

**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA**



**FACTORS INFLUENCING COMPLIANCE WITH INFECTION PREVENTION AND
CONTROL STANDARDS AMONG HEALTHCARE WORKERS IN NORTH BANK**

EAST REGION

THE GAMBIA

BY

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**THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON, IN
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MASTER OF PHILOSOPHY DEGREE IN EPIDEMIOLOGY AND DISEASE
CONTROL**

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DECLARATION

I, Sheriffo MK Darboe, declared that this thesis is the result of my own research work except for references made to the work of other authors, which have been duly acknowledged and was undertaken under supervision. This work has not been presented for the award of another degree elsewhere, partially or in whole.



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ABSTRACT

Background: Globally, healthcare workers and patients are potentially harmed due to healthcare systems or processes daily, with an estimated 3 million cases of percutaneous exposure to bloodborne viruses occurring among healthcare workers. Non-compliance with infection prevention and control measures increases the transmission of HCAs. The study's main objective was to assess the factors influencing compliance with infection prevention and control standards among healthcare workers in the North Bank East Region of The Gambia.

Method: An analytic cross-sectional study assessed factors influencing compliance with Infection Prevention and Control (IPC) standards. Healthcare workers within xxx health facilities in the North Bank East Region of the Gambia were sampled and interviewed using structured questionnaires. The primary outcome was the level of compliance with IPC standards. Descriptive statistics and logistic regression analyses were performed at 95% CI and alpha of 0.05

Result: Majority (78.9%) of health workers had adequate knowledge of infection prevention and control. More than half 128 (58.7%) of the participants had poor attitudes towards IPC standards. Over half (50.5%) of the health workers did not comply with IPC standards. Knowledge level, attitude, accessibility of PPEs and monitoring of IPC practice were significantly associated with compliance with IPC standards. Health workers with good attitudes towards IPC were 2.66 times more likely to comply with IPC standards than their counterparts with poor attitudes IPC (aOR = 2.66, CI = 1.28 – 5.51, p-value = 0.01)

Conclusion: The level of compliance with IPC standards is low among health workers, although the majority of the healthcare workers had high Knowledge of IPC standards. Therefore, it is recommended that the Ministry of Health institute an IPC program that will target compliance with

IPC standards among the entire healthcare workers in the country and health facility management to monitor IPC practice among healthcare workers regularly.

Key Words: healthcare worker, Knowledge, compliance, healthcare-associated infection, infection prevention and control standards



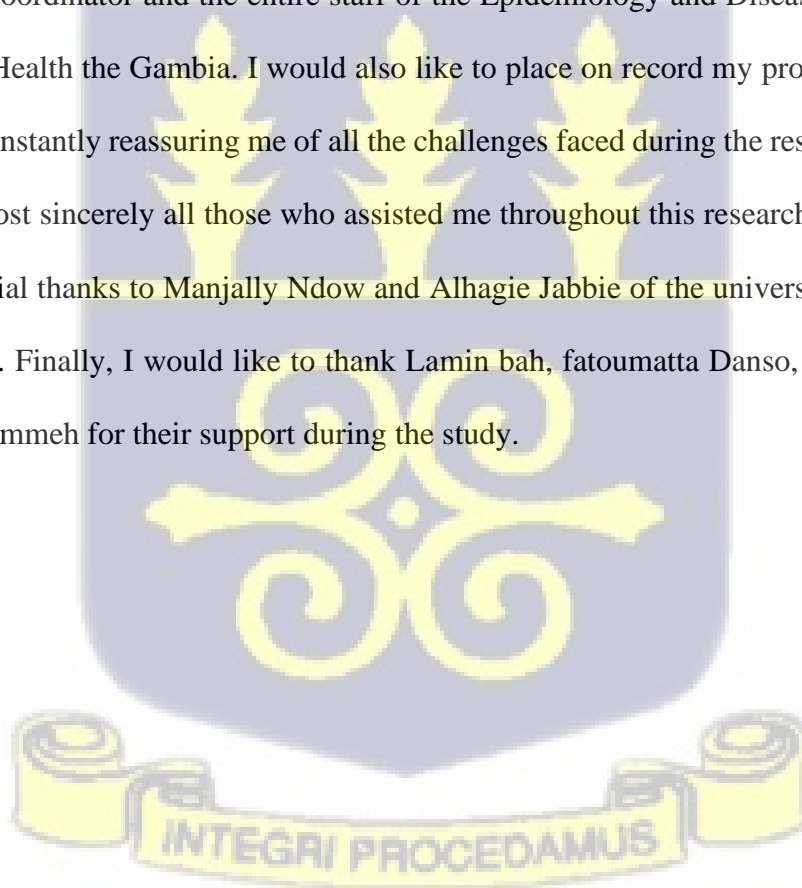
DEDICATION

This work is dedicated to my wife Mariama Sheriffo Darboe, our four children and my dear mother.



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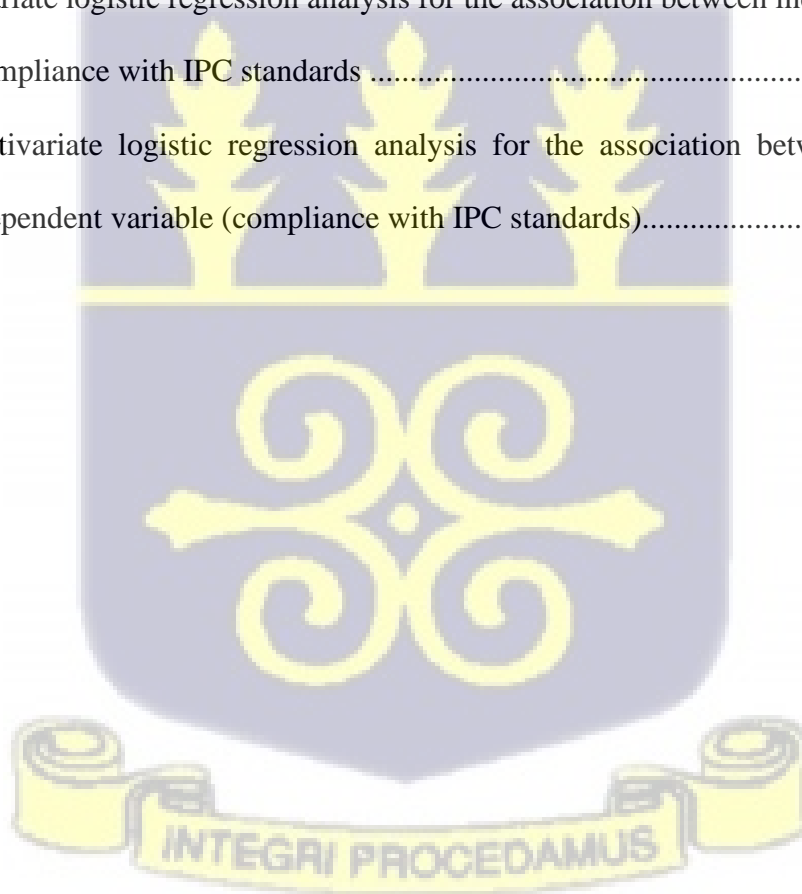
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LIST OF ACRONYMS

ABHS	Alcohol-Based Hand Sanitizer
AIDA	Acquired Immune Deficiency Syndrome
CDC	Center for Disease Control and Prevention
GBoS	Gambia Bureau of Statistics
HCAI	Healthcare-Associated Infections
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HCW	Healthcare Workers
HIV	Human Immunodeficiency Virus
ICU	Intensive Care Unit
ILO	International Labor Organization
IPC	Infection Prevention and Control
MRC	Medical Research Council
NBER	North Bank East Region
NGO	Non-Governmental Organization
PEP	Post Exposure Prophylaxis
PPE	Personal Protective Equipment
WHO	World Health Organization



DEFINITION OF TERMS

Compliance:

strictly following guidelines

Hazard: Hazard is a situation, action or event that may cause harm or damage

Health and safety: Are the reliability of the environment and physical comfort to aid or allow employees to function as expected.

Healthcare-associated Infections: Infection acquired during health care delivery.

Healthcare workers: Workers in the healthcare setting whose present job description includes direct patients care and those exposed to blood and other body fluids during the course of their work.

Infection: Disease caused by germs or bacteria.

Morbidity: Refers to disease states of individuals.

Mortality: Refers to death.

