sectional study was to assess hand hygiene adherence and related factors among nurses working in public hospitals in eastern Ethiopia. A total of 451 participants were selected randomly and data was collected using a self-administered questionnaire

and observation checklist. The study revealed that the overall hand hygiene compliance rate was 37.4%. Those working in the medical and surgical wards recorded the highest compliance rate while those in the obstetrics and gynecology ward recorded the lowest. Findings of this study cannot be generalized to all healthcare workers as the study only focused on nurses which form a part of healthcare workers.[38]

In 2021, a descriptive cross-sectional study was conducted in two hospitals in Kano State with the aim of assessing the impact of a voice reminder system on compliance with recommended hand hygiene practices among healthcare workers. A total of 408 observations (204 each from the intervention and control hospitals) were conducted at both baseline and post-intervention phases. Doctors, nurses, and community health extension workers (CHEWs) were selected for the study using a multistage sampling technique. Data were collected using a WHO-adapted observation form, Baseline compliance with hand hygiene was 31.4% in the intervention hospital and 48.0% in the control hospital. After the introduction of the voice reminder system, compliance in the intervention hospital increased to 78.0%, while the control hospital also increased to 65.2%. The post-intervention observations were conducted only three months after the intervention. A longer observation period would be needed to assess the sustained impact of voice reminder system.[39]

While assessing the compliance of neonatal nurses with the WHO's five moments of hand hygiene, a 2022 descriptive cross-sectional study was done in a tertiary hospital in South Eastern Nigeria. A total of 30 nurses took part in the study and were selected through convenience sampling. Data collection was done using a WHO standardized direct observation tool for hand hygiene compliance. The nurses were observed over five days, monitoring their compliance. The study also utilized a self-reported questionnaire on perceived compliance among respondents. Results on the overall compliance rate was 62.8% with the newborn unit (64.6%) having a higher compliance than the neonatal intensive care unit (60.9%). The highest compliance across the different hand hygiene moments was observed after exposure to fluids. The use of both self-reported and observed

compliance methods allowed for a comprehensive assessment of hand hygiene practices and compliance.[40]

The degree of compliance of hand hygiene among healthcare workers was investigated in a 2017 descriptive cross-sectional study. A total of 311 healthcare workers were studied over a 12-month period. The convert observational method was employed, where healthcare workers were discreetly monitored while interacting with their patients to track compliance with hand hygiene (HH) practices. The overall HH compliance rate was 55.01%. Surgical staff were the most compliant with 56.4% compliance rate. The covert observational method helped eliminate the Hawthorne effect that would have possibly affected findings.[41]

A 2015 descriptive cross-sectional study conducted among healthcare workers in Abia State with an aim of determine the compliance rate of hand hygiene based on the five moments of hand hygiene concept. One hundred and fifty-four HCWs were recruited from five wards selected by stratified random sampling. Data was obtained using the WHO's hand hygiene observation form unmodified. Respondents were directly and covertly observed for compliance on the five moments of hand hygiene. A total of 718 opportunities were observed with an overall compliance rate of 23.5%. Compliance rate was highest after exposure to blood/body fluids (67.83%) and lowest before aseptic procedures (3.5%).[42]

2.3 BARRIERS AND FACILITATORS INFLUENCING HAND HYGIENE COMPLIANCE

A descriptive cross-sectional study was conducted in 2020 to analyze the barriers, as well as the knowledge, attitudes, and practices related to hand hygiene among healthcare workers managing Corona Virus-19 (COVID-19) in India. A total of 215 HCWs were selected for the study using convenience sampling technique. Data was collected through semi-structured questionnaires designed based on previous experience with seasonal flu outbreaks. The questionnaire assed barriers to hand hygiene as well as other set out objectives. Results showed that although hand hygiene

facilities such as soap, hand rub, and basins of clean water were available, adherence was often hindered by work pressure, forgetting to wash hands, and difficulties in following steps during emergencies. Positive attitude and awareness were identified facilitators. The use of convenient sampling method limits the generalizability of results.[43]

Hand hygiene barriers faced by healthcare workers in Gambia was assessed in 2016 using a descriptive cross-sectional study. A total of 201 respondents were obtained from six healthcare facilities using random sampling. Data was collected using a knowledge, attitude, and practice (KAP) survey consisting of 17 structured questions. The questionnaire was adapted from the WHO's evaluation toolkit for hand hygiene. Limited availability of resources and facilities, lack of regular feedback, insufficient training and education on hand hygiene, and hand hygiene misconceptions were barriers hindering compliance. There was no record of pretesting the adapted questionnaire and this may have affected the validity of responses.[44]

In 2019, a descriptive cross-sectional study was conducted in Kano State to access hand hygiene practices among healthcare workers. A total of 260 respondents were recruited for the study using stratified random sampling. Data was collected through pre-tested self-administered questionnaire containing socio-demographic questions, attitudinal questions, and questions on practice regarding hand hygiene. The study also identified facilitators and barriers to hand hygiene practice among respondents. High knowledge and availability of equipment were shown to facilitate HH practice while time constraints (61.5%), forgetfulness (57.7%), limited equipment placement (74.2%), and lack of resources were identified as barriers. The use of stratified random sampling ensured representation across various HCW categories.[45]

The assessment of hand hygiene practices of healthcare workers in a major pubic hospital in Kano State was conducted in 2018 using descriptive cross-sectional study design. Healthcare workers totaling up to 173 included doctors, nurses, physiotherapists, laboratory scientists, and technicians.

The respondents who had direct contact with patients were selected via simple random sampling and data was obtained using self-administered questionnaires. Facilitators of hand hygiene practice included: high awareness, and receiving training (75.1%). Identified barriers included: insufficient time (65.9%), lack of supplies (60.1% and 57.8% of respondents reported lack of water and soap respectively), and forgetfulness (39.3%). The study relied on self-reporting and also did not observe actual hand washing practices, as this would have removed bias and provided a clearer picture of respondents' hand washing practice.[46]

The perception of Nigerian healthcare workers towards hand hygiene was studied in Oyo State in a 2020 qualitative study. A total of 19 participants took part in the study comprising of both doctors and nurses. Purposeful convenience sampling was used to recruit participants who were in regular contact with patients. Data was collected through semi-structured interviews lasting for 16 to 38 minutes. Findings revealed that awareness and routine practice were facilitators of hand hygiene practice while financial constraints including inadequate staff remuneration, absence of regulations, lack of amenities, and workload pressure were barriers to hand hygiene practices. The qualitative nature of the study captured in-depth analysis of the barriers experienced by the respondents.[47]

A 2023 qualitative study aimed to understand barriers and facilitators to hand hygiene in a hospital in Southwest Nigeria. The study utilized in-depth qualitative interview with thematic analysis of nurses and doctors working in surgical wards. Purposive sampling was used to select 16 healthcare workers that participated in the study. The study identified both individual and institutional factors that are barriers and facilitators of hand hygiene compliance. The individual factors were knowledge, skills, and education, perceived risks of infection to self and others, memory, the influence of others, and skin irritation. Identified institutional factors were environment and resources, workload, and staffing levels. The study dug deep into these factors and highlighted knowledge, perceived risks of infection, and influence of others (especially superiors), as facilitators while memory, environment, workload, and staffing were barriers.[48]

2.4 DIFFERENCES IN HAND HYGIENE COMPLIANCE RATES AMONG CATEGORIES OF HEALTH CARE WORKERS

A 2023 descriptive cross-sectional study was carried out in Bangladesh to evaluate HH compliance and associated factors among HCWs in selected tertiary care hospitals. A mixed method approach consisting of three techniques for data collection was used in this study. First was a direct observational approach of HH compliance by HCWs during patient care, followed by an open-ended questionnaire assessing barriers affecting HH, and finally an environmental assessment of the available facilities necessary to facilitate HH practices. The study also assessed the compliance rates of various healthcare workers showing that nurses had the highest compliance rate of 28.5%, followed by physicians with 25.4%, and cleaning staff having the least compliance rate of 9.9%. The observational approach of HH compliance as opposed to self-reporting, limits the chances of bias in the finding.[26]

A systematic review and meta-analysis was done on studies conducted in high-income countries worldwide, majorly from Europe, North America, and the Middle East. The aim was to compare hand hygiene compliance rates between physicians and nurses, examining the effects of observation methods (overt vs covert). A total of 105 studies were examined after a systematic research covering various databases. Data were extracted on hand hygiene compliance through direct observation, either overt (where participants knew they were being observed) or covert (where observations were hidden). The WHO's five moments for hand hygiene served as the framework for measuring compliance in most studies. Results showed that the pooled compliance rate was higher for nurses (52%) compared to physicians (45%). Meta-analyses of low-risk studies showed that nurses consistently had higher compliance rates than physicians, both in overt and covert observation settings. Significant heterogeneity exists in the study results, limiting the precision of its pooled estimates.[49]

Aimed at assessing the knowledge and practice of hand hygiene among healthcare workers at the University of Nigeria Teaching Hospital (UNTH), Enugu State, a descriptive cross-sectional study was conducted among 629 healthcare workers in a 2017 study. Cluster sampling technique was used to select respondents including doctors, nurses, medical laboratory scientists (MLSs), and hospital attendants. Data was collected through a semi-structured, self-administered questionnaire. Results showed that doctors and nurses had higher compliance rates before aseptic procedures (100%). Hand hygiene before touching a patient was notably low across board: 16.1% for doctors, 16.9% for nurses, and 9.6% for medical laboratory scientists. Health attendants had no compliance in this category. It was also seen that access to hand hygiene resources was generally poor, with only 17.6% of MLSs and 7% of doctors having regular access to soap and water.[50]

A total of 202 healthcare workers (163 nurses and 39 doctors) participated in a 2014 descriptive cross-sectional study that was aimed at promoting the adoption of hand hygiene guidelines among healthcare workers in Ebonyi State. A non-random sampling technique was used to recruit respondents and data was collected using direct observation according to the WHO hand hygiene technical reference manual. Compliance with the WHO's five moments of hand hygiene was recorded by trained observers and compliance rates were calculated based on the observed hand hygiene opportunities and corresponding actions. Results showed that the post-intervention overall compliance rate was 65.3%. Differences in compliance were noticed between nurses and doctors, with nurses having a significantly higher compliance rate (72.9%) compared to doctors (59.7%). The direct observation may have influenced healthcare workers' behavior, leading to higher compliance rates during observation. (Hawthorne effect).[51]

A 2022 study determined the hand hygiene compliance rates among surgical healthcare workers (HCWs) in a Nigerian teaching hospital through hand hygiene observations using a descriptive cross-sectional design. Hand hygiene observations were monitored over seven days in the surgical wards with the aid of a modified WHO hand hygiene observation form. The compliance to hand

hygiene varied across professional groups with doctors having a compliance rate of 35.7%, nurses having 31.1%, and 10.7% for healthcare assistants. All the professional groups had their highest compliance after exposure to body fluids with rates of 88.5% for doctors, 73.5% for nurses, and 60% for healthcare assistants.[52]

In a bid to assess the compliance of healthcare workers with hand hygiene practices in a teaching hospital in Ondo State, a 2022 descriptive cross-sectional study was used to evaluate 324 healthcare workers consisting of 204 nurses and 120 doctors. A multi-stage sampling technique was used to select respondents and data was collected through a combination of self-administered questionnaires and observational checklists. Findings showed the overall compliance rate with hand hygiene was 29.9%, with nurses having a higher compliance rate (31.2%) compared to doctors (27.8%). The study only examined attitude but did not look at attitude of healthcare workers towards hand hygiene, which could have provided deeper understanding into factors affecting compliance.[53]

2.5 READINESS TO SUPPORT AND SUSTAIN HAND HYGEINE PRACTICES

In Bangladesh, a 2021 descriptive cross-sectional study was conducted to evaluate the readiness of healthcare facilities regarding standard precautions for IPC. A multi-stage sampling technique was used to select healthcare facilities, of which 1524 provided useable data. Data was collected using structured facility inventory tools based on the WHO Service Availability and Readiness Assessment (SARA) guidelines. The study revealed that fewer than half of the facilities had all the essential elements required for standard precautions. Specifically, only 29.2% of healthcare facilities had running water, soap, or ABHRs available in all required areas. Pedal bins were only present in 38% of facilities, and guidelines for standard precautions were available in just 30% of facilities. Significant differences in readiness between urban and rural facilities were also found,

with rural centers being notably less prepared. The study relied on observed availability of hand hygiene resources without measuring the actual implementation or usage of IPC practices by healthcare workers.[54]

A 2016 descriptive cross-sectional study conducted in Guatemala was aimed at assessing the e-readiness of healthcare workers for an e-learning hand hygiene course and determine their satisfaction with the course. A total of 194 HCWs took part in the study. Data was collected through structured questionnaire containing an e-readiness assessment tool and a satisfaction survey. Results showed that HCWs readiness for r-learning for hand hygiene varied based on their professional roles. Medical doctors reported significantly higher scores across all factors. The study offered key insights into the integration of e-learning for hand hygiene education in lower and middle income countries (LMIC). The small sample size was relatively small, potentially limiting the statistical power.[55]

Aimed at assessing the availability of hand hygiene facilities and compliance with hand hygiene practices among HCWs in a Nigerian tertiary facility in Plateau State, a 2020 descriptive cross-sectional study examined 175 healthcare workers. A systematic random sampling method was used to select the respondents. Data was collected using a structured questionnaire with sections on several sections including facility assessment and hand hygiene compliance. On the readiness of the facility to support hand hygiene, the study revealed that 87% of the hospital units did not have ABHRs, 72% had no posters or written policies on hand hygiene (HH), and only 28% of the handwashing stations had flowing water all day. Although 98% of the units had at least one sink, 72% used the traditional cup and bucket method of hand washing. The study did a comprehensive assessment of the HH facilities and identified major challenges, but it did not explore the underlying reasons for the shortages.[56]

A 2018 descriptive cross-sectional study was carried out in Bayelsa State to assess hand hygiene practices and available resources for hand hygiene in a tertiary hospital. All healthcare workers who had one or more opportunities for hand hygiene process were studied. Data was collected using self-reported questionnaires and observational checklists. Results showed that the overall bed to sink ratio was 3:1 with water flowing in 70% of the sinks. Liquid soap was present in 78% of the sinks, 58% had soap dispenser and paper towel for single use was present in 56% of the sinks. Reliance on self-reported data for compliance may have introduced bias.[57]

While evaluating the availability of hand hygiene facilities and assessing the compliance of healthcare workers with hand hygiene practices in a teaching hospital in Ondo State, a 2022 descriptive cross-sectional study was used to evaluate 324 healthcare workers consisting of 204 nurses and 120 doctors. A multi-stage sampling technique was used to select respondents and data was collected through a combination of self-administered questionnaires and observational checklists. Findings showed that none of the wards met all the criteria for adequate hand hygiene facilities. While 100% of the wards had running water and hand washing sinks, none had complete hand drying facilities or posters promoting hand hygiene. The study only examined attitude but did not look at attitude of healthcare workers towards hand hygiene, which could have provided deeper understanding into factors affecting compliance.[58]

In 2017, a descriptive cross-sectional study was carried out across 12 states in Nigeria, covering all six geopolitical zones. The study was aimed at analyzing the readiness of primary healthcare (PHC) facilities in Nigeria. The study utilized a multi-stage cluster sampling technique to select data from 2,480 healthcare facilities across the 12 selected states. Data was collected as part of the Service Delivery Indicator (SDI) survey commissioned by the World Bank. Readiness for hand hygiene practice was indirectly assessed through the availability of hand gloves which is necessary for hand hygiene and infection control. Only 77.18% of all the healthcare facilities had hand gloves, though significant regional disparities existed, with Northern states generally having lower availability than

Southern states. Although this study did not directly focus on hand hygiene practices, it can be used as a study due to the availability of hand hygiene materials such as hand gloves.[59]

CHAPTER THREE

METHODOLOGY

3.1 STUDY AREA

This study was conducted in the University of Benin Teaching Hospital (UBTH), Benin City, Edo state, Nigeria. Edo State is one of the 36 states in Nigeria, situated in the South-South geopolitical zone of Nigeria. Its capital is Benin City. It was created on the 27th of August, 1991 from the Northern portion of the defunct Bendel State.[60] It is bounded by Kogi State to the north-east, Anambra State to the east, Delta State to the south-east and Ondo State to the west and the north-west.[37] Its population estimate as at 2025 is 5,383,800 (projected). It has a total land area of 19,187km^2 with 18 local government areas. Edo State is an oil producing state and is one of the nine Niger Delta sates in Nigeria. It is home to Nigeria's rubber, oil palm, cassava, and banana industry. It also possesses mineral resources like crude oil, limestone, granite, quartz, and marble.[61] University of Benin Teaching Hospital (UBTH) is a tertiary health facility, which was established on May 12th 1973 following the enactment of Edict No.12 of April, 1971 as the sixth of the 1st generation Teaching Hospitals to complement her sister institution, University of Benin and to provide secondary and tertiary care to the then Midwestern region (now Edo and Delta State) and its environs.[62]

It was taken over by the Federal government on April 1, 1975 as the fifth teaching hospital coming after University College Hospital Ibadan and Lagos University Teaching Hospital. For over forty years now, the tertiary referral hospital, widely acknowledged as a Centre for Excellence, has remarkably and effectively served as the last port of call for expert management of diverse and varied disease conditions in Edo, Delta, part of Kogi and Ondo states which largely form its catchment areas and sometimes further.[62]

In addition to the main hospital there are other facilities which included: two Comprehensive Health Centres located at Ogbona and Udo and a centre for training Community Health Officers in Ekpoma, (presently this school has moved to UBTH).

At inception the hospital's goals were encapsulated in her motto for Healing, Research and Training. Initially commissioned as a 300 bedded hospital in 1973, UBTH has expanded her facilities tremendously over the years such that she provides facilities for training of high and middle level manpower for the health industry. Through the comprehensive health centres in Ogbona and Udo and the General Practice Clinic that came on stream later, she equally provides some avenues for primary health care to the immediate communities. The hospital is located in Egor Local Government area along Benin-Ore Road. Its boundaries are the University of Benin and Federal Government Girls' College Road. University of Benin Teaching Hospital (UBTH) is a 900-bed tertiary care hospital. It serves as a referral center to the State as well as to surrounding states in southern Nigeria.

UBTH provides fixed handwashing facilities in the form of sinks positioned at strategic locations within wards and walk ways. The hospital utilizes both soap (bar soap, liquid soap) and hand sanitizers to promote effective hand hygiene. Educational posters on hand hygiene are positioned on the walls in wards and clinics, serving as reminders to healthcare workers. In addition to all these, the hospital actively participates in world hand hygiene day, organizing awareness campaign, road walks, and seminars aimed at promoting hand hygiene practices.

3.2 STUDY DESIGN

A descriptive cross-sectional study design will be used to conduct the study.

3.3 STUDY POPULATION

The study was carried out among healthcare workers in the University of Benin Teaching Hospital (UBTH), Benin City, Edo state, Nigeria.

3.4 SELECTION CRITERIA

3.4.1 Inclusion Criteria

I. HCWs who were directly involved in direct patient care

II. HCWs who gave consent to the study.

III. HCWs who were present at the time of study.

3.4.2 Exclusion Criteria

I. HCWs who were not directly involved in direct patient care

II. HCWs that did not give consent to the study

3.5 STUDY DURATION

The study was carried out over 1 year from 2024 to 2025.

3.6 SAMPLE SIZE DETERMINATION

The minimum sample size (n) was calculated using the Cochrane formula for a cross-sectional study.[63]

$$n = \frac{Z^2pq}{d^2}$$

Where:

n = Minimum Sample Size.

Z = Standard normal deviate set at 95% confidence interval (1.96)

p = Prevalence rate of a particular characteristics of the target population.

= using 23.5% as the proportion of the compliance rate of hand hygiene in a previous study in Abia state.[42]

= 0.235

q = The complementary probability

1 - p = 1 - 0.235 = 0.765

d = Degree of precision set at 0.05

Deff = Design effect

A design effect of 1.5, estimated to compensate for deviation from a simple random sampling procedure.

Hence:

$$n = \frac{(1.96)^2 \times (0.235)(0.765) \times 1.5}{(0.05)^2} = 414$$

To make room for non-response, poor or incomplete responses, a 10% non-response rate was added to the minimum sample size, utilizing the formula for non-response rate.

$$\mathbf{nf = \frac{n}{1 - nr}}$$

n = Minimum sample size = 414

nr = Non-response rate = 0.10

nf = Final Minimum sample size

$$= \frac{414}{1 - 0.10}$$

$$= 460$$

Thus, the final minimum sample size for this study will be 460.

3.7 SAMPLING TECHNIQUE

A stratified sampling technique was used to evaluate respondents who met the inclusion criteria. The different categories of healthcare workers (Doctors, nurses, and physiotherapists) would form the basis of each stratum.

A sampling fraction was used to calculate the proportionate respondents in each stratum. It was obtained using the formula: minimum sample size (n) / population size (N). Subsequently, in each stratum, respondents were selected to participate in the study.

Sampling fraction = n/N

Where n = minimum sample size

N = total population of HCWs

Applying proportionate allocation, the number of respondents selected from each stratum of healthcare was determined by multiplying the average population of HCWs in the facility with the sampling fraction.

A systematic sampling technique was then used to select respondents from each stratum using the calculated sampling interval. The first respondent was selected by simple random sampling. Then, every eligible respondent at each regular sampling interval was selected and this was continued till the required number in each stratum was obtained.

3.8 DATA MANAGEMENT

3.8.1 TOOLS FOR DATA COLLECTION

The research instrument that was used for collecting data was a structured questionnaire containing both open and closed-ended questions developed from standard tools. The questionnaire was adapted and modified from the WHO hand hygiene knowledge questionnaire for health workers, modified hand hygiene belief scale (HHBS), WHO hand hygiene observation, theoretical domains framework (TDF), and WHO ward infrastructure survey.[64,65,66]

The WHO hand hygiene knowledge questionnaire for health workers is a standard tool developed by WHO in 2009 to assess knowledge about the 5 moments of hand hygiene, transmission routes, hand hygiene techniques, and hand rubs. It includes 16 item.[63]

The modified HHBS is a five-point Likert scale questionnaire that measured attitudes and beliefs toward hand hygiene. It was developed by van de Mortel and comprised of 19 questions with domains including perceived benefits, barriers, social influence, and self-efficacy. It was part of a broader hand hygiene questionnaire that includes HHPI and hand hygiene importance scale (HHIS). A validity and reliability study carried out on this questionnaire revealed it to be reliable with a Cronbach's alpha value of 0.8.[64]

The WHO hand hygiene audit tool is a structured observation-based tool used to monitor compliance with hand hygiene among healthcare workers, based on the 5 moments of hand hygiene framework. It was an audit that helps obtain a situation analysis of hand hygiene promotion and practices within a health-care facility. [63]

The TDF was a tool developed to explore factors affecting a specific behaviour, in this case hand hygiene. It was divided into 14 domains that represent different parts of behavioural change. These domains included: knowledge, skills, social/professional role and identity, belief about capabilities,

optimism, belief about consequences, reinforcements, intentions, goals, memory, attention, and decision processes, environmental context and resources, social influences, emotion, behaviour regulation. It was a 5 point Likert scale questionnaire that told which domain affected/influenced behavior of individuals which had been validated by existing studies.[65] Each of these domains was assessed to know which facilitated hand hygiene and which acted as a barrier.

The WHO ward infrastructure survey tool was a structured assessment tool developed to assess the availability and functionality of hand hygiene resources within all wards. It was developed as a part of WHO's save lives: Clean Your Hands initiative and it focused on gaps in water, sanitation, and hygiene (WASH) infrastructure at point of care. The tool evaluated both quantitative and qualitative readiness of a healthcare facility towards promoting and sustaining hand hygiene practice.[63]

SECTION A: Sociodemographic data of respondents.

SECTION B: Knowledge and attitude towards hand hygiene.

SECTION C: Hand hygiene compliance rate among healthcare workers.

SECTION D: Facilitators and barriers towards hand hygiene among healthcare workers.

Hand hygiene readiness checklist

3.8.2 METHOD OF DATA COLLECTION

Data was collected via self-administered questionnaire and checklist among healthcare workers in the health facility. Informed consent was obtained from the respondents and the respondents was assured of utmost confidentiality. They were informed of their right to withdraw from the study at any time they deem fit and that withdrawal at any point does not signify any harm or loss.

3.8.3 PRE-TESTING

The questionnaire was pretested at Edo Specialist Hospital, Benin city, Edo State, as it had a similar study population. Ten percent of the sample size in the proportion was used for pretesting. The aim

of the pre-test was to check the questionnaire for correctness and appropriate understanding by the respondents to aid appropriate collection of data during the actual test. Appropriate corrections were made where necessary to enable best outcome data collection and analysis.

3.8.4 DATA ANALYSIS

Data was collected, collated, screened for completeness, numbered serially and entered into IBM SPSS for Windows, Version 27.0 software.

Socio-demographic characteristics:

- The age of respondents was grouped using a 10-year interval, with the age range 20 to < 60 years as 20-29, 30–39, 40–49, and 50-59.
- Monthly income will be grouped into < 100000, 100000 – 299999, 300000 – 499999 and ≥ 500000 Naira

SCORING SYSTEM

KNOWLEDGE OF HAND HYGIENE

A total of 26 responses addressing 8 knowledge domains (definition, transmission of infection, hand hygiene indications (5 moments), efficacy of hand hygiene methods, technique and product use, duration and timing, situational application, and infection risk behaviours) was used to assess the knowledge of hand hygiene among healthcare workers. A score of 1 will be given for correct response and 0 for incorrect response giving a maximum achievable score of 25 and a minimum of 0. The scores were converted to percentages and grouped as follows[67]:

- Good Knowledge: scores ≥ 70%
- Poor Knowledge: scores < 70%

ATTITUDE TOWARDS HAND HYGIENE

A total of 19 questions using a 5-point Likert scale was used to assess respondents' attitudes towards hand hygiene. The most correct response was scored 5, while the least correct response was scored 1, giving a maximum score of 65 and a minimum score of 13. A positive attitude represented those who were more inclined to practicing and promoting hand hygiene.

Scores were converted to percentages and grouped as follows[67]:

- Positive attitude: Scores: ≥ 70%
- Negative attitude: < 70%

COMPLIANCE RATE TOWARDS HAND HYGIENE

Hand hygiene compliance was calculated as:

Compliance (%): (Number of hand hygiene actions /Number of opportunities) x 100

Compliance rate was observed for each professional and profession. The total summed up and converted to percentages to obtain the overall compliance rate[67:]

- Compliance: ≥ 70%
- Non-compliance: < 70%

READINESS TO PROMOTE AND SUSTAIN HAND HYGIENE

A checklist containing 24 variables adapted from WHO ward infrastructure survey tool was used to assess the readiness of the health facility to promote and sustain hand hygiene.

Univariate analysis was conducted on socio-demographic, knowledge, attitude, compliance, and facilitators and barriers. The result was presented as frequencies and percentages for categorical for categorical data, mean and standard deviation for numerical data.

Bivariate analysis was carried out for parametric and non-parametric data. A Chi-squared statistical test or Fischer's exact test of association was done for non-parametric data and used to compare associations between the socio-demographic characteristics of respondents and dependent/outcome variables (knowledge, attitude, compliance). Fischer's exact test was used to compare associations when the total number of expected cells less than 5 is more than 20%.

Multivariate analysis using binary logistic regression was carried out to further determine the significant predictors of outcome variables such as knowledge, attitude, and compliance. The crude and adjusted odds ratio together with their corresponding 95% confidence intervals was computed. The level of significance for all statistical associations was set at $p < 0.05$. Data was in prose, frequency tables, and charts.

3.9 ETHICAL CONSIDERATION

Ethical clearance and approval was obtained from the University of Benin Teaching Hospital Ethical Committee. Ethical approval protocol number: **ADM/E 22/A/VOL. VII/1486549127232** Permission for the study was be sought from the various departments of healthcare and wards chosen in UBTH for the study. Consent was obtained from the respondents after they have been educated on the purpose and importance of the study. Their confidentiality pertaining information provided was assured.

3.10 LIMITATION OF STUDY

I. Data collected from the respondents were self-reported which might introduce response bias. To limit this, respondents were encouraged on the need to provide accurate data

II. The study's cross-sectional study design cannot be utilized to examine variables across time, making it impossible to infer causal links.

CHAPTER FOUR

RESULTS

Four hundred and sixty (460) questionnaires were distributed, out of which four hundred and sixty (460) were retrieved, giving a response rate of 100.0%.

The result was represented in the following sections:

Section A: Sociodemographic of respondents.

Section B: Knowledge of hand hygiene.

Section C: Attitude towards hand hygiene.

Section D: Compliance rates of healthcare workers.

Section E: Facilitators and barriers to hand hygiene.

Section F: Readiness to promote and sustain hand hygiene

SECTION A:

SOCIODEMOGRAPHIC CHARACTERISTICS

TABLE 1A: SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variables	Frequency (n = 460)	Percent
Age (Years)		
20 – 29	228	49.6
30 – 39	158	34.3
40 – 49	53	11.5
50 – 59	21	4.6
Mean ± St.D: 31.92 ± 7.71		
Sex		
Female	247	53.7
Male	213	46.3
Religion		
Christianity	407	88.5
Islam	45	9.8
ATR	8	1.7
Marital Status		
Single	274	59.6
Married	165	35.8
Divorced	6	1.3
Co-habiting	6	1.3
Separated	5	1.1
Widowed	4	0.9
Profession		
Doctor	212	46.1
Nurse	140	30.4
Dentist	56	12.2
Physiotherapist	45	9.8
Paramedic	7	1.5
Length of Practice (Years)		

1 – 10	71	35.5
11 – 20	53	26.5
>20	42	21.0
Ethnic group		
Benin	129	28.0
Yoruba	99	21.5
Igbo	86	18.7
Esan	37	8.0
Urhobo	25	5.4
Hausa	14	3.0
Etsako	11	2.4
Igala	10	2.2
Ijaw	10	2.2
Ibibio	8	1.7
Isoko	8	1.7
Itsekiri	6	1.3
Ika	5	1.1
Akwa Ibom	4	0.9
Owan	4	0.9
Efik	3	0.7
Tiv	1	0.2
Monthly allowance of respondents		
100,000 – 299,999	269	58.5
300,000 – 499,999	162	35.2
≥500,000	29	6.3

The most of the respondents 228 (49.6%) were between the age of 20 - 29 years while those respondents between 30 – 39years were 158 (34.3%), 40 – 49years were 53 (11.5%)

and 50 - 59 years were 21 (4.6%). The respondents were more females 247 (53.7%) than males 213 (46.3%).

The majority 407 (88.5%) of the respondents are Christians, while 45 (9.8%) are Muslims and 8 (1.7%) are African traditional worshippers. Majority of the respondents, 274 (59.6%), were single, while 165 (35.8%), 5 (1.1%) were separated, 4 (0.9%) were widowed and 6 (1.3%) were married and divorced respectively.

Most, 212 (46.1%) of the respondents were doctors, while 140 (30.4%) were nurses, 56 (12.2%) were dentists, 45 (9.8%) were physiotherapist and only 7 (1.5%) were paramedics. Most of the respondents 405 (88.0%) had practiced for 1 – 10 years while 53 (26.5%) had practiced for 11 – 20 years and 42 (21.0%) had practiced for more than 20 years. 2

Most of the respondents were Benin 129 (28.0%). More than half 269 (58.5%) of the respondents had a monthly income between 100,000 and 299,999.

SECTION B:

KNOWLEDGE OF HAND HYGIENE

TABLE 2A: KNOWLEDGE OF HEALTHCARE WORKERS ON HAND HYGIENE

Variables	Frequency (n=460)	Percent
Awareness		
Heard of hand hygiene	460	100
Source of information**		
Internet	243	52.8
Television	190	41.3
Friends	171	37.2
Posters	150	32.6
Radio	139	30.2
Newspaper	117	25.4
School	80	17.4
Main route of cross-transmission of germs between patient and hospital facility**		
Healthcare workers hands not clean	368	80.0
Patient's exposure to colonized surfaces	147	32.0
Sharing non-invasive objects between patients	77	16.7
Air circulating in the hospital	73	15.9
Frequent source of germs for healthcare associated infections**		
Germs already on or within patient	293	63.7
Hospital environment (surfaces)	232	50.4
Hospital air	70	15.2
Hospital water system	61	13.3
Hand hygiene actions that prevents germs transmission to patients		
Before touching a patient	445	96.7
Immediately after a clean/aseptic procedure	416	90.4
Immediately after risk of body fluid exposure	318	69.1
After exposure to the immediate surroundings of a patient	290	63.0
Hand hygiene actions that prevents germs transmission to healthcare workers**		
After touching a patient	434	94.3
Immediately after risk of body fluid exposure	425	92.4
Immediately before a clean/aseptic procedure	413	89.8
After exposure to the immediate surroundings of a patient	408	88.7
Hand rubbing is more rapid for head cleansing than hand washing		
True	346	75.2
False	114	24.8

**multiple response

The majority of the respondents 457 (99.3%) had knowledge of hand hygiene. More than half 243 (52.8%) of the respondents got their information about hand hygiene from the internet. A large number of the respondents 359 (78.0%) received formal training in hand hygiene in the last three years.

The majority of the respondents 368 (80.0%) chose healthcare workers hands not clean as the main route of cross transmission of germs between patient and hospital facility. Most of the respondents 293 (63.7%) chose germs already on or within the patient as the frequent source of germs for healthcare associated infections.