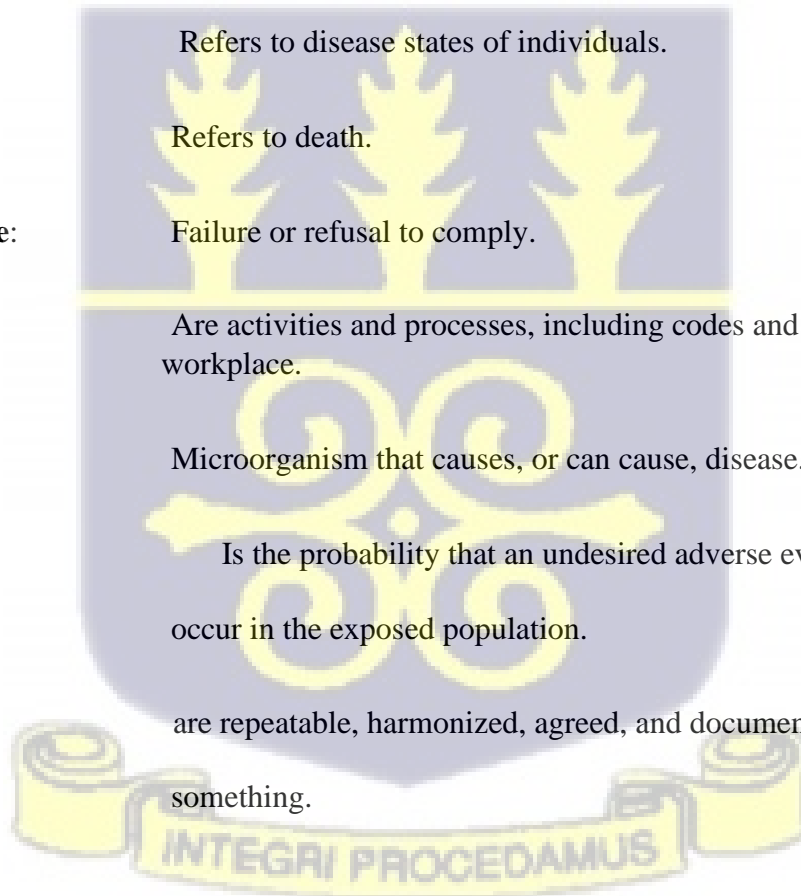
Non-compliance: Failure or refusal to comply.

Practices Are activities and processes, including codes and norms in the workplace.

Pathogen: Microorganism that causes, or can cause, disease.

Risk: Is the probability that an undesired adverse event or hazard will occur in the exposed population.

Standards: are repeatable, harmonized, agreed, and documented ways of doing something.



CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Healthcare-Associated Infections (HCAIs) are a significant public health problem worldwide for both patients and healthcare workers. Globally, millions of patients are affected by HCAIs each year during healthcare delivery (Shirol et al., 2014). An estimated 3 million cases of percutaneous exposure to blood-borne viruses occur among healthcare workers yearly (Gawad, 2017). Annually, about 1.7 million hospitalized patients develop HCAIs while being treated for other health problems (Haque et al., 2018). HCAIs affect 5% to 15% of hospitalized patients in regular wards and up to 50% or more of patients in intensive care units (Nejad et al., 2011).

The prevalence of healthcare-associated infections varies between developed and under-developed countries. In general, HAIs occur more frequently in developing regions than in developed countries. According to several studies, HCAI prevalence rates vary from 4.6% to 9.3% in hospitals across Europe (Haque et al., 2018); however, others have reported rates ranging from 5.7% to 7.1% in Europe, while in low and middle-income countries, the prevalence ranged between 5.7% and 19.2% (Voidazan et al., 2020). In underdeveloped nations, the risk of infection is estimated to be high, with a percentage of infected patients exceeding 25% (Allegranzi & Pittet, 2007).

Like many other African countries, the literature review shows little or no data on the actual burden of HCAIs in the Gambia. This limited or lack of data is due to difficulty in gathering reliable data and the lack of surveillance systems for HCAI. Furthermore, the country does not have a National Program for IPC that should focus its activities on implementing and monitoring IPC activities and gathering reliable data on HCAIs.

One of the significant causes of HCAs is non-compliance with infection prevention and control standards. Non-compliance with infection prevention and control measures increases the transmission of HCAs from patients to other patients, to visitors who spread them outside the healthcare setting and even to healthcare workers (Olajide, et al., 2020). Several studies have reiterated the relationship between compliance with IPC standards and reduction in transmission. Compliance with IPC standards is critical to reducing HCAs. However, reduced compliance with IPC standards has been reported in several studies. (Haile et al., 2017) Compliance rates as low as 30%, 38% and 40% for face mask use, eye protection and hand washing, respectively, have been reported (McGaw et al., 2012).

There are several factors associated with non-compliance with IPC standards among healthcare workers. Studies suggest that non-compliance with IPC standards among healthcare workers is mainly caused by a lack of awareness and understanding about IPC, excessive workload on staff, and insufficient resources and materials for IPC. Also, inadequate IPC training, lack of necessary facilities at the point of care, lack of equipment, and insufficient administrative support creates an enabling work environment. (Haile et al., 2017). Lack of necessary facilities and equipment directly affect compliance with IPC stands because HCWs need to use these facilities and equipment for proper IPC practices.

Non-compliance with IPC standards among healthcare workers have several consequences, including increased hospital stay and draining the limited resources for healthcare (Gichuhi et al., 2015). The worst effect of non-compliance with IPC standards is deaths due to HCAs that could be avoided. HCAs are responsible for 37,000 deaths in Europe and 99,000 deaths in the United

States of America per year (Shirol et al., 2014). A study in two African cohorts of children from Kenya and South Africa reported that attributable deaths due to HCAIs were (53%) and (25%) respectively.

Interventions tried in other countries to increase healthcare workers' compliance with IPC standards are not limited to in-service training on the IPC but beyond the expected level, preservice training through the inclusion of IPC in educational curricula and availability of appropriate personal protective equipment (Haile et al., 2017).

1.2 Problem statement

Compliance with IPC measures have critical implications for HCWs' safety, and patient protection. Generally, occupational exposure accounts for about 40% of infections among HCWs (Ilesanmi et al., 2021). As a result of poor implementation of various IPC measures the prevalence of HCAIs in developing countries ranges from 5.7% to 19.1%. Infections acquired in the ICU account for 4.4% to 88.9% of all patients. while surgical site infections are up to nine times more common in developing countries(Arons et al., 2020). According to a study on device-associated infections conducted in 173 intensive care units (ICUs) in 25 countries, adult patients with catheter-related urinary tract infections, BSIs, and ventilator-associated pneumonia had crude excess death rates of 18.5%, 23.6%, and 29.3%, respectively (WHO, 2022).

In the Gambia, the post-cesarean-section surgical site infection rate was 13.2%, (Aulakh et al., 2018). According to the WHO African region's 21st COVID-19 situation report, 22% of Gambia's COVID-19-positive cases were healthcare workers (WHO, 2020). The high infection rate among healthcare workers is mainly a result of low compliance with IPC standards among healthcare workers (Adepoju, 2020).

Based on the literature, some individual factors such as age, sex, knowledge, attitude, education, and work experience influence compliance with IPC standards. In addition, Organizational factors such as Availability of guidelines, accessibility of PPEs monitoring, and workload also affect compliance with IPC standards. A study by W. Graham 2019, highlighted the lack of training, knowledge around IPC, and resource shortages as factors affecting IPC compliance. Several studies have reiterated the relationship between compliance with IPC standards and the reduction in the transmission of HCAs (McGaw et al., 2012)(Alhumaid et al., 2021).

Noncompliance with IPC standards is linked to disease transmission among HCWs and patients (Hakim et al., 2021). Patients are exposed to a significant risk of infection, primarily through direct contact, as a result of healthcare workers' hands, equipment, and medical procedures due to noncompliance with IPC standards (Bahegwa et al., 2022). Besides, other consequences of non-compliance with IPC standards among healthcare workers, also include prolonged hospital stays, increase in medical cost, morbidity, and mortality of patients (W. Gichuhi, 2015).

During the 2015 Ebola outbreak, the ministry of health conducted several pieces of training on IPC (WHO, 2015). The Gambia has also developed draft national guidelines on IPC and standard operating procedures for the facility levels (WHO, 2021). Despite these efforts by the Ministry of Health, factors influencing compliance with IPC standards have not been determined to guide policy development or re-adjustment and training in The Gambia. This study aimed to assess the compliance and factors influencing compliance with infection prevention and control standards among health workers in the rural Gambia (North Bank East Region), with the ultimate aim of addressing issues HCAs in the country.

1.3 Conceptual framework of factors associated with IPC compliance

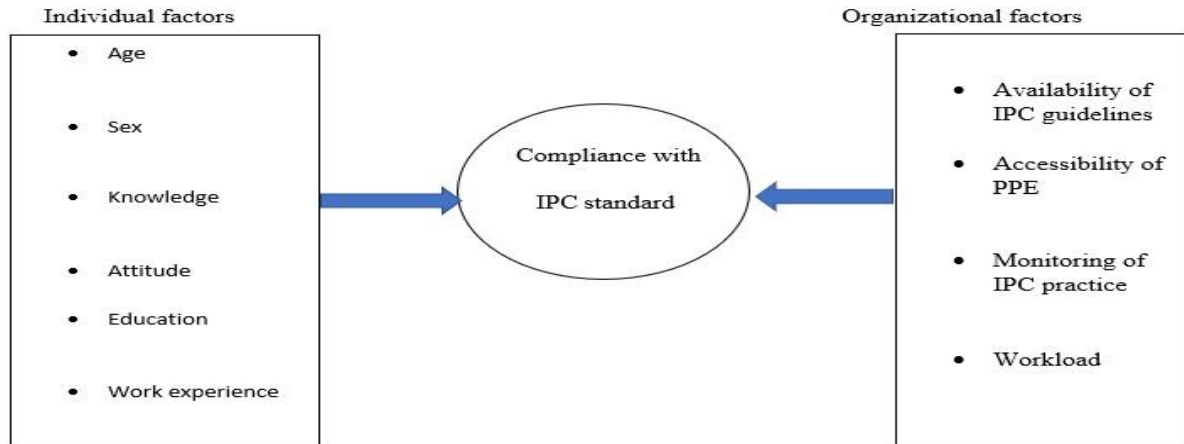


Figure 1 1: A conceptual framework of factors associated with IPC compliance

The figure above illustrates the conceptual framework: The independent variables are individual and organizational factors, whereas the dependent variable is compliance with IPC standards. The conceptual framework is based on the variables that will be used in the study. Presumably, there is a correlation between individual factors, organizational factors, and the outcome. Simultaneously, organizational factors such as the availability of IPC guidelines will facilitate the acquisition of knowledge and skills and improve the practice of infection prevention and control by staff, especially regarding contact with blood and other body fluids skin injuries. This acquisition of knowledge and skills is also a positive and motivating reinforcer that greatly influences employees' attitudes regarding compliance with infection prevention and control standards. Workload affect HCWs compliance with IPC standards, high workload on HCWs can make them not to strictly follow the IPC standards thereby affecting their compliance with IPC standards.