The majority of the respondents 445 (96.7%) chose doing hand hygiene before touching a patient as the most important means of preventing germs transmission to patients. The majority of the respondents 434 (94.3%) practice hand hygiene after touching a patient as an action that prevents germs transmission to healthcare workers. Most of the respondents, 346 (75.2%), chose hand rubbing as a more rapid hand cleansing than hand washing.

TABLE 2B: KNOWLEDGE OF HEALTHCARE WORKERS ON HAND HYGIENE

Variables	Frequency (n=460)	Percent
Hand rubbing causes skin dryness more than hand washing		
True	241	52.4
False	219	47.6
Hand rubbing is more effective against germs than hand washing		
True	255	55.4
False	205	44.6
Hand washing and rubbing are recommended to be performed in sequence		
True	301	65.4
False	159	34.6
Receive formal training in hand hygiene (last 3 years)		
Yes	359	78.0
No	101	22.0
Minimal time needed for alcohol-based hand rub to kill most germs on your hand		
3 seconds	25	5.4
10 seconds	61	13.3
20 seconds	287	62.4
1 minutes	87	18.9
Type of hand hygiene method required before palpation of the abdomen		
Rubbing	252	54.8
Washing	202	43.9
None	6	1.3
Type of hand hygiene method required before giving an injection		
Rubbing	262	57.0
Washing	193	42.0
None	5	1.1
Type of hand hygiene method required after emptying a bedpan		
Washing	261	56.7
Rubbing	195	42.4
None	4	0.9
Type of hand hygiene method required after removing examination gloves		
Rubbing	321	69.8
Washing	135	56.7
None	4	0.9

**multiple response

The majority of the respondents 241 (52.4%) said hand rubbing causes skin dryness more than hand washing. Most of the respondents 255 (55.4%) said hand rubbing is more effective against germs than hand washing. Most of the respondents 301 (65.4 %) recommended hand rubbing and washing to be performed in sequence.

The majority of the respondents 287 (62.4%) said it takes 20 seconds for alcohol-based hand rub to kill most germs on your hand. Most of the respondents 252 (54.8) chose hand rubbing as the method required before palpation of the abdomen. The majority of the respondents 262 (57.0%) chose hand rubbing as the method required before giving an injection.

Most of the respondents 261 (56.7%) chose hand washing as the method required after emptying a bed pan. The majority of the respondents 321 (69.8%) chose hand rubbing as the method required after removing examination gloves.

TABLE 2C: KNOWLEDGE OF HEALTHCARE WORKERS ON HAND HYGIENE

Variables	Frequency (n=460)	Percent
Type of hand hygiene method required after making a patient bed		
Rubbing	296	64.3
Washing	159	34.6
None	5	1.1
Type of hand hygiene method required after visible exposure to blood		
Washing	249	54.1
Rubbing	208	45.2
None	3	0.7
Colonization of hand with harmful germs**		
Artificial nails	431	93.7
Damaged skin	430	93.5
Wearing jewelry	361	78.5
Regular use of hand cream	159	34.6

**multiple response

A large number of the respondents 296 (64.3%) chose hand rubbing as the method required after making a patient bed. Most of the respondents 249 (54.1%) chose hand washing as the method required after visible exposure to blood. The majority of the respondents 431 (93.7%) chose having artificial nails as a means of colonization of the hand with harmful germs.

TABLE 3: DOMAINS OF KNOWLEDGE OF HAND HYGIENE AMONG RESPONDENT

Knowledge domains	Frequency (n=460)	Percent
Main Route of Germ Transmission and Sources of HAIs		
Good knowledge	368	80.0
Hand Hygiene Techniques (Timing, Duration, and Method)		
Good knowledge	416	90.4
Procedural Applications (Before and After Patient Care)		
Good knowledge	359	78.0
Hand Rubbing is More Rapid for Cleansing than Hand Washing		
Good knowledge	346	75.2
Hand Rubbing is More Effective than Hand Washing		
Good knowledge	255	55.4
Hand Washing and Rubbing Should be Done in Sequence		
Good knowledge	301	65.4
Hand Hygiene (Last 3 Years)		
Good knowledge	359	78.0
Minimal Time for Alcohol-Based Hand Rub (20 Seconds)		
Good knowledge	287	62.4
Application Before and After Clinical Procedures (Palpation, Injection, Bedpan, Glove Removal)		
Good knowledge	321	69.8
Specific Exposure Situations (Making Bed, Visible Blood)		
Good knowledge	249	54.1
Risk Factors for Hand Contamination		
Good knowledge	431	93.7

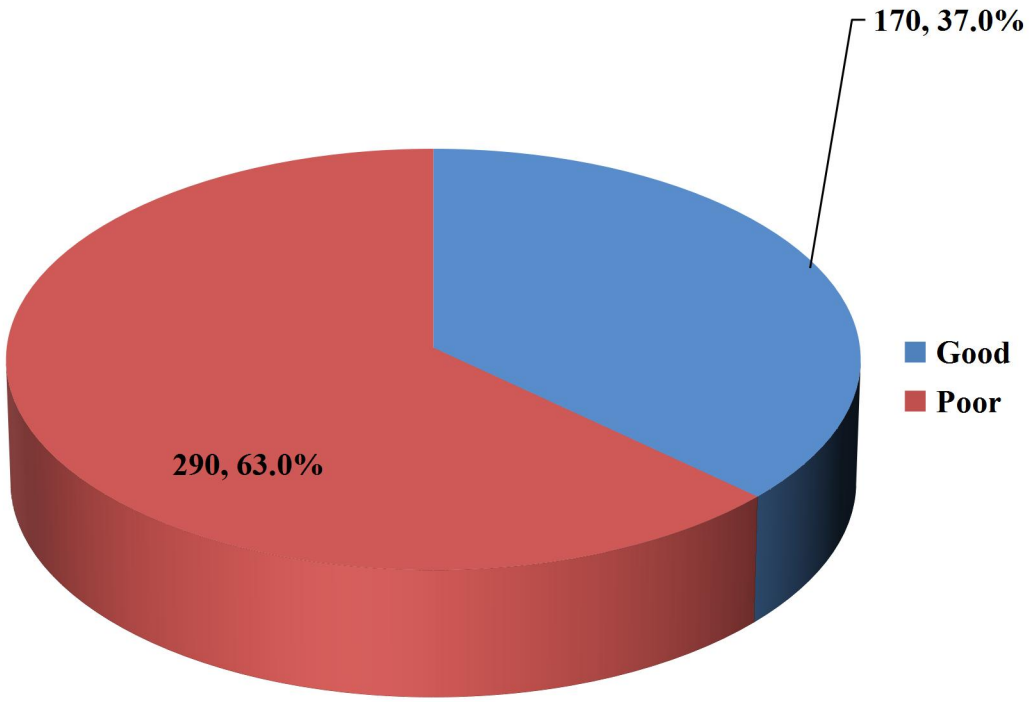

FIGURE 1: OVERALL KNOWLEDGE OF HEALTHCARE WORKERS ON HAND HYGIENE

The majority 290 (63.0%) of the respondents had poor knowledge while 170 (37.0%) had good knowledge.

TABLE 4: THE RELATIONSHIP BETWEEN OVERALL KNOWLEDGE AND SOCIODERMOGRAPHICS

Variables	Overall knowledge		Test Statistics	p-value
	Good (n=170) Frequency (%)	Poor (n=290) Frequency (%)		
Age (Years)			χ^2=11.030	**0.012**
20 – 29	100 (43.9)	128 (56.1)		
30 – 39	47 (29.7)	111 (70.3)		
40 – 49	14 (26.4)	39 (73.6)		
50 – 59	9 (42.9)	12 (57.1)		
Sex			χ^2=2.235	0.147
Female	99 (96.8)	148 (59.9)		
Male	71 (99.1)	142 (66.7)		
Religion			χ^2=1.394	0.489
Christianity	154 (37.8)	253 (62.2)		
Islam	13 (28.9)	32 (71.1)		
ATR	3 (37.5)	5 (62.5)		
Marital Status			Fisher's exact =11.032	**0.033**
Single	110 (40.1)	164 (59.9)		
Married	49 (29.7)	116 (70.3)		
Widowed	1 (25.0)	3 (75.0)		
Separated	2 (40.0)	3 (60.0)		
Divorced	3 (50.0)	3 (50.0)		
Co-habiting	5 (83.3)	1 (16.7)		
Profession			χ^2=10.789	**0.027**
Dentist	17 (30.4)	39 (69.6)		
Doctor	88 (41.5)	124 (58.5)		
Nurse	50 (35.7)	90 (64.3)		
Paramedic	5 (71.4)	2 (28.6)		
Physiotherapist	10 (22.2)	35 (77.8)		
Length of Practice			χ^2=0.720	0.695
1 – 10	152 (37.5)	253 (62.5)		
11 – 20	13 (31.0)	29 (69.0)		
>20	5 (38.5)	8 (61.5)		
Monthly allowance			χ^2=2.571	0.284
100,000 – 299,999	107 (39.8)	162 (60.2)		
300,000 – 499,999	52 (32.1)	110 (67.9)		
≥500,000	11 (37.9)	18 (62.1)		

Among the respondents, the age was statistically significant (χ^2= 11.030, p-value = 0.012) as 43.9% of the respondents within the age group 20-29 had good knowledge of hand hygiene. The sex of the respondents was not statistically significant ((χ^2= 2.235, p-value= 0.147) as 40.1% of the female respondents had good knowledge of hand hygiene.

The religion of the respondents was not statistically significant (χ^2 = 1.394, p-value = 0.489) with 37.8% of the respondents who were Christians had good knowledge of hand hygiene of the respondents. The marital status of the respondents was statistically significant (fisher's exact= 11.171, p-value = 0.039). Among the respondents those who were co-habiting had 83.3% good knowledge of hand hygiene.

The profession of the respondents was statistically significant (χ^2= 10.789, p-value = 0.027) as 71.4% of the respondents who were paramedics had good knowledge of hand hygiene. Among the respondents, the length of service of the respondent was not statistically significant (Chi square = 0.720, p-value = 0.695) as 100.0% of the respondents with 20 years and above service length had good knowledge of hand hygiene.

Among the respondents, the monthly allowance was not statistically significant (χ^2= 2.571, p-value = 0.284) as 39.8% of the respondents with allowance between 100,000 to 299,999 had good knowledge of hand hygiene.

TABLE 5: LOGISTICS REGRESSION ANALYSIS FOR GOOD KNOWLEDGE AMONG RESPONDENTS

Variables	β	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
Age	0.013	1.013	0.964	1.065	0.618
Religion					
Christianity*		1			
Islam	-0.509	0.601	0.289	1.251	0.174
ATR	0.328	1.389	0.271	7.123	0.694
Marital status					
Married*		1			
Not married	0.840	2.315	1.362	3.935	**0.002**
Sex					
Male*		1			
Female	0.483	1.621	1.045	2.514	**0.031**
Profession					
Physiotherapy*		1			
Dentistry	-0.170	0.844	0.333	2.134	0.719
Doctors	0.542	1.719	0.807	3.662	0.160
Nurses	0.931	2.537	1.165	5.526	**0.019**
Paramedics	1.676	5.346	0.509	56.153	0.162
Monthly income					
₦100k–299,999*		1			
₦300k–499,999	0.591	1.806	1.082	3.012	**0.024**
≥₦500,000	0.198	1.220	0.455	3.267	0.693
Length of practice					
1–10 years*		1			
11–20 years	-0.557	0.573	0.113	2.901	0.501
>20 years	-1,205	0.300	0.063	1.426	0.130

CI = Confidence interval; **OR** = Odd ratio; *reference category

For every one-year increase in age, respondents were 1.013 times more likely to have good knowledge of hand hygiene (95% CI: 0.964–1.065, p = 0.618). This association was not statistically significant.

With respect to religion, Muslims were 0.601 times less likely to have good knowledge compared to Christians (95% CI: 0.289–1.251, p = 0.174). Respondents who practiced ATR were 1.389 times more likely to have good knowledge compared to Christians (95% CI: 0.271–7.123, p = 0.694). Neither association was statistically significant.

For marital status, respondents who were not married were 2.315 times more likely to have good knowledge of hand hygiene compared to those who were married (95% CI: 1.362–3.935, p = 0.002). This was statistically significant.

Regarding sex, females were 1.621 times more likely to have good knowledge compared to males (95% CI: 1.045–2.514, p = 0.031). This association was statistically significant.

By profession, dentists were 0.844 times less likely to have good knowledge compared to physiotherapists (95% CI: 0.333–2.134, p = 0.719). Doctors were 1.719 times more likely (95% CI: 0.807–3.662, p = 0.160), and nurses were 2.537 times more likely (95% CI: 1.165–5.526, p = 0.019) to have good knowledge compared to physiotherapists. The association for nurses was statistically significant, while those for dentists and doctors were not. Paramedics were 5.346 times more likely to have good knowledge compared to physiotherapists (95% CI: 0.509–56.153, p = 0.162), but this was not statistically significant due to the wide confidence interval.

For monthly income, respondents earning ₦300,000–₦499,999 were 1.806 times more likely to have good knowledge compared to those earning ₦100,000–₦299,999 (95% CI: 1.082–3.012, p = 0.024). This was statistically significant. Respondents earning ₦500,000 and above were 1.220 times more likely to have good knowledge compared to the reference group (95% CI: 0.455–3.267, p = 0.693), but this was not statistically significant.

For length of practice, those with 11–20 years of experience were 0.573 times less likely to have good knowledge compared to those with 1–10 years of practice (95% CI: 0.113–2.901, p = 0.501). Those with more than 20 years of practice were 0.300 times less likely to have good knowledge compared to the reference group (95% CI: 0.063–1.426, p = 0.130). Both associations were not statistically significant.

SECTION C:

ATTITUDE TOWARDS HAND HYGIENE

TABLE 6A: ATTITUDE OF HEALTH WORKFORCE TOWARDS HAND HYGIENE

Variable n=460	SA	A	U	D	SD
	n (%)	n (%)	n (%)	n (%)	n (%)
I have a duty to act as a role model for other health care workers	285 (62.0)	142 (30.9)	28 (6.1)	3 (0.7)	2 (0.4)
When busy it is more important to complete my tasks than to perform hand hygiene	49 (10.7)	149 (32.4)	33 (7.2)	133 (28.9)	96 (20.9)
Performing hand hygiene in the recommended situations can reduce patient mortality	221 (48.0)	204 (44.3)	24 (5.2)	6 (1.3)	5 (1.1)
Performing hand hygiene in the recommended situations can reduce medical costs associated with hospital- acquired infections	234 (50.9)	193 (42.0)	23 (5.0)	7 (1.5)	3 (0.7)
I can't always perform hand hygiene in recommended situations because my patient's needs come first	75 (16.3)	113 (24.6)	41 (8.9)	126 (27.4)	105 (22.8)
Prevention of hospital- acquired infection is a valuable part of a health care worker's role.	257 (55.9)	179 (38.9)	14 (3.0)	9 (2.0)	1 (0.2)
I follow the example of senior health care workers when deciding whether or not to perform hand hygiene	119 (25.9)	143 (31.1)	56 (12.2)	85 (18.5)	57 (12.4)
I believe I have the power to change poor practices in the workplace	205 (44.6)	196 (42.6)	47 (10.2)	11 (2.4)	1 (0.2)
Failure to perform hand hygiene in the recommended situations can be considered negligence	211 (45.9)	213 (46.3)	22 (4.8)	9 (2.0)	5 (1.1)

***(n=460)**

***SA = Strongly Agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly Disagree**

More than half, 285 (62.0%), of respondents strongly agreed that they have a duty to act as role models for other health care workers while 2 (0.4%) strongly disagreed with it. One hundred and forty nine (42.0%) of the respondents agreed that it is more important to complete their task when busy before performing hand hygiene, while ninety six (20.9%) strongly disagreed that it is more important to complete their task when busy before performing hand hygiene.

Two hundred and twenty one (48.0%) strongly agreed that performing hand hygiene in the recommended situation can reduce patient mortality; however, 3 (0.7%) strongly disagreed with this. More than half (234 (50.9%) of the respondents strongly agreed that performing hand hygiene in the recommended situations can reduce medical costs associated with hospital- acquired infections, while 3 (0.7%) strongly disagreed.

One hundred and twenty-six (27.4%) disagreed that they can't always perform hand hygiene in recommended situations because their patient's needs come first, while 41 (8.9%) were undecided. Two hundred and fifty-seven (55.9%) of the respondents strongly agreed that prevention of hospital- acquired infection is a valuable part of a health care worker's role, while 1 (0.2%) strongly disagreed.