1.4 Justification of the study

In many developing countries, there is little data with low quality or no data available on healthcare-associated infections and factors influencing healthcare workers compliance with infection prevention and control standards (Shirol et al., 2014); the Gambia is not an exception to the problem. This study was to assess factors influencing compliance with infection prevention and control standards among health workers in rural Gambia to add to that the available knowledge about IPC standards compliance.

The study's findings will offer the policymaker in the ministry of health evidence about the factors that affect compliance with IPC standards among healthcare workers in The Gambia. Therefore, this will help promulgate regulations to enhance compliance with infection prevention and control standards among health workers in the whole country. The study results may also elucidate the value of true devotion and compliance with infection control and prevention ethics for healthcare workers to ensure their safety at work and promote efficient and effective health services. It may also be used as reference material for further research, especially for those in academia.

1.5 Research questions

1. What is the level of compliance with IPC standards among healthcare workers in the North Bank East Region?
2. What are the individual-level factors that influence compliance with IPC among health workers in North Bank East Region?
3. What are the organizational-level factors that influence compliance with IPC among health workers in North Bank East Region?

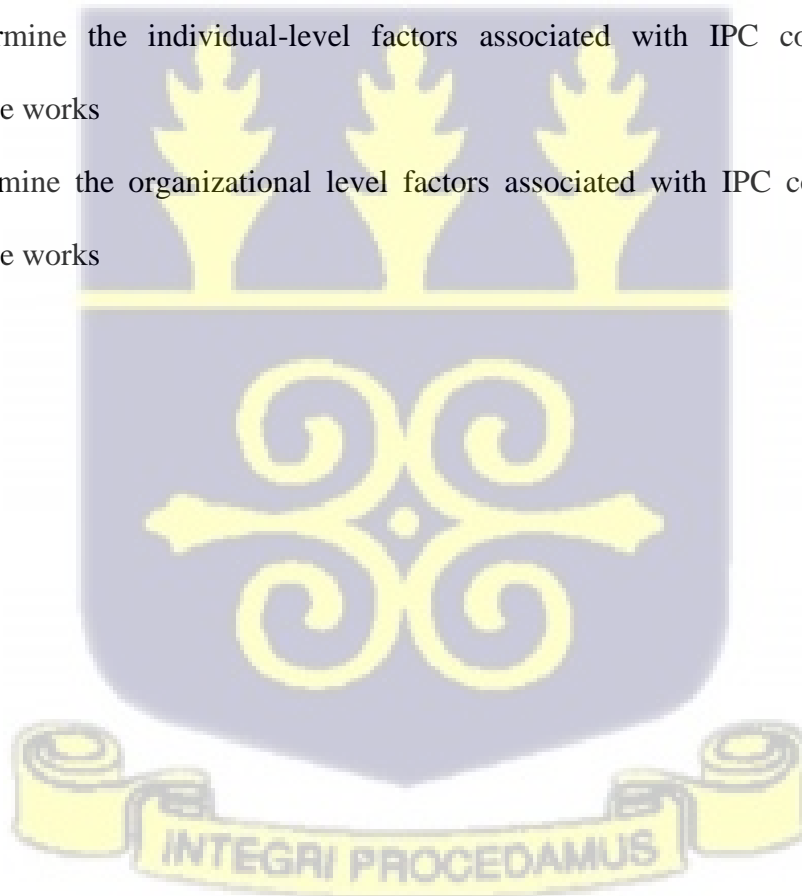
1.6 Objectives

1.6.1 General Objective assess

To assess the factors associated with compliance with infection prevention and control standards among healthcare workers in the North Bank East Region (NBER).

1.6.2 Specific Objectives

1. To determine the level of compliance with IPC standards among healthcare workers
2. To determine the individual-level factors associated with IPC compliance among healthcare works
3. To determine the organizational level factors associated with IPC compliance among healthcare works



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Healthcare-Associated Infections (HCAIs)

Healthcare-associated infections (HCAIs) are infections acquired due to healthcare either directly or indirectly. Infections caused by healthcare-associated infections (HCAIs) can develop in patients in any healthcare setting during the treatment process, which the patient did not develop at the point of admission. HCAIs can affect patients anywhere that patients receive care, and they can also occur after discharge (WHO, 2016b). According to several studies, more than 50% of surgical site infections manifest after discharge (WHO, 2011b). Occupational infections among healthcare workers are also part of HCAIs (Shirol et al., 2014). This stresses the fact that there is a probability that healthcare workers contract an infection from patients and the healthcare setting. Healthcare staff are prone to the microbes present in patients. The healthcare providers may transmit these microorganisms from one patient to another if proper infection prevention and control procedures are not followed (Russotto et al., 2017). A patient who comes to the hospital for treatment may develop another disease from the hospital that was not present before. Healthcare-associated infection can spread to predisposed patients while receiving health care in several ways. The infection can spread to the patient through the hands of service provider, their apparatus and supplies and unhygienic practices (Gichuhi et al., 2015)

2.2 Global burden of HCAI/Epidemiology of HCAI

Healthcare-associated infections are more prevalent in areas with inadequate resources than in highly resourced settings. There are varying incidences of health-related infections ranging from 5.7% and 19.1% in developing and underdeveloped countries, and the overall frequency of

infections is as high as 42.7 incidents per 1,000 patient days. The number of patients with ICU-acquired infection ranged from 4.4% to 88.9%. This amount is virtually three times greater than that of high-income countries. (Naghavi, 2015). A study conducted in several countries on infection-related devices (a form of HCAs) reported that the crude excess mortality in adult patients comprises of 18.5% for catheter-related urinary tract infection, 23.6% for catheter-related bloodstream and 29.3% for ventilator-associated pneumonia (WHO, 2016).

Healthcare-associated infections constitute a significant public health challenge, with more than 1.4 million people developing severe diseases at any given time during treatment for an unrelated condition. Although the rate of acquiring healthcare-associated infection could be different from country to country, it is assumed that up to 10% of patients who died are due to HCAs on average. The magnitude of the problem outside the health facility environment still cannot be determined (Naghavi, 2015).

Approximately 4% to 56% of all neonatal deaths among hospital-born babies in developing countries and that of sub-Saharan Africa and South-East Asia was 75% (WHO, 2010). Based on the literature reviewed, it is assumed that low-income countries bear the highest burden of HCAs. This is a result of deficiencies in the health system such as congestion in health facilities, limited human resources, poor infection prevention and control habits and unavailability of infection prevention and control guidelines. However, a further literature search on several studies indicates that the average incidence of infections due to healthcare in resource-poor settings ranges from 5.1% and 11.6% (WHO, 2010). However, the exact burden of HCAI is not yet known. Lack of adequate data hinders the estimate of the global burden of HCAs (WHO, 2011b).

2.3 Public Health Importance of HCAs (consequences)

Globally, healthcare-associated infections are a critical public health concern. According to a

WHO report, out of every 100 patients in acute care hospitals, seven (7) in advanced nations and fifteen (15) in developing countries acquired at least one HCAIs (Yallew et al., 2019). HCAIs prevalence range from 3,5% to 12.0% in the developed world, and in resource emerging countries, it ranges from 5.7 to 19.1. (Krieger et al., 2015). The size and burden range of HCAIs worldwide appear to be significant and underestimated (Alhumaid et al., 2021) HCAIs are associated with significant mortality and morbidity rates and an increased cost of health care. Depending on the type of infection, the reported case fatality rate ranges from 2.3% to 14.4% (Al-Tawfiq & Tambyah, 2014). The quality of life of an individual can be reduced by HCAI or even reduce the life expectancy of the affected person (Alhumaid et al., 2021).

HCAIs cause extra agony and come at an increased cost to patients and their relatives. Hospital stay is prolonged by HCAIs, and this can lead to long-term disability, increases antimicrobial resistance, represents a considerable increase in terms of resources on health systems, leading to increase cost for patients and their relatives, which can cause avoidable deaths (Alemu et al., 2020). There is a significant financial loss due to HCAIs. In Europe, it is estimated at €7 billion, including direct costs only and reflecting an extra hospital stay of 16 million days, and about \$6.5 billion in the United States. In the developing world, the financial data costs attributable to healthcare-associated infections are reported poorly and unreliably (Shirol et al., 2014).

2.4 Health Workers at risk of acquiring Healthcare-Associated Infections

Healthcare workers face the risk of multiple HCAI while providing healthcare services. (Nofal et al., 2017). Percutaneous exposure to blood and other body fluids through infected materials such as needle sticks and sharps posed a severe risk of HCAIs for healthcare workers. Three million of the world's 35 million healthcare staff suffer needle pricks and sharps injuries per year; considerable risk of more than 20 types of blood-borne pathogens being transmitted posed by

needle prick injuries, as in the case of Hepatitis B and C Virus and HIV. Among healthcare staff, almost 40% of Hepatitis B and C Virus infections and 2-3% of HIV infections result from exposure due to sharp injury in the workplace (Moyo, 2013).

The risk of HCAIs is also closely related to specific devices that can increase the risk of exposure to blood-borne pathogens. Disposable syringes account for 31%, suture needles account for 24%, and 5% for winged steel needles. Percutaneous injury with contaminated needles or sharps is the most significant risk of contracting HIV, particularly a hollow needle in the vein or artery of a patient with HIV (Charles John, 2017).

Most reported needlestick injuries affect nurses, but laboratory personnel, medical doctor, cleaners, and other healthcare workers are also injured. Healthcare workers are exposed to bloodborne pathogens that can cause infection through some of these injuries. Where the injury involves exposure to HIV, this effect is especially severe. (De Lima et al., 2015).

2.5 Overview of IPC

Infection Prevention and Control (IPC) is a scientific method and workable solution intended to avoid infection or injury to both healthcare staff and their patients. Infection prevention and control relates to all health systems and affects health outcomes for patients and healthcare workers (WHO, 2016a). Infection prevention and control is widely accepted as a critical component of a holistic approach to protecting, quality management, and enhancing patients and healthcare staff's health outcomes (Naghavi, 2015). Infection Prevention and Control is a systematic method and a pragmatic solution to prevent infection to patients and healthcare staff caused by healthcare activities. The focus of IPC is on the epidemiology of infectious diseases and strengthening the health system. IPC occupies a distinctive role in terms of patient health and quality care because it is essential to healthcare staff and patients at every interaction during healthcare delivery

(Weston, 2008). Infection prevention and control is ultimately about people. Effective prevention and control of infections are fundamental in delivering high-quality, patient-centre healthcare (Australian Commission for Safety and Quality in Healthcare, 2010).

2.6 Approaches to IPC programs

Effective Infection Prevention and Control Programs reduce the rate of HCAs by more than 30% (Allengrazi, 2018). It is, therefore, crucial for health institutions to implement an infection prevention program. Such programs should not only prevent healthcare-associated infections but also prepare for and respond to crises of an infectious (WHO, 2011a). Policymakers and administrators continued to be committed to providing all-inclusive, available, reasonable, and high-quality healthcare services. The mission of Infection Prevention and Control (IPC) programs is to prevent and control healthcare-associated infections, with three main objectives: patient protection; protecting healthcare workers, visitors and others in a healthcare environment; and achieving this in a cost-effective manner whenever possible (Wale et al., 2016).

2.7 Compliance of healthcare workers with infection prevention and control standards

Compliance with infection prevention and control has remained the most crucial issue in many countries, exposing both patients and healthcare workers (HCWs) to a high risk of developing HCAs. Infection prevention and control standards compliance are critical to reducing HCAs. However, reduced compliance with IPC standards has been reported in several studies. Compliance rates as low as 30%, 38% and 40% for face mask use, eye protection and hand washing, respectively, have been reported (McGaw et al., 2012).

From the literature review, it was found that IPC compliance varies significantly among healthcare providers and is likely to be influenced by the knowledge and attitudes of an individual. However, most studies indicate that compliance with IPC standards tends to be below standard, especially

for directly observable safety measures. Poor compliance with IPC standards may be due to knowledge gaps among HCW or situations, including apparent barriers such as lack of time, equipment availability, feeling that protective equipment is interfering with work performance or patient discomfort.

2.8 Methods for assessing compliance of Healthcare Workers with IPC standards

Most studies have assessed health care workers' compliance with IPC by self-reporting, using self-developed questionnaires, and a few studies have measured compliance using direct observation by a trained observer. Several research studies have reported many factors that may influence health care workers' compliance and non-compliance with IPC standards. The main factors that drove healthcare workers to comply with IPC measures were knowledge, Education, training and experience (Alhumaid et al., 2021).

2.9 Factors associated with compliance with IPC standards.

A number of factors have been identified to be associated with compliance with IPC standards: they include individuals and organizational factors. Individual factors affecting compliance with infection prevention and control standards are lack of understanding and knowledge among healthcare workers regarding IPC, lack of appropriate training, and uncomfortable equipment. Additionally, Skin irritation, forgetfulness, and job satisfaction all affect compliance with IPC. Besides, some sociodemographic variables such as age, gender, marital status, and work experience were associated with compliance with IPC standards (Parmeggiani et al., 2010). It is known that improving health care workers (HCW) awareness and attitudes towards infection control requirements will affect their compliance with standard practices. (Nofal et al., 2017)

2.10 Individual factors

Individual factors may have a role in determining compliance with IPC standards, as evidenced by the fact that IPC behavior differs significantly among HCWs (Alhumaid et al., 2021). From the literature, lack of understanding and knowledge among healthcare workers regarding IPC and lack of appropriate training are some of the individual factors affecting compliance with the infection prevention and control standard. Besides, some sociodemographic variables such as age, sex, level of Education, and work experience were associated with compliance with IPC standards (Parmeggiani et al., 2010). It is known that improving health care workers (HCW) awareness and attitudes towards infection control requirements will affect their compliance with recommended practices (Nofal et al., 2017).

2.10.1 Attitude

Attitude is the way one think, feel, or act toward something. A negative attitude towards infection prevention and control can promote point-to-point transmission HCAIs, while a positive attitude towards IPC standards can reduce the incidence of HCAIs. According to a study by Okran and Tagoe 2014, at the Central Regional Hospital in Ghana, to assess patients and healthcare workers' knowledge and attitude concerning healthcare-associated infections, changing attitudes is the best prevention method.

2.10.2 Knowledge

Knowledge of infection risks and behaviors are likely to influence compliance with IPC standards. Although, good knowledge does not automatically predict good IPC practices. However, a lack of knowledge about the suitability, efficacy and use of IPC materials determines poor compliance (Alhumaid et al., 2021).

Adequate knowledge and safe infection prevention practices among healthcare providers are vital to preventing infection in healthcare settings. In Africa, several studies have shown that a large proportion of healthcare providers have insufficient knowledge of infection prevention and Control (Assefa et al., 2020). This statement is supported by the findings of the study conducted in Nigeria by Ghadamgahi et al. (2011), which indicates that only (28.75%) of the health workers had good knowledge of standard precautions.

2.10.3 Education and training

The training of healthcare workers is an essential factor associated with compliance with IPC standards. Healthcare staff should receive instruction and training during orientation. After that, they should undergo refresher training at regular intervals. (Sato & Tohda, 2010). Training of healthcare workers is also necessary to overcome the fears, doubts, stigmas, and inaccurate healthcare workers' assumptions about the transmission or prevention of healthcare-related infections (Folan & Baillie, 2014).

2.10.4 Work Experience

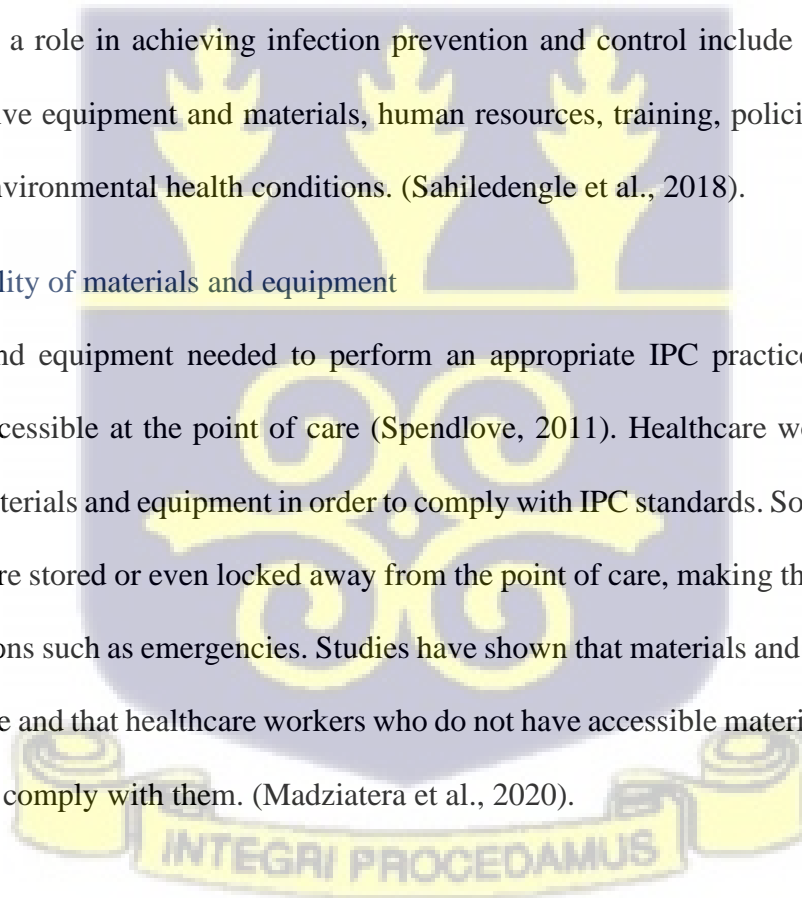
Work experience is another strong indicator of IPC knowledge, showing that health care workers with more than ten years of work experience were four times more likely to be familiar with IPC than those under five years (Assefa et al., 2020). Since poor compliance may be due to limited knowledge, those with many years of work experience are expected to follow IPC standards than individuals with fewer years of work experience as work experience correlates positively with IPC knowledge.