One hundred and forty-three (31.1%) agreed that they follow the example of senior health care workers when deciding whether or not to perform hand hygiene, while 56 (12.2%) were undecided. Two hundred and five (44.6%) strongly agreed that believe they have the power to change poor practices in the workplace, while 1 (0.2%) strongly disagreed with it. Two hundred and thirteen (46.3%) agreed that failure to perform hand hygiene in the recommended situations can be considered negligence; however, 5 (1.1%) strongly disagreed.

TABLE 6B: ATTITUDE OF HEALTH WORKFORCE TOWARDS HAND HYGIENE

Variable n=460	SA	A	U	D	SD
	n (%)	n (%)	n (%)	n (%)	n (%)
Hand hygiene is a habit for me in my personal life	231 (50.2)	202 (43.9)	22 (4.8)	3 (0.7)	2 (0.4)
I am confident I can effectively apply my knowledge of hand hygiene to my clinical practice	248 (53.9)	200 (43.5)	10 (2.2)	1 (0.2)	1 (0.2)
It is an effort to remember to perform hand hygiene in the recommended situations	188 (40.9)	217 (47.2)	17 (3.7)	26 (5.7)	12 (2.6)
I would feel uncomfortable reminding a health professional to hand wash	137 (29.8)	169 (36.7)	61 (13.3)	60 (13.0)	33 (7.2)
If I disagree with a guideline I look for research findings to guide my practice	148 (32.2)	210 (45.7)	84 (18.3)	14 (3.0)	4 (0.9)
Performing hand hygiene slows down building immunity to disease	114 (24.8)	150 (32.6)	44 (9.6)	65 (14.1)	87 (18.9)
Dirty sinks can be a reason for not washing hands	132 (28.7)	196 (42.6)	53 (11.5)	47 (10.2)	32 (7.0)
Lack of an acceptable soap product can be a reason for not cleansing hands	130 (28.3)	174 (37.8)	58 (12.6)	62 (13.5)	36 (7.8)
Performing hand hygiene after caring for a wound can protect from infections	268 (58.3)	168 (36.5)	14 (3.0)	6 (1.3)	4 (0.9)
Cleansing hands after going to the toilet can reduce transmission of infectious disease	278 (60.4)	166 (36.1)	12 (2.6)	2 (0.4)	2 (0.4)

***(n=460)**

***SA = Strongly Agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly Disagree**

More than half, 231 (50.2%), of respondents strongly agreed that hand hygiene is a habit for me in my personal life while 2 (0.4%) strongly disagreed with it. Two hundred and forty-eight (53.9%) of the respondents strongly agreed that they are confident they can effectively apply their knowledge of hand hygiene to my clinical practice, while 1 (0.2%) strongly disagreed.

Two hundred and seventeen (47.2%) agreed that it is an effort to remember to perform hand hygiene in the recommended situations; however, 12 (2.6%) strongly disagreed with this. One hundred and sixty-nine (36.7%) agreed that they would feel uncomfortable reminding a health professional to hand wash, while 33 (7.2%) strongly disagreed with it. Two hundred and ten (45.7%) of the respondents agreed that if they disagree with a guideline they look for research findings to guide my practice, while 4 (0.9%) strongly disagreed.

One hundred and fifty (32.6%), agreed that performing hand hygiene slows down building immunity to disease; however, 44 (9.6%) were undecided. One hundred and ninety-six (42.6%) agreed that dirty sinks can be a reason for not washing hands, while 32 (7.0%) strongly disagreed. One hundred and seventy-four (37.8%) agreed that lack of an acceptable soap product can be a reason for not cleansing hands, while 36 (7.8%) strongly disagreed with it.

Two hundred and sixty-eight (58.3%) strongly agreed that performing hand hygiene after caring for a wound can protect from infections; however, 4 (0.9%) strongly disagreed. More than half, 278 (60.4%), of the respondents strongly agreed that cleansing hands after going to the toilet can reduce transmission of infectious disease, while 2 (0.4%) strongly disagreed.

TABLE 7: DOMAINS OF ATTITUDE OF HEALTH WORKFORCE TOWARDS HAND HYGIENE

Attitude domains	Frequency (n=460)	Percent
Sense of Professional Responsibility and Role Modelling		
Good attitude (agree they must act as role models)	427	92.9
Prioritization of Hand Hygiene during Busy Schedules		
Good attitude (disagree that tasks are more important than hygiene)	229	49.8
Perceived Effectiveness of Hand Hygiene in Reducing Mortality and Costs		
Good attitude (agree it reduces mortality and costs)	428	93.0
Balancing Patient Needs with Hygiene Compliance		
Good attitude (disagree that patient needs override hand hygiene)	231	50.2
Perception of Infection Prevention as a Core Professional Role		
Good attitude (agree it's a valuable responsibility)	436	94.8
Influence of Senior Colleagues on Hand Hygiene Behaviour		
Good attitude (independent decision-making, not just following seniors)	262	57.0
Confidence and Empowerment to Improve Workplace Practices		
Good attitude (believe they can change poor practices)	401	87.2
Accountability and Legal Awareness		
Good attitude (agree failure to perform hygiene is negligence)	424	92.2
Personal Habit and Integration of Hand Hygiene		
Good attitude (perform hygiene as personal habit)	433	94.1
Confidence in Applying Hand Hygiene Knowledge in Practice		
Good attitude (confident in practice application)	448	97.4
Motivation and Memory to Perform Handhygien		
Good attitude (do not find it difficult to remember)	405	88.0
Assertiveness to Remind Colleagues		
Good attitude (comfortable reminding others)	306	66.5
Research-Oriented and Evidence-Based Mindset		
Good attitude (seek research when in doubt)	358	77.9
Perception of Hand Hygiene and Immunity		
Good attitude (disagree that hand hygiene weakens immunity)	229	49.8
Environmental and Product Barriers to Hand Hygiene		
Good attitude (do not justify dirty sinks or lack of soap as barriers)	196	42.6
Understanding of Protective Value after Wound Care		
Good attitude (agree hygiene after wound care prevents infection)	436	94.8
Understanding of Hand Hygiene after Toilet Use		
Good attitude (agree it reduces transmission)	444	96.5

Attitudes towards hand hygiene were evaluated under five major domains — beliefs, motivation, role-modelling, perceived control, and commitment — to determine respondents' psychological and behavioural disposition toward hand hygiene practices.

Overall, 349 (75.9 %) of respondents demonstrated a positive attitude across the domains, while 111 (24.1 %) exhibited a negative attitude.

In the belief domain, a substantial majority (over 90 %) agreed that proper hand hygiene significantly reduces healthcare-associated infections and prevents patient harm. Within the motivation domain, about 88 % expressed personal satisfaction and fulfilment when adhering to hand hygiene protocols, and 86 % indicated they monitor their hand hygiene performance regularly.

Regarding the role-modelling domain, approximately 82 % perceived themselves as examples for their colleagues and maintained confidence in performing hand hygiene even when busy or under pressure. In the perceived-control domain, 84 % believed they could maintain good hygiene despite workload demands, reflecting strong internal control and perceived self-efficacy.

The commitment domain also revealed encouraging results, as over 80 % of respondents intended to always follow hand hygiene protocols and continuously improve their compliance levels. Nonetheless, fewer respondents (about 60 %) agreed that institutional recognition or reward exists for staff who demonstrate good compliance, indicating the need for stronger organizational reinforcement.

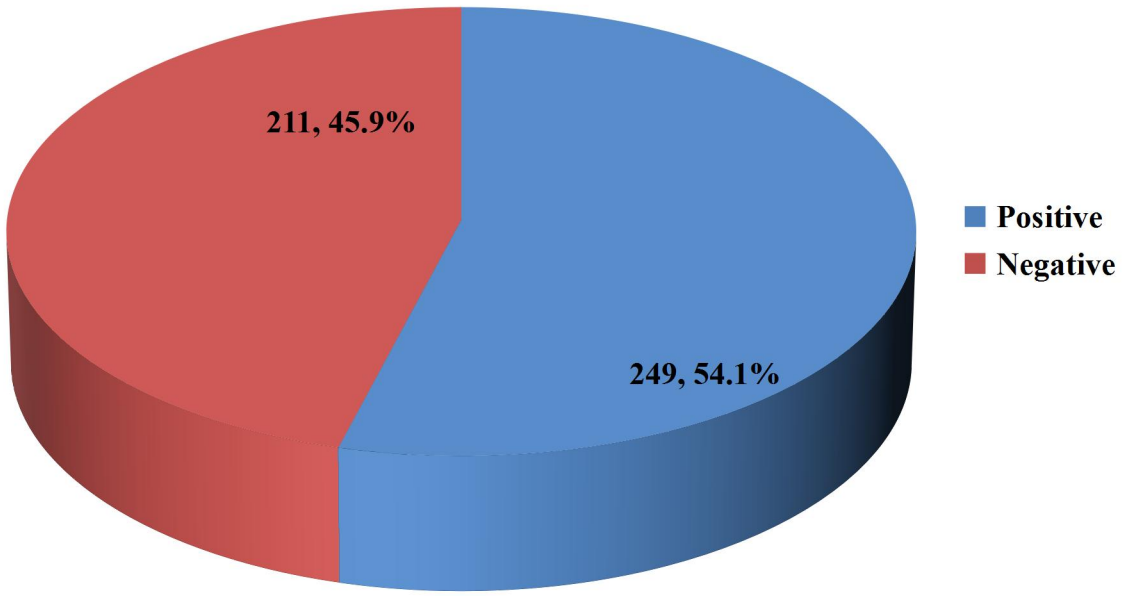

FIGURE 2: ATTITUDE OF HEALTH WORKFORCE TOWARDS HAND HYGIENE

The majority 249 (54.1%) of the respondents had positive attitude while 211 (45.9%) had negative attitude.

TABLE 8A: THE RELATIONSHIP BETWEEN OVERALL ATTITUDE AND SOCIODERMOGRAPHICS

Variables n = 460	Overall attitude		Test Statistics	p-value
	Positive (n=249) Frequency (%)	Negative (n=211) Frequency (%)		
Age (Years)			χ^2=30.379	**<0.001**
20 – 29	150 (65.8)	78 (34.2)		
30 – 39	62 (39.2)	96 (60.8)		
40 – 49	23 (43.4)	30 (56.6)		
50 – 59	14 (66.7)	7 (33.3)		
Sex			χ^2=6.227	**0.013**
Female	147 (59.5)	100 (40.5)		
Male	102 (47.9)	111 (52.1)		
Religion			χ^2=5.515	0.063
Christianity	227 (55.8)	180 (44.2)		
Islam	17 (37.8)	28 (62.2)		
ATR	5 (62.5)	3 (37.5)		
Marital Status			Fisher's exact =21.866	**<0.001**
Single	169 (61.7)	105 (38.3)		
Married	66 (40.0)	99 (60.0)		
Widowed	3 (75.0)	1 (25.0)		
Separated	4 (80.0)	1 (20.0)		
Divorced	3 (50.0)	3 (50.0)		
Co-habiting	4 (66.7)	2 (33.3)		
Profession			χ^2=23.117	**<0.001**
Dentist	20 (35.7)	36 (64.3)		
Doctor	120 (56.6)	92 (43.4)		
Nurse	88 (62.9)	52 (37.1)		
Paramedic	6 (85.7)	1 (14.3)		
Physiotherapist	15 (33.3)	30 (66.7)		

TABLE 8B: THE RELATIONSHIP BETWEEN OVERALL ATTITUDE AND SOCIODERMOGRAPHICS

Variables n = 460	Overall attitude		Test Statistics	p-value
	Positive (n=249) Frequency (%)	Negative (n=211) Frequency (%)		
Length of Practice			χ^2=7.262	**0.025**
1 – 10	225 (55.6)	180 (44.4)		
11 – 20	15 (35.7)	27 (64.3)		
>20	9 (69.2)	4 (30.8)		
Monthly allowance			χ^2=0.239	0.908
100,000 – 299,999	144 (53.5)	125 (46.5)		
300,000 – 499,999	90 (55.6)	72 (44.4)		
≥500,000	15 (51.7)	14 (48.3)		
Knowledge of hand hygiene			χ^2=0.070	>0.999
Good	244 (54.2)	206 (45.8)		
Poor	5 (50.0)	5 (50.0)		

Among the respondents, the age group was statistically significant (Chi square= 30.374, p-value < 0.001) as 66.7% of the respondents within the age group 50-59 had positive attitude towards hand hygiene. The sex of the respondents was statistically significant (χ^2 square= 6.227, p-value= 0.013) as 59.7% of the female respondents had positive attitude towards hand hygiene.

The religion of the respondents was not statistically significant (χ^2 = 5.515, p-value =0.063) with 62.5% of the respondents who were African traditional worshippers had positive attitude towards hand hygiene of the respondents. The marital status of the respondents was statistically significant (fisher's exact= 21.866, p-value < 0.001). Among the respondents those who were separated had 80.0% positive attitude towards hand hygiene.

The profession of the respondents was statistically significant (Chi square= 23.117, p-value < 0.001) as 85.7% of the respondents who were paramedics had positive attitude towards hand hygiene. Among the respondents, the length of service was statistically significant (χ^2= 7.262, p-value = 0.025) as 69.2% of the respondents with above 20 years of service length had positive attitude towards hand hygiene.

Among the respondents, the monthly allowance was not statistically significant (χ^2= 0.239, p-value = 0.908) as 55.6% of the respondents with allowance over or equal to 500,000 had positive attitude towards hand hygiene. The knowledge of hand hygiene of the respondents was not statistically significant (Chi square= 0.070, p-value > 0.999) as 54.2% of the respondents who had good knowledge of hand hygiene had positive attitude towards hand hygiene.

TABLE 9: LOGISTICS REGRESSION ANALYSIS FOR ATTITUDE AMONG RESPONDENT

Variables	β	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
Age	0.013	1.013	0.964	1.065	0.618
Religion					
Christianity*		1			
Islam	–0.509	0.601	0.289	1.251	0.174
ATR	0.328	1.389	0.271	7.123	0.694
Marital status					
Married*		1			
Not married	0.840	2.315	1.362	3.935	**0.002**
Sex					
Male*		1			
Female	0.483	1.621	1.045	2.514	**0.031**
Profession					
Physiotherapy*		1			
Dentistry	–0.170	0.844	0.333	2.134	0.719
Doctors	0.542	1.719	0.807	3.662	0.160
Nurses	0.931	2.537	1.165	5.526	**0.019**
Paramedics	1.676	5.346	0.509	56.153	0.162
Monthly income					
₦100k–299,999*		1			
₦300k–499,999	0.591	1.806	1.082	3.012	**0.024**
≥₦500,000	0.198	1.220	0.455	3.267	0.693
Length of practice					
1–10 years*	–0.557	0.573	0.113	2.901	0.501
11–20 years	–1.205	0.300	0.063	1.426	0.130
>20 years		1			
Knowledge					
Good knowledge*		1			
Poor knowledge	–1.475	0.229	0.146	0.359	**<0.001**

For every one-year increase in age, respondents were 1.013 times more likely to have a positive attitude toward hand hygiene (95% CI: 0.964–1.065, p = 0.618). This was not statistically significant.

With respect to religion, Muslims were 0.601 times less likely to have a positive attitude compared to Christians (95% CI: 0.289–1.251, p = 0.174). Respondents practicing ATR were 1.389 times more likely to have a positive attitude compared to Christians (95% CI: 0.271–7.123, p = 0.694). Neither association was statistically significant.

For marital status, respondents who were not married were 2.315 times more likely to have a positive attitude compared to those who were married (95% CI: 1.362–3.935, p = 0.002). This association was statistically significant.

Females were 1.621 times more likely to have a positive attitude compared to males (95% CI: 1.045–2.514, p = 0.031). This was statistically significant.

In terms of profession, dentists were 0.844 times less likely to have a positive attitude compared to physiotherapists (95% CI: 0.333–2.134, p = 0.719). Doctors were 1.719 times more likely (95% CI: 0.807–3.662, p = 0.160), while nurses were 2.537 times more likely (95% CI: 1.165–5.526, p = 0.019) to have a positive attitude compared to physiotherapists. The association was statistically significant only among nurses. Paramedics were 5.346 times more likely to have a positive attitude compared to physiotherapists (95% CI: 0.509–56.153, p = 0.162), but this was not statistically significant due to the wide confidence interval.

For monthly income, respondents earning ₦300,000–₦499,999 were 1.806 times more likely to have a positive attitude compared to those earning ₦100,000–₦299,999 (95% CI: 1.082–3.012, p = 0.024). This was statistically significant. Respondents earning ₦500,000 and above were 1.220 times more likely to have a positive attitude compared to the same reference group (95% CI: 0.455–3.267, p = 0.693). This was not statistically significant.

For length of practice, respondents with 11–20 years of practice were 0.573 times less likely to have a positive attitude compared to those with 1–10 years (95% CI: 0.113–2.901, p = 0.501). Those with more than 20 years were 0.300 times less likely compared to the reference group (95% CI: 0.063–1.426, p = 0.130). Neither association was statistically significant.