2.11 Organizational factors

Organizational factors, such as monitoring and supervision, availability and accessibility of material and management support for safe work practice are positively related to improving compliance with IPC standards and quality of care. The healthcare workers' culture greatly influences healthcare workers' compliance with the IPC standards in the workplace (Cruz, 2019). An effective IPC directly depends on the successful interaction of multiple management systems strongly influenced by the corporate culture. Studies on the correlation between organizational culture and IPC behaviour have shown that Healthcare institutions with more efficient leadership have shown greater enforcement and increased staff compliance. (De Bono et al., 2014). Other factors that play a role in achieving infection prevention and control include the availability of personal protective equipment and materials, human resources, training, policies and guidelines, and necessary environmental health conditions. (Sahiledengle et al., 2018).

2.11.1 Accessibility of materials and equipment

The materials and equipment needed to perform an appropriate IPC practice must be readily available and accessible at the point of care (Spendlove, 2011). Healthcare workers need direct access to IPC materials and equipment in order to comply with IPC standards. Sometimes materials and equipment are stored or even locked away from the point of care, making their use impossible in certain situations such as emergencies. Studies have shown that materials and equipment are not always accessible and that healthcare workers who do not have accessible materials and equipment are less likely to comply with them. (Madziatera et al., 2020).



2.11.2 Supportive Policies

Infection prevention and control policies and guidelines are built on the findings, research and approval from specialists, as well as skilled judgment. When necessary, they are modified to meet local requirements.

The infection control policies have been shown to reduce the burden of HCAs in many healthcare institutions and have since become a constant element of most healthcare facilities (Brisibe et al., 2014). From an IPC perspective, policies help healthcare workers understand practices and provide an agreed method for dealing with incidents (Folan & Baillie, 2014).

2.11.3 Monitoring and Evaluation

Monitoring and evaluation should be performed regularly to obtain timely feedback on healthcare practices and other indicators per the IPC Standards for the Prevention and Control of HCAs in Healthcare settings. The primary purpose of M&E and feedback exercise is to support the achievement of behavior or system change to improve IPC compliance and quality of care to reduce the risk and spread of HCAI (Spendlove, 2011).

Learning from the fields of quality improvement, monitoring, assessment, and feedback can be a powerful tool for persuading others that there is a problem and that the solution chosen is the best. This should be done without assigning blame in order to foster a non-punitive corporate culture.

2.11.4 Workload/workforce

Workload and inadequate human resources are also factors impacting compliance with IPC standards. According to the study conducted by Yassi A et al. (2009), inadequate staffing and too much work, the gap between the need for human resources for health and the supply was a global challenge, the disproportion was huge, that areas that seriously in need had the least healthcare providers. About 53% of the global disease burden is found in Sub-Saharan Africa and Southeast

Asia, with only 15% of the world's healthcare providers (Njovu, 2016). This shows the relationship between the workload and the number of staff available.



CHAPTER THREE

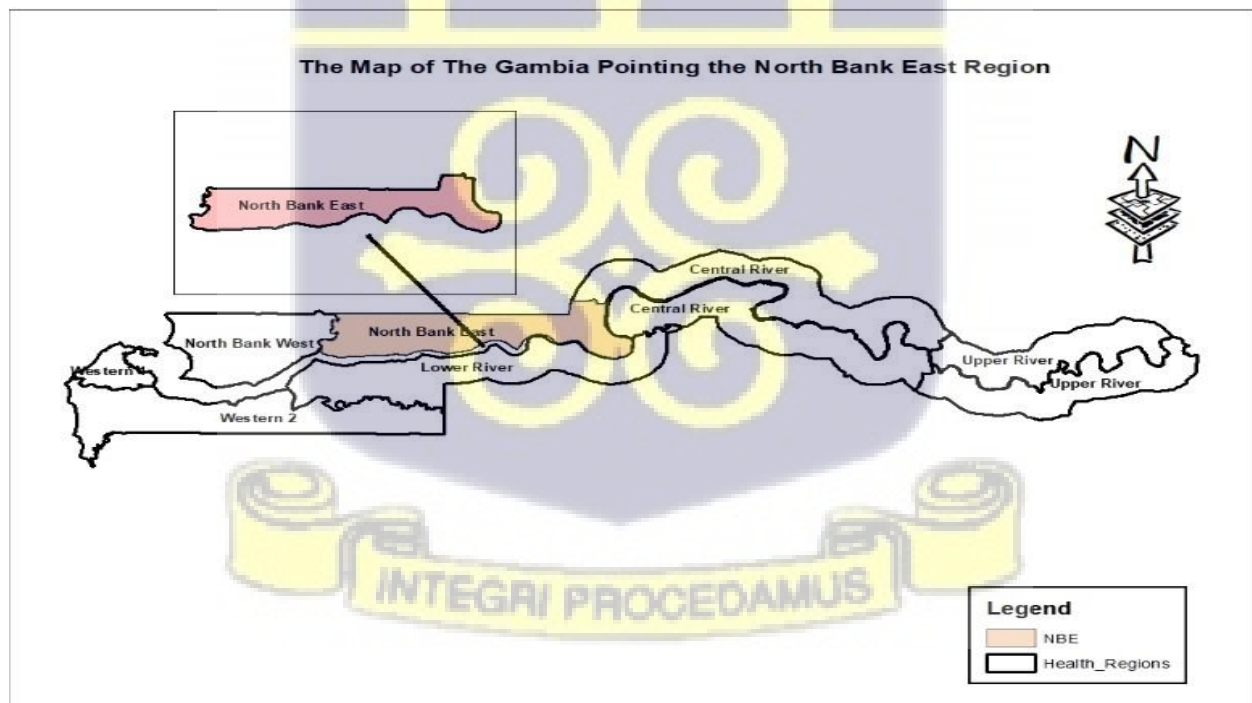
3.0 MATERIALS AND METHODS

3.1 Study Design

An analytic-cross-sectional study was conducted. Data were collected on sociodemographic characteristics, IPC practice and factors influencing the compliance with IPC standards among HCWs such as doctors, nurses, public health officers, laboratory personnel and others (orderlies, dental staff physiotherapist anaesthetists and laundry workers). The data were collected through face-to-face interviews of the participants using a questionnaire

3.2 Study area

The research was conducted among the health workers in rural Gambia (North Bank East Region). North Bank East region is one of the seven (7) health administrative regions of The Gambia. The region stretches from Kerewan to Palodi, covering a distance of 75km. It has approximately 121,368, (GBoS, 2013).



The region is divided into four districts and is headed by the Regional Director of Health Services.

Administratively, the regional Director oversees the activities of all the health in the four districts

except Farafenni general hospital, which is headed and managed by the chief executive officer because the districts did not have their own administrative structure but administered directly from the region. The region has seven minor health facilities that provide both preventive and curative medical services. It also has five community clinics, two service clinics, one NGO and one private clinic. There is only one tertiary health facility (Farafenni General Hospital) which serves as a referral point for all minor health facilities within the region. The total number of staff eligible for this study was four hundred and eight (408) staff.

3.3 Study Variables

3.3.1 Dependent Variable

The dependent variable was compliance with infection prevention and control standards. The main outcome variable was measured with eight (8) question items. The health workers indicated they adhere to specific IPC practices based on the following answers; always, sometimes, or never. A score of two (2) for an answer of always, one (1) for sometimes, zero (0) for never, given the total maximum score of sixteen (16). A score of 13 or more was considered compliant, and a score less than 13 was considered non-compliant (Kondor, 2018).

3.3.2 Independent Variables

Independent variables include people factors (age, gender, knowledge, attitude level, Education, work experience) and organizational factors, including (availability of guidelines, accessibility of Personal Protective Equipment, monitoring and supervision, and workload)

Seven question items were used to measure health workers' level of knowledge about IPC standards, which was determined by their level of agreement or disagreement with statements about IPC standards. Health workers were asked to select the appropriate answer by ticking the appropriate box from 1-5, written on a Likert scale based on the degree of agreement or

disagreement with statements. The answer of strongly agree was scored Three (3), agree was scored two (2), disagree was scored one (1) and strongly disagree was scored zero (0) given the highest score of twenty-one (21). A health worker was considered as having adequate knowledge when he/she had a score of seventeen (17) and above, and a score below seventeen (17) was considered as inadequate knowledge (Kondor, 2018).

Table 1: Study variables

Variables	Variables definition	Indicator	Variable type	Measurement scale
HCW's Age	Age of respondent	Age at last birthday.	Continuous	Nominal
Sex	Gender of the respondent	Male /Female	Categorical	Nominal
Work experience	Number of years worked by the respondent	In complete years,	Continuous	Nominal
Level of Education	The highest level of Education attained by the respondent.	Did not attend school Basic Tertiary	Categorical	Ordinal
Cadre	Cadre of respondent	Clinician Non-clinician	Categorical	Nominal
HCWs of knowledge IPC	Understanding and awareness of the healthcare worker	Adequate:: A score of 13 or more Inadequate: score below 13	categorical	Continuous
Organizational factors	Materials & facilities availability	Categorical	Categorical	Ordinal
Availability of IPC guidelines	IPC guidelines availability	Available Not available	Categorical	Ordinal

Monitoring of IPC practice	Management monitoring HCWs IPC practice	Monitored Not monitored	Categorical	Ordinal
Accessibility of PPEs	PPEs accessibility	Accessible Not accessible	Categorical	Ordinal
Availability of handwashing facilities	Available Not available	Categorical	Categorical	Ordinal
workload	High Not high	Categorical	Categorical	Ordinal

3.4 Study Population

The study population included the health care workers in the North Bank East Region.

3.5 Eligibility criteria

3.5.1 Inclusion criteria

Clinical staff and non-clinical staff whose job exposed them to blood and other bodily fluids during the course of their work.