Finally, knowledge was a strong predictor: respondents with poor knowledge were 0.229 times less likely to have a positive attitude compared to those with good knowledge (95% CI: 0.146–0.359, p < 0.001). This association was statistically significant.

SECTION D:

COMPLIANCE RATES OF HEALTHCARE WORKERS

TABLE 10: INDICATION FOR HAND HYGIENE PRACTICES

Variables	Before touching the patient n (%)	Before aseptic procedure n (%)	After exposure to body fluids n (%)	After touching the patient n (%)	After exposure to the patient surrounding n (%)	Overall compliance (%)
Nurse (n=58)	12 (20.7)	44 (75.9)	56 (96.6)	53 (91.4)	33 (56.9)	68.3
Doctor (n=122)	66 (54.1)	52 (42.6)	94 (77.0)	82 (67.2)	81 (66.4)	61.5
Physiotherapist (n=24)	11 (45.8)	10 (41.7)	15 (62.5)	22 (91.7)	16 (66.7)	61.7
Dentist (n=16)	11 (68.8)	12 (75.0)	13 (81.3)	12 (75.0)	10 (62.5)	72.5
Paramedic(n=10)	10 (100.0)	2 (20.0)	3 (30.0)	10 (100.0)	10 (100.0)	70.0

Among the respondents, the majority 10 (100.0%) who were paramedics had the most indication to practice hand hygiene before touching the patient while 60 (68.8%) were dentists, 66 (54.1%) were doctors, 11 (45.8%) were physiotherapist and 12 (20.7%) were nurses.

Most, 44 (75.9%) of the respondents who were nurses had the most indication to practice hand hygiene before aseptic procedure while 12 (75.0%) were dentist, 52 (42.6%) were doctors, 10 (41.7%) were physiotherapist and 2 (20.0%) were paramedics.

The majority 56 (96.6%) of the respondents, who were nurses had the most indication to practice hand hygiene after exposure to body fluids while 13 (81.3%) were dentists, 94 (77.0%) were doctors, 15 (62.5%) were physiotherapist and 3 (30.0%) were paramedics.

A large number of the respondents, 10 (100.0%) who were paramedics had the most indication to practice hand hygiene after touching the patient while 22 (91.7%) were physiotherapist, 53 (91.4%) were nurses, 12 (75.0%) were doctors and 82 (67.2%) were doctors.

Among the respondents, the majority 10 (100.0%) who were paramedics had the most indication to practice hand hygiene after exposure to the patient surrounding while 16 (66.7%) were physiotherapists, 81 (66.4%) were doctors, 10 (62.5%) were dentists and 33 (56.9%) were nurses.

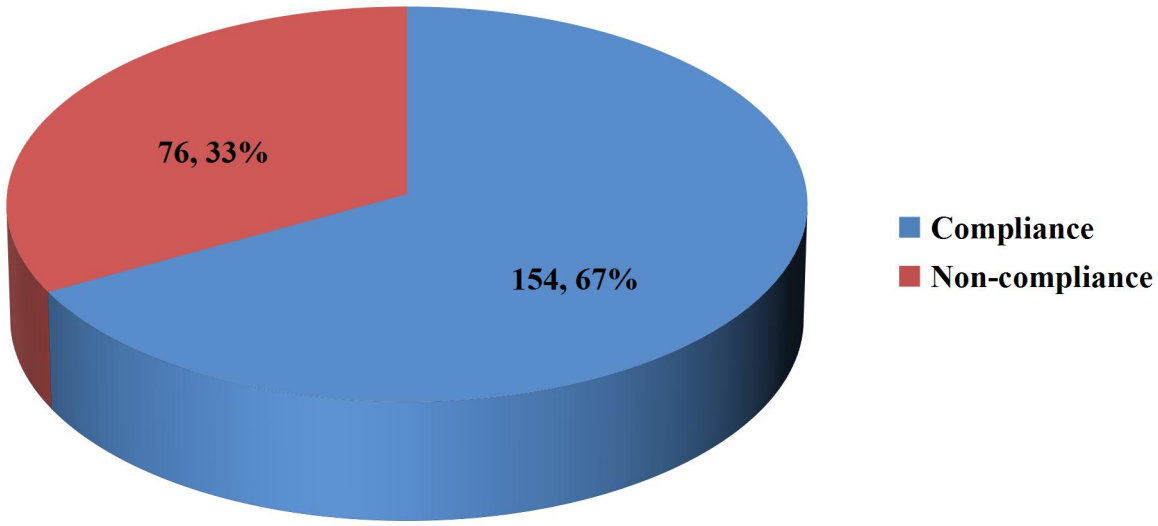

FIGURE 3: COMPLIANCE RATES OF HEALTHCARE WORKERS TOWARDS HAND HYGIENE

A pie chart showing the compliance rate of healthcare workers towards hand hygiene with majority 154 (67.0%) of the respondents being compliant while 76 (33.0%) were not compliant.

TABLE 11: THE RELATIONSHIP BETWEEN COMPLIANCE RATES AND HEALTHCARE WORKERS

Variables	Compliance		Statistics	p-value
	Compliant (n=154) Frequency (%)	Not compliant (n=76) Frequency (%)		
Profession			χ^2=36.578	**<0.001**
Dentist	6 (37.5)	10 (62.5)		
Doctor	76 (62.3)	46 (37.7)		
Nurse	51 (87.9)	7 (12.1)		
Paramedic	1 (10.0)	9 (90.0)		
Physiotherapist	20 (83.3)	4 (16.7)		

Among respondents those who were nurses and physiotherapists had the highest compliance rates 51 (87.9%) and 20 (83.3%) respectively. The profession of the respondents was statistically significant (Chi square= 36.578, p-value < 0.001).

TABLE 12: LOGISTICS REGRESSION ANALYSIS FOR COMPLIANCE RATES

Variables	B (Regression co-efficient)	AOR	95% CI		p-value
			Min	Max	
Profession					
Nurse*	1				
Doctor	-1.484	0.227	0.095	0.542	**<0.001**
Physiotherapist	-0.376	0.686	0.181	2.602	0.580
Dentist	-2.497	0.082	0.023	0.297	**<0.001**
Paramedic	-4.183	0.015	0.002	0.139	**<0.001**

***Reference Category, Statistically significant, AOR - Adjusted Odds Ratio, CI - Confidence Interval.**

Doctors were 0.227 times less likely to comply with hand hygiene instruction compared to nurses (95% CI: 0.095–0.542, $p < 0.001$). This association was statistically significant.

Physiotherapists were 0.686 times less likely to comply with hand hygiene instruction compared to nurses (95% CI: 0.181–2.602, $p = 0.580$). This association was not statistically significant.

Dentists were 0.082 times less likely to comply with hand hygiene instruction compared to nurses (95% CI: 0.023–0.297, $p < 0.001$). This association was statistically significant.

Paramedics were 0.015 times less likely to comply with hand hygiene instruction compared to nurses (95% CI: 0.002–0.139, $p < 0.001$). This association was statistically significant.

SECTION E:

FACILITATORS TO HAND HYGIENE

TABLE 13A: FACILITATORS TO HAND HYGIENE AMONG HEALTHCARE WORKERS

Variable	Agree n (%)	Disagree n (%)
I am aware of the guidelines for proper hand hygiene in my workplace	448 (97.4)	12 (2.6)
I know when hand hygiene is required during patient care	445 (96.7)	15 (3.3)
I have the skills required to perform hand hygiene correctly	438 (95.2)	22 (4.8)
I have been trained on hand hygiene practices in the last 12 months	358 (77.8)	102 (22.2)
Performing hand hygiene is an important part of my role as a healthcare worker	450 (97.8)	10 (2.2)
I see myself as a role model for hand hygiene among my colleagues	402 (87.4)	58 (12.6)
I am confident I can perform hand hygiene even when I'm busy	426 (92.6)	34 (7.4)
I can maintain good hand hygiene even when I am under pressure	423 (92.0)	37 (8.0)
I believe that hand hygiene can significantly reduce healthcare-associated infections	443 (96.3)	17 (3.7)
I am optimistic that hand hygiene compliance can improve in my facility	433 (94.1)	27 (5.9)
Poor hand hygiene can lead to patient harm	439 (95.4)	21 (4.6)
Performing hand hygiene reduces the risk of infection transmission	443 (96.3)	17 (3.7)
I receive positive feedback when I follow hand hygiene protocols	397 (86.3)	63 (13.7)
Hand hygiene compliance is recognized and rewarded in my unit	348 (75.7)	112 (24.3)
I intend to follow proper hand hygiene protocols at all times	426 (92.6)	34 (7.4)
I always plan to wash or sanitize my hands before and after patient contact	440 (95.7)	20 (4.3)
Hand hygiene is a priority for me during my daily tasks	442 (96.1)	18 (3.9)
I set goals to improve my hand hygiene compliance	408 (88.7)	52 (11.3)

***(n=460)**

More than half, 448 (97.4%), of respondents agreed that they are aware of the guidelines for proper hand hygiene in their workplace while 12 (2.6%) disagreed with it. Four hundred and forty-five (96.7%) of the respondents agreed that they know when hand hygiene is required during patient care while 15 (3.3%) disagreed.

Four hundred and thirty-eight (95.2%) agreed that they have the skills required to perform hand hygiene correctly; however, 22 (4.8%) disagreed with this. The majority 358 (77.8%) of the respondents agreed that they have been trained on hand hygiene practices in the last 12 months, while 102 (22.2%) disagreed. Four hundred and fifty (97.8%) agreed that performing hand hygiene is an important part of their role as a healthcare worker, while 10 (2.2%) disagreed.

Four hundred and two (87.4%) of the respondents agreed that they see themself as a role model for hand hygiene among their colleagues, while 58 (12.6%) disagreed. Four hundred and twenty-six (92.6%) agreed that they are confident they can perform hand hygiene even when they are busy, while 34 (7.4%) disagreed.

Four hundred and twenty-three (92.0%) agreed that they can maintain good hand hygiene even when they are under pressure, while 37 (8.0%) disagreed with it. Four hundred and forty-three (96.3%) agreed that they believe that hand hygiene can significantly reduce healthcare-associated infections, 17 (3.7%) disagreed.

Most 433 (94.1%) of the respondents agreed that they are optimistic that hand hygiene compliance can improve in their facility, while 27 (5.9%) disagreed. Four hundred and thirty-nine (95.4%) agreed that poor hand hygiene can lead to patient harm, while 21 (4.6%) disagreed. Four hundred and forty-three (96.3%) of the respondents agreed that performing hand hygiene reduces the risk of infection transmission, while 17 (3.7%) disagreed.

Three hundred and ninety-seven (86.3%) agreed that they receive positive feedback when they follow hand hygiene protocols, while 63 (13.7%) disagreed. Three hundred and forty-eight (75.7%) agreed that hand hygiene compliance is recognized and rewarded in my unit, while 112 (24.3%) disagreed with it. More than half, 426 (92.6%), of respondents strongly agreed that they intend to follow proper hand hygiene protocols at all times, while 34 (7.4%) disagreed with it.

Four hundred and forty (95.7%) of the respondents agreed that they always plan to wash or sanitize my hands before and after patient contact, while 20 (4.3%) disagreed.

Four hundred and forty-two (96.1%) agreed that hand hygiene is a priority for them during their daily tasks; however, 18 (3.9%) disagreed with this. Four hundred and eight (88.7%) agreed that they set goals to improve their hand hygiene compliance, while 52 (11.3%) disagreed with it.

TABLE 13B: FACILITATORS TO HAND HYGIENE AMONG HEALTHCARE WORKERS

Variable	Agree n (%)	Disagree n (%)
I easily remember to perform hand hygiene before and after patient interactions	418 (90.9)	42 (9.1)
There are visual reminders in my workplace that help me remember hand hygiene	399 (86.7)	61 (13.3)
Hand hygiene supplies (soap, sanitizer, paper towels) are always available where I work	395 (85.9)	65 (14.1)
The placement of hand hygiene stations is convenient in my unit	387 (84.1)	73 (15.9)
My colleagues encourage me to maintain good hand hygiene	362 (78.7)	98 (21.3)
Senior staff in my unit consistently follow hand hygiene practices	395 (85.9)	65 (14.1)
I feel anxious when I forget to perform hand hygiene	376 (81.7)	84 (18.3)
I feel satisfied when I adhere to hand hygiene protocols	431 (93.7)	29 (6.3)
I monitor my hand hygiene practices regularly	422 (91.7)	38 (8.3)
I use strategies to remind myself to perform hand hygiene	402 (87.4)	58 (12.6)

***(n=460)**

Four hundred and eighteen (90.9%) of the respondents agreed that they easily remember to perform hand hygiene before and after patient interactions, while 42 (9.1%) disagreed. Three hundred and ninety-nine (86.7%), agreed that there are visual reminders in my workplace that help me remember hand hygiene; however, 61 (13.3%) disagreed.

Three hundred and ninety-five (85.9%) agreed that hand hygiene supplies (soap, sanitizer, paper towels) are always available where they work, while 65 (14.1%) disagreed. Three hundred and

eighty-seven (84.1%) agreed that the placement of hand hygiene stations is convenient in their unit, while 73 (15.9%) disagreed with it.

Three hundred and sixty-two (78.7%) agreed that their colleagues encourage them to maintain good hand hygiene; however, 98 (21.3%) disagreed. Most, 395 (85.9%), of the respondents agreed that senior staff in their unit consistently follow hand hygiene practices, while 65 (14.1%) disagreed. Three hundred and seventy-six (81.7%) agreed that they feel anxious when they forget to perform hand hygiene, while 84 (18.3%) disagreed with it.

Four hundred and thirty-one (93.7%) of the respondents agreed that they feel satisfied when they adhere to hand hygiene protocols, while 29 (6.3%) disagreed. Four hundred and twenty-two (91.7%), agreed that they monitor their hand hygiene practices regularly; however, 38 (8.3%) disagreed. Four hundred and two (87.4%) agreed that they use strategies to remind themself to perform hand hygiene while 58 (12.6%) disagreed.

SECTION F:

READINESS TO PROMOTE AND SUSTAIN HAND HYGIENE

TABLE 14: WARD INFRASTRUCTURE READINESS CHECKLIST

Item Assessed	Compliant Wards (n = 32)	Compliance (%)
Running water is consistently available	32	100.0
Water is visibly clean	32	100.0
Soap is available at sinks	32	100.0
Disposable towels are available at sinks	8	25.0
Alcohol-based hand rub is available in the ward	14	43.8
Hand rub dispensers are present at the point of care	0	0.0
Hand rub pocket bottles are available to staff	12	37.5
Functional wall dispensers are filled and in use	13	40.6
Hand hygiene posters are displayed near sinks	19	59.4
Hand rub technique posters are displayed near dispensers	0	0.0
Hand hygiene indication posters are displayed in the ward	19	59.4
Other hand hygiene reminders are available	21	65.6
Gloves are available on the ward	32	100.0
Hand hygiene audits are conducted regularly	25	78.1
Assigned person is responsible for refilling dispensers	31	96.9
Hand rub dispensers are replaced when empty	15	46.9
Functional sinks are available in all patient care rooms	30	93.8
Beds have hand rub within arm’s reach	3	9.4
Treatment rooms have at least one hand hygiene point	10	31.3
Corridors/other care areas have hand hygiene points	32	100.0
At least one visual hand hygiene aid is present per room	12	37.5
Total number of fully functioning dispensers is recorded	12	37.5
Each sink has water, soap, and towel available	18	56.3
Audit frequency is at least once per year	24	75.0

The report summarizes the compliance of 32 wards which showed running water, clean water and soap at sinks are available in 100% of the wards. Gloves are also present across all wards 100%. A high proportion (96.9%) has an assigned person for refilling dispensers, and 93.8% of the wards have functional sinks in all patient care rooms.

Only 25% of wards have disposable towels at sinks. Hand rub availability is limited: just 43.8% have it in the ward, and 0.0% at the point of care. Hand rub pocket bottles 0.0% were not available to staff in the wards. Just 9.4% of the wards had hand rub within arm's reach of the bed, raising accessibility concerns.

Poster near sinks (59.4%), dispensers (37.5%), and in wards (59.4%) about hand hygiene vary in availability. 100.0% of wards have hygiene points in corridors and other areas and 31.3% in treatment rooms.

While audit frequency meets the standard in 75% of wards, only 37.5% record the number of fully functional dispensers. Hand hygiene audits are conducted in 78.1% of wards.

TABLE 15: OVERALL READINESS BASES ON ITEM ASSESSED

Category	Number of item	percent
Ready	9	36
Not ready	16	64

Out of the 25 hand hygiene infrastructure indicators assessed, 9 (36%) met the readiness threshold of ≥70% compliance, signifying adequate availability or functionality. Meanwhile, 16 (64%) items were below the acceptable level, indicating limited readiness for effective hand hygiene implementation across wards.

This implies that, although fundamental resources like running water, clean water, soap, gloves, and designated refill staff were present in most wards, alcohol-based hand rubs, posters, disposable towels, and functional dispensers were notably deficient.

Hence, overall readiness to support and sustain proper hand hygiene practices in UBTH wards remains suboptimal, requiring urgent improvement in supply, accessibility, and monitoring infrastructure.

CHAPTER FIVE

DISCUSSION

Regarding the socio-demographic characteristics of the respondents, the age distribution revealed that nearly half were between 20 and 29 years, with more than one-third between 30 and 39 years, and only a small fraction above 40 years. The mean age was 31.92 ± 7.71 years. This likely reflects the age structure of the Nigerian healthcare workforce, where recruitment often targets early-career professionals who form the backbone of service delivery.[68] The predominance of younger staff has implications for workforce planning, training needs, and career development initiatives, emphasizing the importance of targeting early-career healthcare workers in capacity-building programs.

Gender distribution showed a slight predominance of females over males, reflecting the feminization trend seen in many healthcare professions, particularly nursing and allied health disciplines. A similar pattern was reported in Ibadan, where women formed the majority of clinical staff.[68] The near balance of males and females in the workforce is likely to promote diverse perspectives in patient care and collaborative practice, while also shaping workplace policies related to flexibility, mentorship, and professional development.

Religious affiliation was dominated by Christianity, followed by Islam, with very few respondents practicing African Traditional Religion. This mirrors the religious composition of southern Nigeria and is consistent with findings among healthcare workers in Ibadan.[68] The predominance of Christianity suggests that faith-based networks, especially churches, could be leveraged in workplace wellness programs, staff engagement initiatives, and health promotion campaigns targeting healthcare personnel.

Marital status revealed that nearly three-fifths of respondents were single, while just over one-third were married, with only a few being divorced, separated, or widowed. This trend aligns with observations in Kaduna State, where a majority of healthcare professionals were unmarried. The preponderance of single professionals may be attributable to the younger age structure of the workforce and urban lifestyle dynamics, including delayed marriage and career prioritization.[69] It underscores the need for support systems in the workplace that consider the social and family needs of single staff members, including mentoring, housing, and flexible scheduling.

Professional cadre showed that doctors constituted nearly half of the respondents, followed by nurses, dentists, physiotherapists, and a small number of paramedics. This composition is comparable to that reported in Ibadan and highlights the central role of doctors in clinical decision-making and leadership within healthcare teams.[68] The substantial representation of nurses and allied health professionals further underscores the multidisciplinary nature of service delivery and the need to ensure equitable professional development opportunities across cadres.

Regarding years of practice, nearly two-fifths had practiced for 1–10 years, with smaller proportions in the 11–20 years and over 20 years categories. This distribution reflects the concentration of early-career professionals in the Nigerian healthcare system, likely driven by recruitment patterns, career progression, and the availability of entry-level positions. The predominance of less-experienced staff emphasizes the importance of structured mentorship, continuing professional development, and hands-on supervision to maintain clinical competence and enhance retention.[68]

Ethnic distribution showed that the Bini were the largest group, followed by Yoruba, Igbo, and other ethnicities, reflecting the cosmopolitan nature of Benin City. Such ethnic diversity aligns with findings among healthcare workers in Ibadan and highlights the need for culturally sensitive

workplace policies, inclusive team-building strategies, and communication approaches that respect and accommodate different backgrounds.[68]

Finally, monthly income revealed that nearly three-fifths of respondents earned between ₦100,000 and ₦299,999, with fewer earning higher amounts. This trend is similar to observations in Kaduna State and suggests that while most healthcare staff receive moderate remuneration, disparities exist that may influence job satisfaction, motivation, and long-term retention. These findings reinforce the need for equitable salary structures and targeted incentives to sustain workforce morale and reduce attrition.[69]

Nearly all healthcare workers in this study had heard of hand hygiene, and most correctly identified the hands of healthcare workers as the main route of cross-transmission of germs between patients and hospital facilities. A considerable proportion also knew that germs already on or within patients represent a frequent source of healthcare-associated infections, while the majority recognized that hand hygiene before touching a patient and after patient contact prevents transmission to both patients and staff. These findings suggest that core principles of hand hygiene are well disseminated within UBTH, likely due to routine infection control training and institutional emphasis on preventing hospital-acquired infections. By contrast, a study in Kano reported that just over one-third of healthcare workers demonstrated good knowledge, with a significant proportion having only fair or poor knowledge, indicating notable disparities across Nigerian hospitals.[36] Similarly, a study in Saudi Arabia reported that although average knowledge was fair, many participants struggled to distinguish which actions protected patients versus those protecting healthcare workers.[30] The public health implication is that although basic awareness is widespread, institutional training must ensure that healthcare workers do not only recall principles in theory but consistently apply them in practice.[33] A recommendation is for UBTH to integrate

scenario-based assessments during refresher training to evaluate how knowledge is translated into real-world hand hygiene actions.

When knowledge was considered more broadly, less than two-fifths of the healthcare workers demonstrated good overall knowledge. Despite strong awareness of basic principles, gaps were evident in specific areas such as the duration required for alcohol-based hand rubs, the relative effectiveness of rubbing compared with washing, and the sequence in which both should be applied. These deficiencies may reflect reliance on informal learning and inconsistent emphasis on technical details during training, which is a common challenge in Nigerian healthcare settings where resources and structured infection prevention programs may be limited. In Southwest Nigeria, however, almost all respondents in a tertiary facility demonstrated good knowledge, possibly due to more consistent integration of WHO protocols into institutional policy.[33] A Ugandan study similarly reported that nearly nine in ten healthcare workers had good knowledge of handwashing techniques, showing stronger alignment with global recommendations.[32] The public health significance is that although UBTH staff understand core concepts, gaps in protocol-specific knowledge can compromise the quality of infection prevention.[33] Addressing this requires deliberate incorporation of WHO protocol content into refresher courses, with practical emphasis on critical details such as rub duration and sequence.[33]

Bivariate analysis revealed that age was significantly associated with knowledge, with younger healthcare workers more likely to have good knowledge compared with older colleagues. This may reflect recent curricular updates in medical and nursing schools that place stronger emphasis on infection prevention and control. A similar trend was observed in Al-Qassim, Saudi Arabia, where knowledge scores increased with younger participants, contrasting with findings in Rivers State where age did not significantly predict knowledge.[30,33] The public health implication is that

generational differences in exposure to structured training influence hand hygiene knowledge.[33] Periodic refresher programs tailored to older staff may therefore be crucial to bridging this gap.

Marital status was also significantly associated with knowledge, with those cohabiting showing higher levels of good knowledge. This could reflect shared professional or educational experiences between partners, facilitating exchange of health information. A comparable pattern was observed in Southwest Nigeria where marital support was linked to higher adherence to preventive practices.[33] In Uganda, however, hygiene practices rather than marital context were more strongly predictive.[32] The implication is that while socio-cultural support structures may influence knowledge in Nigeria, reinforcing formal health education is more universally applicable.[33] Hospitals can build on this by designing couple-inclusive infection prevention seminars during major training events.

Profession was another significant factor, with physiotherapists showing the highest proportion of good knowledge, while doctors and paramedics had significantly lower odds of good knowledge at multivariate level. This may be due to differential emphasis across professional curricula, where physiotherapy training often underscores aseptic precautions during close patient contact, while other cadres may assume familiarity without structured reinforcement. In Asaba, healthcare workers across cadres demonstrated high knowledge overall, while in Kano doctors and nurses outperformed other groups.[35],[36] This contrast underscores that variability between professions may be context-dependent. The public health implication is that gaps among frontline staff like doctors and paramedics can undermine infection control, given their critical patient contact.[33] Incorporating standardized hand hygiene modules into continuing professional development across all cadres, especially doctors and emergency staff, is therefore necessary.

Multivariate analysis revealed that unmarried respondents were more than twice as likely to have good knowledge of hand hygiene compared to married respondents, while females were also

more likely than males to demonstrate adequate knowledge. Among professional cadres, nurses stood out with more than twice the odds of having good knowledge compared to physiotherapists, and respondents earning a moderate income were significantly more likely to be knowledgeable. These patterns may reflect differences in professional responsibilities, access to training opportunities, or motivation to adhere to institutional hand hygiene protocols.

These results are consistent with previous Nigerian studies, where nurses and doctors demonstrated higher hand hygiene knowledge than other cadres.[34,35] In contrast, lower knowledge levels reported in Kano highlight how differences in training, supervision, and institutional emphasis can influence outcomes.[36]

From a public health perspective, understanding these determinants is crucial for infection prevention and patient safety. Ensuring that all healthcare workers, regardless of demographic or professional characteristics, maintain good knowledge of hand hygiene can reduce the risk of hospital-acquired infections.[35]

To address these gaps, hospitals should implement uniform, competency-based hand hygiene training programs, accompanied by periodic evaluations and refresher courses, ensuring equitable access and support across all professional groups, sexes, and marital statuses.

As regards the attitude of healthcare workers in UBTH towards hand hygiene and hand hygiene protocols. The findings from the study revealed that a substantial proportion of respondents expressed agreement with the importance of maintaining correct hand hygiene practices at all times, while a similar proportion strongly endorsed the view that adherence to hand hygiene is an integral duty of healthcare workers. These responses highlight a generally favorable disposition towards infection prevention, suggesting that healthcare workers recognize the central role of hand hygiene in safeguarding both patient and provider well-being.

When considered as a whole, the results indicated that more than three fifths of respondents had a positive attitude towards hand hygiene. This is encouraging, as it suggests that the majority of staff value hygiene protocols within the hospital setting. The findings are comparable to those from a Nigerian study in Ahmadu Bello University Teaching Hospital where over three fifths of respondents had a positive attitude towards hand hygiene, and to another study in Uganda that documented favorable attitudes among most respondents.[34,32] The similarities may be linked to the increasing emphasis on infection control training and public health campaigns across African healthcare systems. However, reports from Saudi Arabia have shown comparatively lower levels of positive attitudes, reflecting contextual challenges such as work overload and weak compliance monitoring structures.[31]

The observed positive attitudes among healthcare workers in UBTH carry important public health implications. A workforce that values hand hygiene is more likely to translate knowledge into consistent practice, thereby reducing the risk of healthcare-associated infections and enhancing patient safety.[33] In the Nigerian context, where resource limitations may constrain infection prevention infrastructure, such positive attitudes provide a strong foundation for sustainable change. To consolidate this, UBTH management should integrate regular refresher sessions into departmental meetings, using real case-based discussions that link lapses in hand hygiene to preventable patient outcomes. Recognition awards for staff who demonstrate exemplary adherence can further reinforce these attitudes and foster a culture of accountability.

Bivariate analysis revealed significant associations between positive attitude and certain sociodemographic characteristics, including age and cadre. Older healthcare workers, as well as doctors and nurses, were more likely to hold favorable attitudes towards hand hygiene compared to their younger counterparts and other cadres. This may reflect greater professional experience, longer exposure to institutional infection control policies, and increased awareness of the

consequences of lapses in hygiene. A similar pattern was observed in the Nigerian study at Ahmadu Bello University Teaching Hospital, where doctors and nurses displayed stronger commitment to hygiene protocols, and in a Saudi Arabian study where age was positively associated with attitude.[34,31] The consistency across these settings underscores the role of experience and professional responsibility in shaping attitudes. The public health implication is that younger staff and less patient-facing cadres may lag in appreciating the full importance of hand hygiene, potentially creating weak links in infection prevention chains.[34,31] UBTH can address this by instituting mentorship programs where senior staff model and reinforce appropriate attitudes during ward rounds, theatre sessions, and routine procedures, thereby influencing junior colleagues through visible leadership.

Multivariate analysis showed that unmarried respondents were more than twice as likely to have a positive attitude toward hand hygiene compared to married respondents, while females were also more likely than males to demonstrate a positive attitude. Among professional cadres, nurses were more than twice as likely to have a positive attitude compared to physiotherapists, and respondents earning a moderate income were significantly more likely to demonstrate a positive attitude. Additionally, respondents with poor knowledge were markedly less likely to have a positive attitude compared to those with good knowledge. These patterns may reflect greater professional exposure, access to training opportunities, and the influence of adequate knowledge on shaping positive perceptions.

These findings align with Nigerian studies where nurses and doctors consistently exhibited better hand hygiene attitudes than other healthcare workers.[34,35] Conversely, lower levels of positive attitudes reported in Kano may reflect differences in institutional training, supervision, and exposure across professional cadres.[36]

From a public health perspective, these determinants highlight the importance of combining knowledge enhancement with attitude improvement to strengthen infection prevention practices. Ensuring all healthcare workers maintain a positive attitude can reduce the risk of hospital-acquired infections and improve overall patient safety.[34]

To address these gaps, hospitals should implement uniform, competency-based training programs that integrate knowledge and attitude components, accompanied by periodic evaluations and refresher courses. Special attention should be given to reinforcing training among married staff, males, and those with lower baseline knowledge, while sustaining support for all professional groups.

Compliance with hand hygiene protocols varied across the specific moments of care. Nearly all of the nurses demonstrated compliance after exposure to body fluids, while almost all physiotherapists and paramedics adhered to hand hygiene after direct patient contact. More than two thirds of dentists and three quarters of nurses complied before aseptic procedures, whereas less than half of doctors and physiotherapists followed this recommendation. In contrast, compliance was lowest before touching a patient, where only about two fifths of doctors and fewer nurses observed the guideline. Interestingly, paramedics showed consistent compliance across nearly all moments, particularly after exposure to the patient's surroundings. This variation across categories may reflect differences in training emphasis, professional role expectations, and perceived risks associated with patient contact within the Nigerian healthcare setting.

In terms of the overall pattern, more than two-thirds of healthcare workers were compliant. This aligns with the more than three-fifths reported among neonatal nurses in South Eastern Nigeria[40] but remains lower than the nearly four-fifths achieved in Kano after introducing a voice reminder intervention.[39] This suggests that while UBTH compliance is encouraging, opportunities remain for improvement. The public health implication is that even when most healthcare workers

comply, lapses among a minority can perpetuate the transmission of infections.[40] Institution-wide measures such as digital reminders, regular audits, and stricter enforcement of the WHO's five moments of hand hygiene could help raise compliance levels further.

Bivariate analysis showed a statistically significant association between profession and compliance. Nurses and physiotherapists were the most compliant, while dentists and paramedics were the least. This may be explained by the structured and routine patient interactions of nurses and physiotherapists, who are also subject to closer supervision, compared to dentists and paramedics whose professional roles often demand speed or involve less consistent patient contact. A study in Bangladesh similarly reported that nurses had the highest compliance, followed by physicians, while cleaning staff had the lowest adherence.[26] In Nigeria, a study among neonatal nurses also highlighted higher levels of compliance within nursing cadres compared to others.[40] These findings reinforce the notion that professional role and work context strongly influence adherence. The public health implication is that weak compliance among certain cadres increases the risk of preventable infection transmission.[40,26] Targeted professional training, regular cadre-specific monitoring, and reinforcement of accountability systems are therefore recommended, particularly for dentists and paramedics

Multivariate analysis revealed that doctors, dentists, and paramedics were significantly less likely than nurses to comply with hand hygiene protocols. This indicates that nurses remained the strongest cadre in terms of adherence, while other professionals showed comparatively lower odds of compliance. A study in Abia State similarly reported cadre-specific differences, with compliance varying across the five moments of hand hygiene,[42] while regional findings from the Eastern Mediterranean showed variation across cadres, with nurses reporting slightly higher compliance than physicians.[37] This suggests that cadre is an independent predictor of compliance. The public health implication is that interventions should be cadre-specific, strengthening

adherence among groups with lower odds of compliance.[37] Department-based monitoring, mentorship, and reinforcement of the WHO five moments are therefore recommended to optimize adherence across all healthcare worker groups.

The study also revealed a high level of awareness and motivation toward hand hygiene. More than nine-tenths of respondents reported knowing the guidelines for hand hygiene, when it is required, and having the skills to perform it correctly. Nearly all respondents recognized hand hygiene as an important part of their role, believed it reduces infection transmission and patient harm, and expressed confidence in performing it even under pressure or when busy. More than four-fifths reported monitoring their own hand hygiene, using strategies to remind themselves, and seeing themselves as role models for colleagues. Visual cues, encouragement from colleagues, and adherence by senior staff were additional facilitators identified.

The high level of awareness and positive perception among respondents may be due to regular training programs, professional education emphasizing infection prevention, and an institutional culture that values patient safety. Similar facilitators have been reported in Nigerian studies, where high awareness and knowledge were found to support hand hygiene practice[47], and in India, where positive attitudes and awareness enabled compliance even under challenging conditions[43]. The public health significance is substantial, as these facilitators help ensure consistent hand hygiene practices, reducing the risk of healthcare-associated infections and improving patient outcomes. Strengthening training and reinforcing these positive behaviors through feedback and recognition can further sustain compliance.