3.5.2 Exclusion criteria

Eligible staff who were on annual leave were excluded.

3.6 Sample Size Determination

The assumption of 50% compliance was used to calculate the study's sample size due to the lack of data regarding IPC standards compliance in the Gambia. To determine the study's sample size, the Cochran formula was used to calculate the required sample size. The formula below was used to calculate the minimum sample size.

$n = Z^2 (p (1-p)) / e^2$, where n = desired sample size, Z normal deviation = 1.96 which equals 95% confidence interval, P = estimated attribute present in target population, $0.5 = 50%$ (assumed estimate Due to the lack of data on compliance with IPC standards in The Gambia), e = the desired level of accuracy, 0.05 (Kasiulevičius et al., 2006). $n = 1.962 * [(0.5 (1-0.5)) / (0.05)^2] = 3.8416 (0.5 * 0.5) / 0.0025 = 384.16 = 385$.

Meanwhile, in this study, the study population is 408 healthcare workers. Therefore, to obtain the sample size for this study, the adjusted formula was used as follows: (Morse, 2000).

$$nf = n / \{1+(n-1/N)\}$$

Here n is Cochran's sample size recommendation, N is the population size, and nf is the new, adjusted sample size.

$$nf=385 / \{1+(384/408)\} =197.8181=198$$

After adding 10% of the estimated sample size to cater for the non-response rate, the final estimated sample is 218.

Samples were calculated proportionally to the number of eligible staff in a district using the formula below:

$$\text{Recruited staff} = \frac{\text{No.of eligible staff in the district}}{\text{Total No.of eligible staff in the region}} \times \text{Sample size}$$

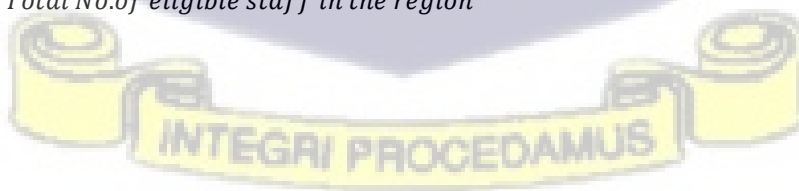


Table 3.1: The recruited participants are proportional to the number of eligible staff in each district.

Districts	Sabach sanjal	Upper Badibu	Central Badibu	lower Badibu	Total
Number of eligible staff in a District	36	301	36	35	408
Recruited participants by proportion	19	161	19	19	218

3.7 Sampling Techniques

3.7.1 Regional level

North Bank region was conveniently selected for the purpose of this study because the researcher worked in this region and has been observing the issues of non-compliance among health workers. Secondly, the region was selected due to time constrain and limited resources. The region has four districts Namely, Sabach Sanjal, Upper Baddibu, Central Baddibu and Lower Baddibu. To minimize bias due to sampling error, health workers were drawn from each district based on the proportion of its size (i.e., the number of eligible healthcare workers in each district) to the target population.

3.7.2 District level

At the district level, all the health facilities in each district were included in this study.

3.7.3 Health facility level

A simple random sample was used to select study participants to provide equal opportunities to each eligible individual from the target population. This simple random sampling was done by listing the names of eligible staff in each health facility on a piece of paper and putting them in a box where the names were randomly picked without replacement and health facilities were represented on this based on the proportion of their size (that is the number of eligible staff).

3.8 Training and pretesting of data collection tools.

The research assistants were recruited and trained; the training included a detailed explanation of the questionnaire, ethical issues involved, and the study participants' informed consent. Questions in the questionnaire were explained to research assistants to prevent interviewer bias. They were also trained to comply with the study's ethical guidelines. Before the actual data collection, the structured questionnaire was pretested on fifteen (15) healthcare workers in three (3) health facilities in North Bank West Region to achieve the required objective to verify their clarity and consistency.

The study's purpose was explained to each participant, as would encourage them to give an accurate response. All the data collectors were to assure strict confidentiality, and all information collected were remained private and were only used for this study. All data were entered into a computer with a secure password.

3.9 Data Collection Techniques

In this study, data were collected using an interviewer-administered questionnaire. All the participants were informed about the reason for the study before the start of the interview. Questionnaires were administered to 218 randomly selected health workers in all healthcare facilities in the North Bank East Region from the target population.

The questionnaire was developed based on the review of relevant literature and was divided into three sections (Appendix III). Section A; captured sociodemographic data such as age, sex, work experience, level of Education and cadre. Section B: individual factors affecting compliance with IPC standards, such as knowledge, IPC practice, level of exposure, and use of personal protective equipment. Section C: Organizational factors that affect compliance with IPC standards, such as

the availability of protocols, accessibility of materials, supportive policies, evaluation and monitoring and workload.

3.10 Data management and analysis

Data were entered into the Microsoft excel software and cleaned. Incomplete forms with missing outcome variable were excluded and then imported to Stata software version 16.0 for analysis.

Descriptive statistics were used; (including the calculation of frequencies and percentages) to summarize variables such as sex, age, work experience, education level, staff category, knowledge, attitude, and compliance with IPC.

A Chi-square test of association was performed to determine the association between individual factors and organizational factors on their compliance with IPC standards. The level of significance was set at less than 0.05.

A crude logistic regression analysis was performed on individual-level factors (age, sex, attitude, education, work experience and staff category), organizational-level factors (availability of guidelines, accessibility of PPEs, monitoring of IPC practice and workload) and compliance with infection prevention and control standards. The crude odds ratio, the p-values and corresponding confidence intervals were reported. Variables with statistically significant associations were included.

For adjusted logistic regression, variables with statistically significant association with compliance with IPC standards were further selected.

Adjusted logistic regression was performed. The adjusted odds ratio, p-values and corresponding confidence intervals were reported with significant levels set at 0.05 in a tabular form.

3.11 Ethical Consideration

3.12.1 Ethical approval

Ethical Approval (Appendix IV) was obtained from the Gambia Government/MRC Joint Ethics Committee through the Research and Publication Committee of The University of The Gambia (Republic).

3.11.2 Permission from the study site

The Director of Health Services granted permission for data collection. An official letter was sent to the Director of Health Services for his approval, a copy of which was sent to both the region and the hospital (Appendix V)

3.11.3 Description of the study subjects

The participant in this study includes Clinical staff and non-clinical staff whose job exposed them to blood and other body fluids during the course of their work.

3.11.4 Informed Consent

Informed consent was obtained from participants after explaining the purpose of the study and what was expected of them. Participants were informed that their participation in the study was entirely voluntary and that they had the opportunity to withdraw at any moment without explanation. Any information collected from them until the withdrawal time will not be used if they opt to withdraw their participation during the study. Even though they are encouraged to engage.



3.11.5 Privacy/Confidentiality

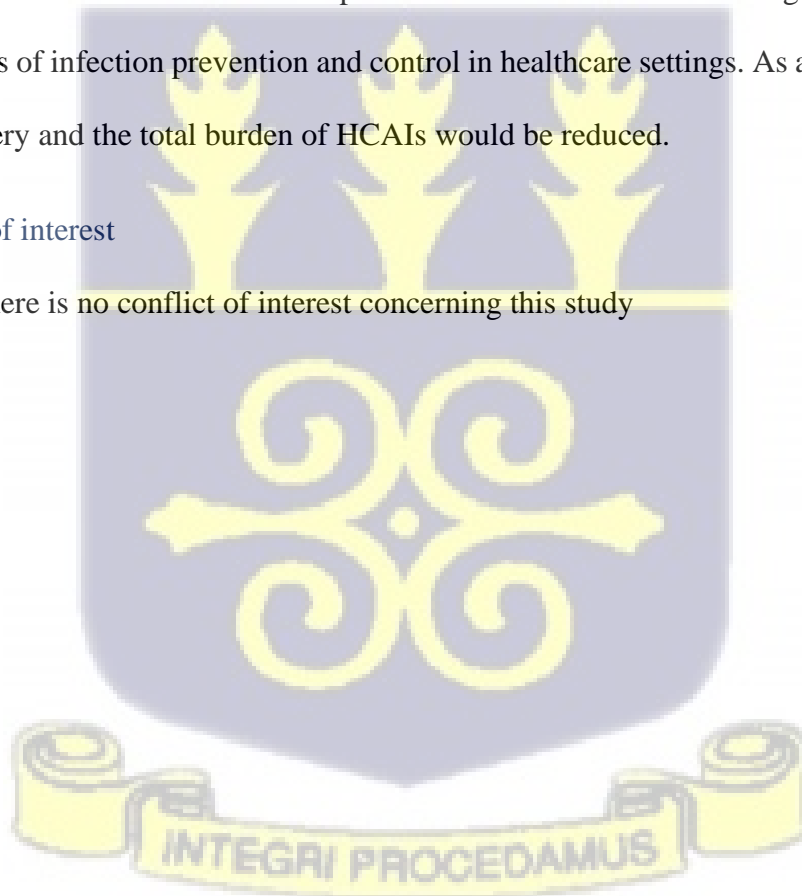
All data collected was kept private and exclusively used for research purposes. Participants were questioned at their convenience but at a specified time and location. This ensures participant privacy when filling out the questionnaire.

3.11.6 Potential Risk and Benefit

Patients and the general public will benefit from the study since the information provided by the participants would help the researcher better understand the factors that influence IPC compliance. Furthermore, the findings of this study would greatly help policymakers and HCWs better understand the factors that influence compliance with IPC standards among HCWs for better planning in terms of infection prevention and control in healthcare settings. As a result, the cost of healthcare delivery and the total burden of HCAs would be reduced.

3.11.7 Conflict of interest

I declared that there is no conflict of interest concerning this study



CHAPTER FOUR

4.0 RESULTS

4.1 Sociodemographic characteristics of healthcare workers

A total of 218 healthcare workers were recruited in this study, with a response rate of 100%. Most participants, 111/218 (50.9%), were males, and nearly two-fifths 84/218 (38.5%) of the health workers were in the age range 20 – 29 years; a little more than one-third 75/218 (36.2%) were between age 30 – 39 years and 40 years and above were 55/218 (25.3%). About 50% (n=108) of the participants had more than five (5) years of working experience. More than half of the participants, 127/218 (58.3%), had a tertiary education, about 46/218 (21.1%) only had basic Education, and 45/218 (20.6%) did not attend school. Of the 218 participants, 99/218 (46.0%) were clinicians, while 116/218 (54.0%) were non-clinicians (Table 4.1).

Table 4 1: Sociodemographic characteristic of healthcare workers in NBER, 2021

Health workers Characteristic	Frequency (N= 218)	Percentage (%)
Sex		
Male	111	50.9
Female	107	49.1
Age (years)		
20-29	84	38.5
30-39	79	36.2
≥40	55	25.3
Work experience (years)		
1-5	108	49.5
>5	110	50.5
Education level		
Did not attend School.	45	20.6
Basic	46	21.1
Tertiary	127	58.3

Staff category

Clinician	99	46.0
Non-clinician	116	54.0

4.2 Health worker's compliance score

From the result of our study, most of the participants, 73.1%, reported that they always wash their hands with soap under running water. Most of the health workers, 74.8%, also said they always wash their hands-on the removal of gloves after contact with patient or body fluids. The study also found out that most participants, 70.6% indicated that they always discarded all disposable PPEs after use. About 80.7% confirmed that they always use gloves when handling body fluids. About half (50.9%) of the health workers sometimes wear Google and masks when handling casualties. Less than half, 47.3%, sometimes wear an apron while on duty. Less than half, 47.3%, sometimes wear an apron while on duty, and a little more a quarter of the health workers said they never wear an apron while on duty. About 48.1% of the health workers reported that they always change gloves before attending to another patient, while 45.9% reported that they sometimes change gloves before attending to another patient. The finding of the study also indicated that 50% of the respondents wash their hands after attending to each patient

Table 4 2: Compliance with infection prevention and control standards among HCWs in NBER, 2021

<u>Statement</u>	<u>Always</u>	<u>Sometimes</u>	<u>Never</u>	<u>Total</u>
I wash my hand with soap under running water	73.1%	26.6%	0.0%	100%
On removal of gloves, I wash my hand after contact with the patient or body fluids	74.8%	24.3%	0.9%	100%

In my unit, all disposable PPEs are discarded after use	70.6%	28.4%	0.9%	100%
I use gloves when handling body fluids	80.7%	17.4%	1.9%	100%
I wear goggles and a mask to protect myself when handling casualties	39.0%	50.9%	10.1%	100%
I wear an apron when performing my duties	24.8%	47.3%	28.0%	100%
I change gloves before attending to another patient	48.1%	45.9%	6.0%	100%
I wash my hands after attending to each patient	50.0%	43.1%	6.9%	100%

4.3 Compliance with IPC standards among healthcare workers

Table 4.3 showed that the majority (78.9%) of health workers had adequate knowledge of infection prevention and control. More than half 128 (58.7%) of the participants had poor attitudes towards IPC standards. The result also shows that little more than half (50.5%) of the health workers did not comply with IPC standards.

Table 4 3: Knowledge, attitude, and compliance with IPC standards among HCWs in NBER, 2021

Variables	Frequency (N=218)	Percentage (95% CI)
Knowledge of IPC		
Adequate	172	78.9 (72.9 - 83.8)
Inadequate	46	21.1 (16.2 - 27.1)
Attitude		
Poor attitude	128	58.7 (52.0 - 65.1)
Good attitude	90	41.3 (34.9 - 48.0)
Compliance with IPC		
Compliant	108	49.5 (42.9 - 56.2)
Non-compliant	110	50.5 (43.8 - 57.1)

4.4 Most common mode of occupational exposure

From figure 4.1, the majority of the health workers (76.5%) indicated contact with blood and other body fluids as the most common mode of exposure. 12.4% indicated airborne transmission as the most common, while 4.6% indicated droplets transmission as the most common and 6.5% indicated others.

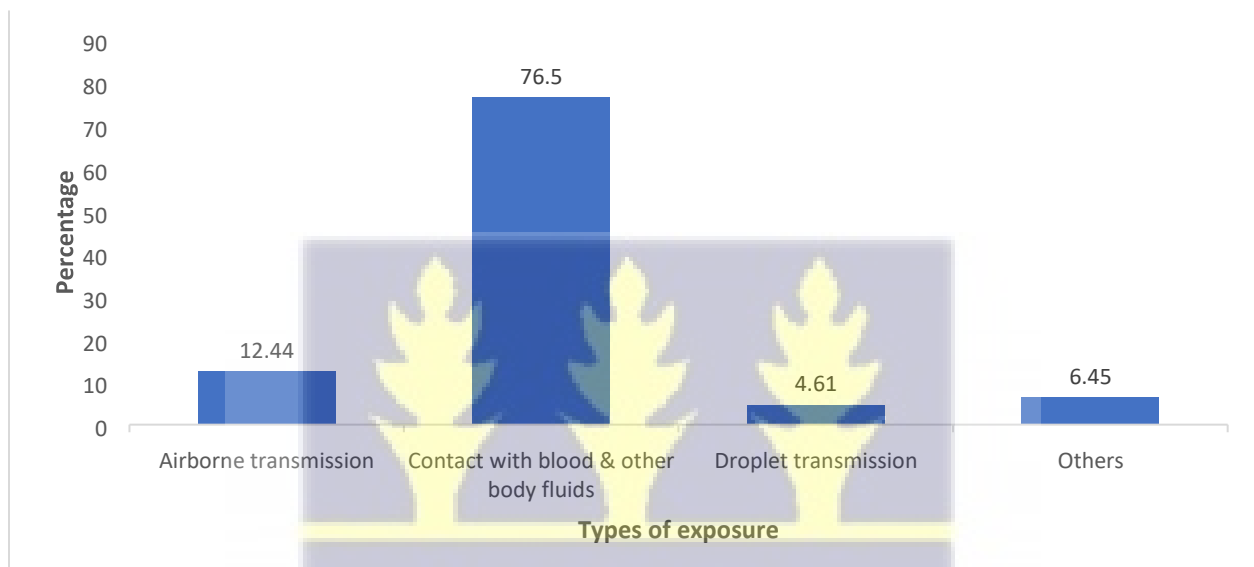


Figure 4 1: Modes of occupational exposure among HCWs in NBER, 2021

5 Frequency of exposure to occupational health hazards

The majority of the participants (56.6%) indicated that they were sometimes exposed to occupational health hazards, while one out of every five HW (21.9%) were always exposed to occupational health hazards



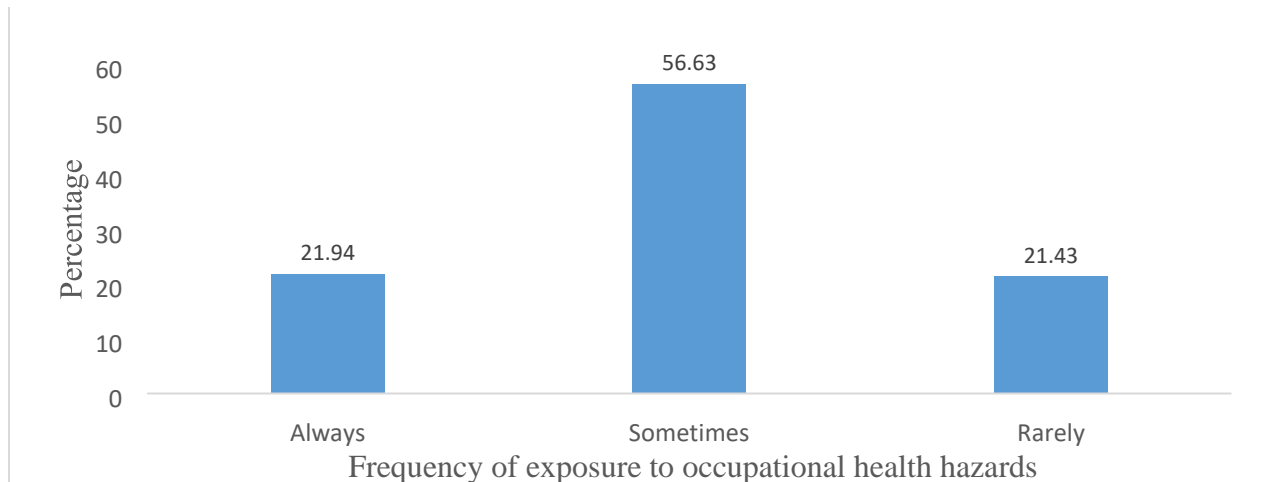


Figure 4 2: Frequency of exposure to occupational hazard by HCWs in NBER, 2021

4.6 Hand hygiene habits of healthcare workers

From figure 3 below, 177/218 (81.19%) of the health workers revealed that they wash their hands before and after handling patients, while 34 out of 218 healthcare workers (15.6%) wash their hands only after handling patients. Only a small number, 3.21% (n=7), washed their hands before handling patients.