Overall, ward infrastructure showed partial readiness for hand hygiene compliance. While all wards had running water, visibly clean water, soap at sinks, and gloves, and nearly all wards had functional sinks and assigned personnel responsible for refilling dispensers, other critical resources were limited. Only about a quarter of wards had disposable towels at sinks, less than

half had alcohol-based hand rubs in the ward, and none had hand rub dispensers at points of care. Hand rub pocket bottles were available in just over a third of wards, and only a very small proportion had hand rub within arm's reach of the bed. Visual educational aids were inconsistently displayed, and less than half of wards recorded the number of fully functioning dispensers, despite most conducting regular audits. These findings suggest that while basic infrastructure supports hand hygiene, accessibility and convenience of key supplies remain insufficient to fully facilitate compliance.

The gaps in infrastructure may be due to limited funding, inconsistent supply chains, and logistical challenges common in Nigerian healthcare settings. Similar infrastructural barriers were reported in Gambia, where limited resources and lack of facilities impeded hand hygiene,[44] and in Kano State, Nigeria, where insufficient equipment placement and limited supplies reduced compliance.[45] Public health implications are significant, as inadequate infrastructure can hinder even motivated healthcare workers from performing hand hygiene consistently, increasing the risk of infection transmission. Addressing these gaps requires investment in accessible alcohol-based hand rubs, disposable towels, educational posters, and routine monitoring of supplies to ensure availability at points of care.

CONCLUSION

Only about a third of the health workers had good knowledge of hand hygiene practices, marital status and profession were significant predictors of hand hygiene knowledge among the health workers.

Half of the health workers had positive attitude towards hand hygiene, and female gender, single marital status, profession (paramedics) and length of practice (above twenty years) were associated with positive attitude towards hand hygiene.

Two-thirds of the health workers were compliant with hand hygiene practices, profession was significantly associated with compliance and nurses had the highest compliance towards hand hygiene practices.

Awareness of proper hand hygiene guidelines, understanding of the importance of hand hygiene, and belief that hand hygiene in preventing healthcare-associated infections were facilitators to hand hygiene practices.

Only a third of the wards were well equipped with infrastructures to promote and sustain hand hygiene practices.

RECOMMENDATIONS

To the Federal Ministry of Health / National Health Authorities

1. Ensure adequate funding for healthcare facilities to maintain consistent supply of alcohol-based hand rubs, disposable towels, and hand hygiene infrastructure at points of care.
2. Develop and enforce nationwide hand hygiene training programs emphasizing technical protocol details, including rub duration, sequence, and moments of hand hygiene.
3. Mandate periodic competency-based hand hygiene assessments for all healthcare workers, with re-certification linked to performance.
4. Support institutional audits and monitoring systems to track compliance rates and identify professional cadres or wards needing targeted interventions.

To UBTH Hospital Management / Institutional Authorities

1. Provide alcohol-based hand rubs at every point of care and ensure regular replenishment of hand hygiene supplies, including disposable towels.
2. Integrate scenario-based, cadre-specific refresher training on hand hygiene protocols, highlighting gaps identified among doctors, dentists, and paramedics.
3. Conduct regular internal audits of hand hygiene compliance with immediate feedback and recognition programs for high-performing staff.
4. Display clear visual aids on hand hygiene procedures across all wards, including instructions on rub duration and sequence.
5. Implement mentorship programs where senior staff model proper hand hygiene, particularly for younger staff and less patient-facing cadres.

To Individual Healthcare Workers

1. Adhere strictly to the WHO “five moments” of hand hygiene and ensure correct technique, including recommended rub duration and sequence.
2. Monitor personal hand hygiene practices and use reminders or peer encouragement to sustain compliance.
3. Participate actively in training sessions and apply scenario-based learning to translate knowledge into practice.
4. Support colleagues by sharing knowledge, modeling best practices, and reinforcing adherence to protocols.

REFERENCES

1. Igwe U, Okolie OJ, Ismail SU, Adukwu E. Effectiveness of infection prevention control interventions in health care facilities in Africa: a systematic review. America journal of infection control. 2024;52(10): 1135-1143.
2. Kraker MEA, Tartari E, Tomczyk S, Twyman A, Francioli LC, Cassini A, et al. Implementation of hand hygiene in health-care facilities: results from the WHO hand hygiene self-assessment and framework global survey 2019. The Lancet Infectious Diseases. 2022;22(6): 835-844
3. Aldawsari M, Lam SK, Raman RA, Taib NM, Aboshaiqah A. Hand Hygiene among Healthcare Workers Caring for Children with Leukaemia in the Paediatric Oncology Ward of King Saud Medical City, Saudi Arabia. Malays J Med Sci. 2023;30(4):116-131.
4. Ndu CA, Arinze-Onyia SU, Aguwa EN. Hand hygiene: knowledge and practice by health care workers in a tertiary health care facility in south east Nigeria. Nigerian Journal of Medicine. 2017;26(4): 1115-2613
5. Tyagi U, Barwal KC. Ignac Semmelweis- Father of hand hygiene. Indian journal of surgery. 2020;82(3): 276-277
6. WHO. WHO guidelines on hand hygiene in health care: a summary. First global patient safety challenge. 2009.
7. Haque M, Sartelli M, McKimm J, Abubakar M. Health care-associated infections – an overview. Infection and drug resistance. 2018;11(1): 2321-2333
8. Magill SS, Bamberg W, Kainer MA, McAllister-Hollod L, Thompson DL, Fridkin SK. Multistate point-prevalence survey of health care associated infections. The new England journal of medicine. 2014;370(13): 1198-208

9. Gidey K, Gidey MT, Haliu BY, Gebreakmlak ZB, Niriayo YL. Clinical and economic burden of healthcare-associated infections: a prospective cohort study. PLoS ONE. 2023;18(2): 1-11
10. Baek EH, Kim SE, Kim DH, Cho OH, Hong SI, Kim S. The difference in hand hygiene compliance rate between unit-based observers and trained observers for World Health Organization checklist and optimal hand hygiene. International Journal of Infectious Diseases. 2020;90(1): 197-200.
11. Ataiyero Y, Dyson J, Graham M. The barriers and facilitators to hand hygiene practices in Nigeria: A qualitative study. American Journal of Infection Control. 2023;51(1): 295−303
12. WHO. Clean care is safer care. 2005. Available at https://www.who.int/news-room/events/details/2005/10/13/default-calendar/clean-care-is-safer-care\
13. WHO. World hygiene day. Save lives: Clean your hands. 2023. Available at https://www.who.int/campaigns/world-hand-hygiene-day
14. Irek E, Aliyu A, Dahiru T, Obadare TO, Aboderin A. Healthcare-associated infections and compliance of hand hygiene among healthcare workers in a tertiary health facility, southwest Nigeria. Journal of infection prevention. 2019;20(6): 289-296
15. Toney-Butler TJ, Gasner A, Carver N. Hand hygiene. National Library of Medicine. 2023;1:1
16. WHO. Infection prevention and control. Hand hygiene. 2022. Available at https://www.who.int/teams/integrated-health-services/infection-prevention-control/hand-hygiene
17. WaterAid. Costs of healthcare acquired infections due to inadequate water, sanitation and hygiene (WASH) in healthcare facilities in Nigeria. 2024

18. Engdaw GT, Gebrehiwot M, Andualem Z. Hand hygiene compliance and associated factors among health care providers in Central Gondar zone public primary hospitals, Northwest Ethiopia. Antimicrobial resistance and infection control. 2019;8(1):1-7
19. Conway LJ. Challenges in implementing electronic hand hygiene monitoring systems. Annals journal of infection and control. 2016;44(5): 7-12.
20. Zakeri H, Ahmadi F, Rafeemanesh E, Saleh LA. The knowledge of hand hygiene among the healthcare workers of two teaching hospitals in Mashhad. Electronic physician. 2017; 9(8): 5159-5165
21. Wamala AJ. Study on knowledge attitude and practices of health workers towards hand washing at Lahor health center III OPIT. A descriptive cross-sectional study. Student's journal of health research Africa. 2023;4(9): 1-13
22. Ochie CN, Aniwada EC, Uchegbu EK, Asogwa TC, Onwasoigwe CN. Infection prevention and control: knowledge, determinants and compliance among primary healthcare workers in Enugu metropolis, South-East Nigeria. Infection prevention in practice. 2022;4(2):100214
23. Awoyemi BO, Makanju AA, Mpapalika J, Ekpeyo RS. A time series analysis of government expenditure and health outcomes in Nigeria. Journal of public health in Africa. 2023;14(7): 1409)
24. WHO. Half of healthcare facilities globally lack basic hygiene services. 2022. Available at https://www.who.int/news/item/30-08-2022-half-of-health-care-facilities-globally-lack-basic-hygiene-services---who--unicef
25. Ahmadipour M, Dehghan M, Ahmadinejad M, Jabarpour M, Mangolian SP and Rigi EZ. Barriers to hand hygiene compliance in intensive care units during the COVID-19 pandemic: A qualitative study. Front. Public Health. 2022; 10:968231

26. Harun MGD, Anwar MMU, Sumon SA, Mohona TM, Hassan MZ, Rahman A. Hand hygiene compliance and associated factors among healthcare workers in selected tertiary-care hospitals in Bangladesh. Journal of Hospital Infection. 2023;139(1): 220-227
27. Krishnamoorthy Y, Kala M, Kuberan D, Krishnan M, Tondare D. Compliance with hand hygiene practices and its appropriateness among healthcare workers during COVID-19 pandemic in public health facilities of Tamil Nadu, India. Heliyon. 2023;1(1): 1-7
28. WHO. Infection prevention and control. Hand hygiene. Monitoring tools. 2024. Available at https://www.who.int/teams/integrated-health-services/infection-prevention-control/hand-hygiene/monitoring-tools
29. Center for Disease Control. CDC in Nigeria. Global health. Available at https://www.cdc.gov/global-health.countries/nigeria.html#:~:text=Infection%20Prevention %20and%20Control%20(IPC).%20CDC%20helped,NIgeria%20Centre%20for%20Disease%20Control%20and%20Prevention
30. Al-Ra'awji BA, Almogbel ES, Alharbi LA, Alotaibi AK, Al-Qazlan FA, Juliann Saquib J. Knowledge, attitudes, and practices of health-care workers regarding hand hygiene guidelines in Al-Qassim, Saudi Arabia: A multicenter study. International Journal of Health Sciences. 2018;12(2): 3-8
31. Aldawsari M, Soh KL, Abdul Raman R, Mohd Taib N, Aboshaiqah A. Knowledge, attitude and practice of hand hygiene among healthcare workers caring for children with leukaemia in the paediatric oncology ward of King Saud Medical City, Saudi Arabia. Malays J Med Sci. 2023;30(4):116–131.
32. Wamala AJ. Study on knowledge attitude and practices of health workers towards hand washing at Lahor health center III OPIT. A descriptive cross-sectional study. Student's journal of health research Africa. 2023;4(9): 1-13.

33. Agbana RD, Ogundeji SP, Owoseni JS. A survey of hand hygiene knowledge, attitude and practices among health care workers in a tertiary hospital, Southwestern Nigeria. Arch Community Med Public Health. 2020;6(2): 146-151.
34. Garba MB, Uche LB. Knowledge, attitude, and practice of hand washing among healthcare workers in a tertiary health facility in Northwest Nigeria. Journal of medicine the tropics. 2019;21(2): 73-80
35. Ezunu EE, Ezunu EO, Aigbokhaode AQ, Agbele T, Okwudishu MN, Ogwuazor P. Knowledge and practice of handwashing among healthcare workers as a measure of covid-19 infection prevention in federal medical centre, Asaba. Journal of biosciences and medicines. 2022;10(1):48-59
36. Gajida AU, Ibrahim UU, Jalo RI, Bello MM, Gboluwaga AT, Gwarzo DH. Reported healthcare workers' knowledge and practices of hand hygiene in specialist hospitals of Kano, Northwest Nigeria. 2020;3(1):40-46
37. Bajunaid RM, Saeed A, Bostaji M, Farsi N. Hand hygiene and compliance and improvement interventions in the Eastern Mediterranean region: a systematic review and meta-analysis. Infection prevention in practice. 2024;6(1): 1-17
38. Umar H, Geremew A, Kassie TW, Dirirsa G, Bayu K, Mengistu DA, Berhanu A, Mulat S. Hand hygiene compliance and associated factor among nurses working in public hospitals of Hararghe zones, Oromia region, eastern Ethiopia. Frontiers in Public Health. 2022;10(1): 1-9
39. Ibrahim UM, Gajida AU, Garba RM, Gadanya MA, Umar AA, Jalo RI, et al. Effect of voice reminder on compliance with recommended hand hygiene practice among health-care workers in Kano metropolis. Nigerian postgraduate medical journal. 2021;28(1): 94-101.

40. Oko C, Yusuf A, Taib F. Hand hygiene compliance during COVID-19 pandemic among neonatal nurses in a federal university teaching hospital in Nigeria. Malaysian journal of medicine and health sciences. 2022;18(4): 119-127.
41. Shobowale EO, Onyedibe KI, Adegunle KB, Elikwu CJ. An observational and trend analysis study of hand hygiene practices of healthcare workers at a private Nigerian tertiary hospital. Annals of medical and health sciences research. 2017;7(1): 84-89.
42. Ogbonnaya GU, Ogbonnaya UL, Nwamoh UN, Nwokeukwu HI, Odeyemi KA. Five moments for hand hygiene: a study of compliance among healthcare workers in a tertiary hospital in South East Nigeria. Journal of community medicine and public health care. 2015;2(2): 1-4.
43. Chauhan K, Mistry Y, Mullan S. Analysis of compliance and barriers for hand hygiene practices among healthcare workers during Covid-19 pandemic management in tertiary care hospital of India-an important step for second wave preparedness. Open journal of medical microbiology. 2020;(10)1: 182-189
44. Rosenberg A. Hand hygiene barriers faced by healthcare workers in Gambia. Infectious disease control. 2016. 1(1): 1-17
45. Aliyu AS, Bello BA, Yakasai MY. Umar NY. Epidemiological study on hand hygiene practices among healthcare workers at infectious diseases hospital Kano, Nigeria. Texila international journal of public health. 2019;7(2):1-15
46. Gwarzo G. Hand hygiene practices among healthcare workers in a public hospital in North-Western Nigeria. Nigerian journal of basic and clinical sciences. 2018; 15(1): 109-113
47. Nwaokenye J, Lakoh S, Morga J. Perceptions of Nigerian healthcare workers towards hand hygiene: a qualitative study. Pam African medical journal. 2020;36(204): 1-12

48. Ataiyero Y, Dyson J, Graham M. The barriers and facilitators to hand hygiene practices in Nigeria: A qualitative study. American Journal of Infection Control. 2023;51(1): 295−303
49. Bredin D, O'Doherty D, Hannigan A, Kingston L. Hand hygiene compliance by direct observation in physicians and nurses: a systematic review and meta-analysis Journal of hospital infection. 2022;130(1): 20-33
50. Anne NC, Arinze-Onyia SU, Aguwa EN. Hand hygiene: knowledge and practice by healthcare workers in a tertiary facility in South East Nigeria. Nigerian journal of medicine. 2017;26(4): 328-333
51. Uneke JC, Ndukwe DC, Oyibo PG, Nwakpu KO, Nnabu RC, Prasopa-Plaizier NP. Promotion of hand hygiene strengthening initiative in a Nigerian teaching hospital: implication for improved patient safety in low-income health facilities. The Brazilian journal of infectious diseases. 2014;18(1): 21-27
52. 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;23(2): 1-9
53. Alao OI, Farotimi AA. Evaluation of hand hygiene facilities and compliance of healthcare workers at the university of medical science teaching hospital Ondo. International journal of nursing, midwife and related cases. 2022;8(3): 15-33.
54. Biswas A, Hassan Z, Monjur M, Islam S, Rahman A, Akhtar Z, et al. Assessment of standard precaution related to infection prevention readiness of healthcare facilities in Bangladesh: findings from a national cross-sectional survey. Antimicrobial stewardship and healthcare epidemiology. 2021;52(1): 1-7.
55. Gonzalez M, Melgar M, Homsi M, Shuler A, Antillon-Klussmann F, Matheu L. Measuring readiness for and satisfaction with a hand hygiene e-learning course among healthcare

workers in a pediatric oncology center in Guatemala City. International journal of infection and control. 2016;12(4):1-12.

56. Onyedibe K, Shehu N, Pires D, Isa S, Okolo M, Simeji S. Assessment of hand hygiene facilities and staff compliance in a large tertiary healthcare facility in northern Nigeria: a cross sectional study. Antimicrobial resistance and infection control. 2020; 9(30):1-9.
57. Oyeyemi A, Ogoina D, Olomo W, Tamaramiebi N, Pondei K. Assessment of hand hygiene resources and practices in a tertiary hospital in Niger Delta Region of Nigeria. Niger Delta Medical Journal. 2018;2(3):27-35.
58. Alao OI, Farotimi AA. Evaluation of hand hygiene facilities and compliance of healthcare workers at the university of medical sciences teaching hospital, Ondo. International journal of nursing, midwife, and health related cases. 2022;8(3): 15-33
59. Oyekale SA. Assessment of primary healthcare facilities' service readiness in Nigeria. BMC Health Services Research. 2017;17(1): 1-7.
60. Edo State Government. About Edo. 2022. Available at https://www.edostate.gov.ng/edo/
61. Nigerian investment promotion commission. Nigerian states – Edo state. 2019. Available at https://www.nipc.gov.ng/nigeria-states/edo-state2/
62. University of Benin Teaching Hospital, UBTH, Nigeria. 2023. [Accessed on 24th April, 2025]. Available from https://www.ubth.org.
63. Cochran WG. Sampling techniques. 3rd ed. New York: John Wiley and sons, inc; 1977.223-224
64. WHO. Hand hygiene- monitoring tools. Infection prevention and control. Available at https://www.who.int/teams/integrated-health-services/infection-prevention-control/hand-hygiene/monitoring-tools

65. de Mortel T. Development of a questionnaire to assess healthcare students' hand hygiene knowledge, beliefs, and practices. Australian journal of advanced nursing. 2009;29(3): 9-16

66. Huijg JM, Gebhardt WA, Crone MR, Dusseldorp E, Presseau M. Discriminant content validity of a theoretical domains framework questionnaire for use in implementation research. Implementation research. 2014;9(11): 1-18.

67. Tamang N, Rai P, Dhungana S, Sherchan B, Shah B, Pyakurel P, et al. COVID-19: a National Survey on perceived level of knowledge, attitude and practice among frontline healthcare Workers in Nepal. BMC Public Health [Internet]. 2020 Dec [cited 2025 Sep 25];20(1). Available from: https://pubmed.ncbi.nlm.nih.gov/33317486/

APPENDIX

APPENDIX I: QUESTIONNAIRE

HAND HYGIENE AUDIT AMONG HEALTHCARE WORKERS IN THE UNIVERSITY OF BENIN TEACHING HOSPITAL (UBTH)

Dear respondent, I am a 600 level student at the School of Medicine, University of Benin, Benin City. I am researching to assess the knowledge, attitude, compliance rate, facilitators and barriers of hand hygiene among healthcare workers in UBTH. This questionnaire will aid as a tool for data collection in this research. Your sincere response will be helpful and the information given here will be appreciated and treated with utmost confidentiality.

SECTION A: SOCIODEMOGRAPHIC CHARACTERISTICS

1. Age in years as at last birthday _____
2. Sex: Male [ ] Female [ ]
3. Marital status: Single [ ] Married [ ] Widowed [ ] Separated [ ] Divorced [ ] Co-habiting [ ]
4. Religion: _____
5. Ethnicity: _____
6. Profession: _____
7. Length of practice (in years): _____
8. Average monthly income _____

SECTION B: KNOWLEDGE OF HEALTHCARE WORKERS ON HAND HYGIENE

9. Have you heard of hand hygiene? Yes [ ] No [ ]
10. If yes, where did you hear about it? Radio [ ] Television [ ] Newspaper [ ] Friends [ ] Internet [ ] Posters [ ] Others Specify _____ **(multiple responses allowed)**
11. Did you receive formal training in hand hygiene in the last three years? Yes [ ] No [ ]
12. Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility? Health-care workers' hands when not clean [ ] Air circulating in the hospital [ ] Patients' exposure to colonised surfaces [ ] Sharing non-invasive objects between patients [ ]
13. What is the most frequent source of germs responsible for healthcare-associated infections? The hospital's water system [ ] The hospital air [ ] Germs already present on or within the patient [ ] The hospital environment (surfaces) [ ]
14. Which of the following hand hygiene actions prevents transmission of germs to the patient?
    i. Before touching a patient Yes [ ] No [ ]
    ii. Immediately after a risk of body fluid exposure Yes [ ] No [ ]
    iii. After exposure to the immediate surroundings of a patient Yes [ ] No [ ]
    iv. Immediately before a clean/aseptic procedure Yes [ ] No [ ]
15. Which of the following hand hygiene actions prevents transmission of germs to the healthcare worker?

i. After touching a patient Yes [ ] No [ ]
ii. Immediately after a risk of body fluid exposure Yes [ ] No [ ]
iii. Immediately before a clean/aseptic procedure Yes [ ] No [ ]
iv. After exposure to the immediate surroundings Yes [ ] No [ ]

16. Which of the following statements on alcohol-based hand rub and hand washing with soap and water are true?
    i. Hand rubbing is more rapid for hand cleansing than hand washing. True [ ] False [ ]
    ii. Hand rubbing causes skin dryness more than hand washing. True [ ] False [ ]
    iii. Hand rubbing is more effective against germs than handwashing True [ ] False [ ]
    iv. Hand washing and hand rubbing are recommended to be performed in sequence True [ ] False [ ]

17. What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands? 20 seconds [ ] 3 seconds [ ] 1 minute [ ] 10 seconds [ ]

18. Which type of hand hygiene method is required in the following situations?
    A. Before palpation of the abdomen. Rubbing [ ] Washing [ ] None [ ]
    B. Before giving an injection. Rubbing [ ] Washing [ ] None [ ]
    C. After emptying a bed pan Rubbing [ ] Washing [ ] None [ ]
    D. After removing examination gloves Rubbing [ ] Washing [ ] None [ ]
    E. After making a patient's bed Rubbing [ ] Washing [ ] None [ ]
    F. After visible exposure to blood Rubbing [ ] Washing [ ] None [ ]
19. Which of the following should be avoided, as associated with increased likelihood of colonisation of hands with harmful germs?
    A. Wearing jewellery. Yes [ ] No [ ]
    B. Damaged skin. Yes [ ] No [ ]
    C. Artificial fingernails Yes [ ] No [ ]
    D. Regular use of had cream Yes [ ] No [ ]

SECTION B2: ATTITUDE OF HEALTH WORKFORCE TOWARDS HAND HYGIENE

KEY: SD – Strongly Disagree, D – Disagree, U – Undecided, A - Agree, SA – Strongly Agree

S/N	ITEMS	SA	A	U	D	SD
20.	I have a duty to act as a role model for other health care workers					
21.	When busy it is more important to complete my tasks than to perform hand hygiene					
22.	Performing hand hygiene in the recommended situations can reduce patient mortality					
23.	Performing hand hygiene in the recommended situations can reduce medical costs associated with hospital- acquired infections					
24.	I can't always perform hand hygiene in recommended situations because my patient's needs come first					
25.	Prevention of hospital- acquired infection is a valuable part					

	of a health care worker's role.					
26.	I follow the example of senior health care workers when deciding whether or not to perform hand Hygiene					
27.	I believe I have the power to change poor practices in the workplace					
28.	Failure to perform hand hygiene in the recommended situations can be considered negligence					
29.	Hand hygiene is a habit for me in my personal life					
30.	I am confident I can effectively apply my knowledge of hand hygiene to my clinical practice					
31.	It is an effort to remember to perform hand hygiene in the recommended situations					
32.	I would feel uncomfortable reminding a health professional to hand wash					
33.	If I disagree with a guideline I look for research findings to guide my practice					
34.	Performing hand hygiene slows down building immunity to disease					
35.	Dirty sinks can be a reason for not washing hands					
36.	Lack of an acceptable soap product can be a reason for not cleansing hands					
37.	Performing hand hygiene after caring for a wound can protect from infections					
38.	Cleansing hands after going to the toilet can reduce transmission of infectious disease					

SECTION C: COMPLIANCE RATE OF HEALTH WORKFORCE TOWARDS HAND HYGIENE

Facility:	–	**Period Number*:**	–	**Session Number*:**	–
Service:	–	**Date:** (dd/mm/yy)	– / /	**Observer:** (initials)	–
Ward:	–	**Start/End time:** (hh:mm)	– : / :	**Page N°:**	–
Department:	–	**Session duration:** (mm)	–	**City**:**	–
Country:**	–	–	–	–	–

Prof.cat –			Prof.cat –			Prof.cat –			Prof.cat –		
– pp.	Indication	HH Action	– pp.	Indication	HH Action	– pp.	Indication	HH Action	– pp.	Indication	HH Action
– 1	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 1	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 1	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 1	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves
– 2	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 2	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 2	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 2	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves
– 3	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 3	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 3	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 3	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves
– 4	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 4	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 4	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 4	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves
– 5	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 5	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 5	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 5	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves
– 6	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. –	– HR – HW – missed – gloves	– 6	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. –	– HR – HW – missed – gloves	– 6	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. –	– HR – HW – missed – gloves	– 6	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. –	– HR – HW – missed – gloves

	aft.p.surr.			aft.p.surr.			aft.p.surr.			aft.p.surr.	
– 7	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 7	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 7	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 7	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves
– 8	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 8	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 8	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves	– 8	– bef-pat. – bef-asept. – aft-b.f. – aft-pat. – aft.p.surr.	– HR – HW – missed – gloves

SECTION D: FACILITATORS AND BARRIERS TO HAND HYGIENE AMONG HEALTHCARE WORKERS

KEY: SD – Strongly Disagree, D – Disagree, U – Undecided, A - Agree, SA – Strongly Agree

S/N	ITEMS	SA	A	U	D	SD
53.	I am aware of the guidelines for proper hand hygiene in my workplace					
54.	I know when hand hygiene is required during patient care					
55.	I have the skills required to perform hand hygiene correctly					
56.	I have been trained on hand hygiene practices in the last 12 months.					
57.	Performing hand hygiene is an important part of my role as a healthcare worker					
58.	I see myself as a role model for hand hygiene among my colleagues					
59.	I am confident I can perform hand hygiene even when I'm busy					
60.	I can maintain good hand hygiene even when I am under pressure					

61.	I believe that hand hygiene can significantly reduce healthcare-associated infections					
62.	I am optimistic that hand hygiene compliance can improve in my facility					
63.	Poor hand hygiene can lead to patient harm					
64.	Performing hand hygiene reduces the risk of infection transmission					
65.	I receive positive feedback when I follow hand hygiene protocols					
66.	Hand hygiene compliance is recognized and rewarded in my unit					
67.	I intend to follow proper hand hygiene protocols at all times					
68.	I always plan to wash or sanitize my hands before and after patient contact.					
69.	Hand hygiene is a priority for me during my daily tasks					
70.	I set goals to improve my hand hygiene compliance					
71.	I easily remember to perform hand hygiene before and after patient interactions					
72.	There are visual reminders in my workplace that help me remember hand hygiene					
73.	Hand hygiene supplies (soap, sanitizer, paper towels) are always available where I work					
74.	The placement of hand hygiene stations is convenient in my unit					
75.	My colleagues encourage me to maintain good hand hygiene					
76.	Senior staff in my unit consistently follow hand hygiene practices					
77.	I feel anxious when I forget to perform hand hygiene					
78.	I feel satisfied when I adhere to hand hygiene protocols					
79.	I monitor my hand hygiene practices regularly					
80.	I use strategies to remind myself to perform hand hygiene					

WARD INFRASTRUCTURE READINESS CHECKLIST

To evaluate the readiness of the University of Benin Teaching Hospital to support hand hygiene practices.

Complete this checklist during ward visits. Tick if item is available/functional. Leave blank if not.

S/N	Item Assessed	Available/Functional (✓)
1	Running water is consistently available	
2	Water is visibly clean	
3	Soap is available at sinks	
4	Disposable towels are available at sinks	
5	Alcohol-based handrub is available in the ward	
6	Handrub dispensers are present at the point of care	
7	Handrub pocket bottles are available to staff	
8	Functional wall dispensers are filled and in use	
9	Hand hygiene posters are displayed near sinks	
10	Handrub technique posters are displayed near dispensers	
11	Hand hygiene indication posters are displayed in the ward	
12	Other hand hygiene reminders are available	
13	Gloves are available on the ward	

14	Hand hygiene audits are conducted regularly	
15	Assigned person is responsible for refilling dispensers	
16	Handrub dispensers are replaced when empty	
17	Functional sinks are available in all patient care rooms	
18	Beds have handrub within arm’s reach	
19	Treatment rooms have at least one hand hygiene point	
20	Corridors/other care areas have hand hygiene points	
21	At least one visual hand hygiene aid is present per room	
22	Total number of fully functioning dispensers is recorded	
23	Each sink has water, soap, and towel available	
24	Audit frequency is at least once per year	

APPENDIX II: INFORMED CONSENT FORM

TITLE OF STUDY: HAND HYGIENE AUDIT AMONG HEALTHCARE WORKERS IN THE UNIVERSITY OF BENIN TEACHING HOSPITAL (UBTH).

INVESTIGATORS: MR. JOHN OSARUMWENSE ODIASE,

MR. GIDEON OSIAGBON

SUPERVISOR: PROF. E.O OGBOGHODO

PURPOSE OF THE RESEARCH: The purpose of the research is to assess the Knowledge, Attitude, Compliance rate, and barriers and facilitators of hand hygiene among healthcare workers in ubth, Benin City, Edo State.

PROCEDURE INVOLVED IN THE STUDY: In this study, questions will be asked regarding knowledge, attitude, compliance rate, and barriers and facilitators of hand hygiene among healthcare workers.

CONFIDENTIALITY: All data collected will be treated with utmost confidentiality. Participants who volunteer to take part in the study will be given a unique study number and data will be collected without including the names of the participant taking part in the study. Participants' information will be stored safely, secured by codes in computers using only the identification number. All those handling the data will not at any time reveal respondents' identity.

FINANCIAL SPONSORSHIP: This research is self-sponsored.

FINANCIAL COMPENSATION: There will be no payment for participation in this study.

VOLUNTARY PARTICIPATION: Your participation in this study is entirely voluntary and if you desire to withdraw out of this study at any time, no punitive measure will be meted out against you on account of your withdrawal. Your refusal to participate or withdrawal from the

study, will not involve any negative consequences or loss of benefits to which you are otherwise entitle to.

RISK: It is not expected that any harm will come to you because of your participation in this study. This study does not entail any activity that will result in harm to you.

BENEFIT: This study investigates the Knowledge, Attitude, Compliance rate, and barriers and facilitators of hand hygiene among healthcare workers in ubth, Benin City, Edo State in order to promote good health practices and reduce infection transmission within the healthcare facility.

CONTACT INFORMATION

MR. JOHN OSARUMWENSE ODIASE,

PROJECT STUDENT.

Email: Johnodiase82@gmail.com

Tel: 09033158378

MR. GIDEON OSIAGBON

PROJECT STUDENT.

Email: Osiagbonosamu@gmail.com

Tel: 07039040803

ETHICS AND RESEARCH COMMITTEE

University of Benin Teaching Hospital

Benin City.

Phone Number: 07063331337

HEALTH RESEARCH ETHICS COMMITTEE (HREC)

UNIVERSITY OF BENIN TEACHING HOSPITAL
P.M.B, 1111 BENIN CITY NIGERIA Telephone: 052-600418 Website: ubth.org

CHIEF MEDICAL DIRECTOR
Prof.Darlington . Obaseki
E-mail: darlobaseki@ mail.com

DIRECTOR OF ADMINISTRATION
Jim Uwadie, Esq

CHAIRMAN
Prof. (Mrs.) Antoinette N. Ofili

HREC OFFICE:
Committee email: ubthresearchethics@gmail.com
Registration Number:
NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADM/E 22/A/VOL. VII/1486549127232

PROPOSAL TITLE: "HAND HYGIENE AUDIT AMONG HEALTHCARE WORKERS IN THE UNIVERSITY OF BENIN TEACHING HOSPITAL (UBTH)."

PRINCIPAL INVESTIGATOR(S): ODIASE OSARUMWESE JOHN & OSIAGBON GIDEON

DEPARTMENT/INSTITUTION: DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, SCHOOL OF MEDICINE, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA

DATE CONSIDERED: 11th SEPTEMBER, 2025

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 11/09/2025 TO 10/09/2026. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI **SIGNATURE & DATE:** Sign 11/11/2025 Date

UNIVERSITY OF BENIN TEACHING HOSPITAL ETHICS & RESEARCH COMMITTEE BENIN CITY P.M.B. 1111

SUPERVISOR (S): DR E.O. OGBOGHODO

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual re-port to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification

Signature & Date.....

INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)

Vice Chancellor's Office
University of Benin
PMB1154, Benin City, Nigeria

CLEARANCE FORM

DATE: 7/10/2025

NAME: OSIAGBON GIDEON

MATRIC NO: MED1606133

DEPARTMENT: MEDICINE

FACULTY: MEDICINE

SESSION OF GRADUATION: 2021/2022

DIRECTOR
DATE .....
IPTTO UNIVC
UNIBEN, BENIN CITY

Head Of Unit (IPTTO)