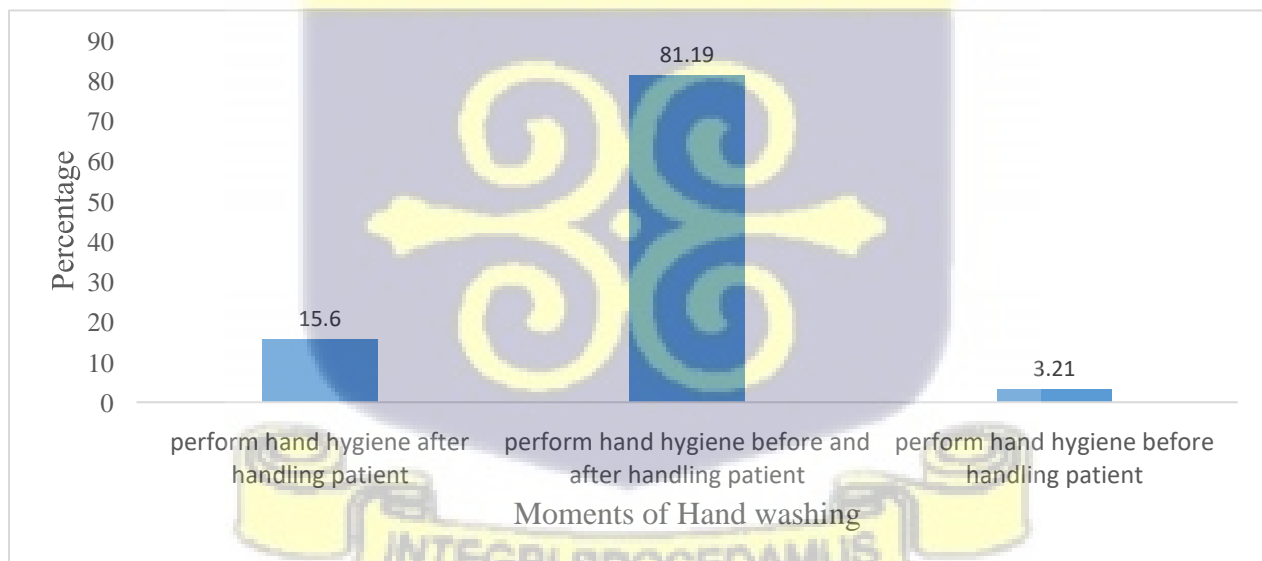


Figure 4 3: Hand washing habit of HCWs in NBER, 2021

4.7 Bivariate Analysis between predictor variables and Compliance with IPC standards

A Chi-square test of association was performed to determine the association between the individual-level factors and organizational level factors on their level of compliance with IPC standards. The test was carried out at a 95% confidence interval (Table 4.4).

Among the predictor variables analyzed, knowledge of IPC, Attitude of health workers, availability of IPC guidelines, accessibility of PPEs and monitoring of IPC practice by management were found to be significantly associated with IPC compliance [(Chi = 15.32, p-value = <0.001), (Chi=23.14, p-value=<0.001), (Chi=12.59, p-value=<0.001), (Chi=30.39, pvalue=<0.001), Chi=39.56, p-value= <0.001)] respectively. All other variables were not significantly associated with the outcome of interest (Table 4.4)

Table 4 4: Chi-square test of association of independent variables and compliance with IPC among HCWs in NBER, 2021

Variables	Compliant Number	%	Noncompliant Number	%	X²	pvalue
Sex					1.17	0.28
Male	51	46.0	60	54.0		
Female	57	53.3	50	46.7		
Age					0.16	0.92
20-29	42	50.0	42	50.0		
30-39	40	50.6	39	49.4		
≥40	26	47.3	29	52.7		
Work experience					0.02	0.89
1-5	54	50.0	54	50.9		
>5	54	49.1	56	50.0		

Education level	Did not attend	23	51.1	22	48.9	1.59	0.45
	school	19	41.3	27	58.7		
	Basic Education	66	52.0	61	48.0		
	Tertiary Education						
Staff category	Clinician	51	51.5	48	48.5	0.36	0.55
	Non-clinician	55	47.4	61	52.6		
Knowledge	Adequate	97	56.4	75	43.6	15.32	0,000
	Inadequate	11	23.9	35	76.1		
Attitude	Poor	81	63.3	47	36.7	23.41	0.000
	Good	27	30.0	63	70.0		
Availability of IPC guidelines	Available	86	57.7	63	42.3	12.59	0.000
	Not available	22	31.9	47	68.1		
Accessibility of PPEs	Accessible	94	61.8	58	38.2	30.39	0.000
	Not accessible	14	38.2	52	78.8		
Monitoring of IPC practice	Monitored	95	64.2	57	81.4	39.56	0.000
	Not monitored	13	18.6	53	35.8		
Workload	High	57	50.0	57	50.0	0.02	0.89
	Not high	51	49.0	53	51.0		

4.8 Univariable analysis of the association between independent variables and dependent variable

The crude analysis was performed for all individual-level variables and organizational level variables (Table 4.5). Variables such as knowledge, attitude, availability of guidelines,

accessibility of PPEs and monitoring of IPC practice were significant in predicting health workers compliance with IPC standards.

Table 4 5: Univariate logistic regression analysis for the association between independent variables and compliance with IPC standards among health worker in NBER, 2021

Variables	Observations	Crude Odd Ratio	(95% CI)	P-value
Sex				
Male	111	Reference	(0.44 – 1.27)	0.28
Female	107	0.75		
Age				
20-29	84	Reference		
30-39	79	0.98	(0.53 – 1.80)	0.94
≥40	55	1.12	(0.56 – 2.20)	0.75
Work experience				
1-5	108	Reference		
>5	110	1.04	(0.61 – 1.76)	0.89
Education level				
Did not attend school	45	Reference	1.00	
Basic Education	46	1.49	(0.65 – 3.40)	0.35
Tertiary Education	127	0.97	(0.49 – 1.91)	0.22
Staff category				
Clinician	99	Reference		
Non-clinician	116	1.28	(0.69 – 2.02)	0.55
Knowledge				
Adequate	172	Reference		
Inadequate	46	4.12	(1.96 – 8.64)	<0.001
Attitude				
Poor	128	Reference		
Good	90	4.02	(2.26 – 7.16)	<0.001
Availability of guidelines				
Available	149	Reference		
Not available	69	2.92	(1.60 – 5.32)	<0.001
Accessibility of PPEs				
Accessible	152	Reference		
Not accessible	66	6.02	(3.07–11.82)	<0.001
Monitoring of IPC Practice				
Monitored	152	Reference		
Not monitored	66	7.86	(3.94 -15.67)	<0.001

Workload				
High	114	Reference		
Not high	104	0.96	(0.57 – 1.64)	0.89

4.9 Multiple logistic regression analysis for the association between independent variables and Dependent variable (compliance with IPC standards)

After running the multiple logistic regression, the adjusted odds Ratios were found and are shown in table 4.6 below. However, after controlling for all other variables, knowledge level, attitude, accessibility of PPEs and Monitoring of IPC practice by management were found to be significantly associated with compliance with IPC standards. Health workers who had basic Education had 3.70 times more odds to comply with IPC standards than those who did not attend school (AOR = 3.70, CI = 1.16-11.82, p-value = 0.03). Additionally, health workers who have had good attitudes towards infection prevention and control practice had 2.66 times more odds to comply with IPC standards than those health workers who had poor attitudes towards infection prevention and control practice (AOR = 2.66, CI = 1.28 – 5.51, p-value = 0.01).

Table 4 6: Multiple logistic regression analysis for the association between independent variables and compliance with IPC standards among health workers in NBER, 2021

Variables	Observations	Adjusted Odd Ratio	(95% CI)	P-value
Sex				
Male	111	Reference	1	
Female	107	0.57	(0.28 – 1.14)	0.11
Age				
20-29	84	Reference	1	
30-39	79	1.58	(0.59 – 4.23)	0,36
≥40	55	1.70	(0.46 – 6.28)	0.43

Work experience					
1-5	108	Reference	1.00		
>5	110	0.92	(0.36 – 2.35)	0.87	
Education level					
Did not attend school	45	Reference	1.00		
Basic Education	46	3.70	(1.16 -11.82)	0.03	
Tertiary Education	127	2.85	(0.82 – 9.89)	0.10	
Staff category					
Clinician	99	Reference	1.00		
Non-clinician	116	1.07	(0.50 – 2.29)	0.87	
Knowledge					
Adequate	172	Reference	1.00		
Inadequate	46	1.99	(0.77 – 5.13)	0.15	
Attitude					
Poor	128	Reference	1.00		
Good	90	2.66	(1.28 – 5.51)	0.01	
Availability of guidelines					
Available	149	Reference	1.00		
Not available	69	1.81	(0.77 – 4.26)	0.17	
Accessibility of PPEs					
Accessible	152	Reference	1.00		
Not accessible	66	3.32	(1.46 – 7.58)	0.004	
Monitoring of IPC practice					
Monitored	152	Reference	1.00		
Not monitored	66	4.91	(2.08–11.60)	<0.001	
Workload					
High	114	Reference	1.00		
Not high	104	1.44	(0.71 – 2.93)	0.31	

4.10 Additional findings

The finding of our study revealed that less than half (44,5%) of the health workers had encountered at least one healthcare-related injury during the course of their duty(Figure 4.4).

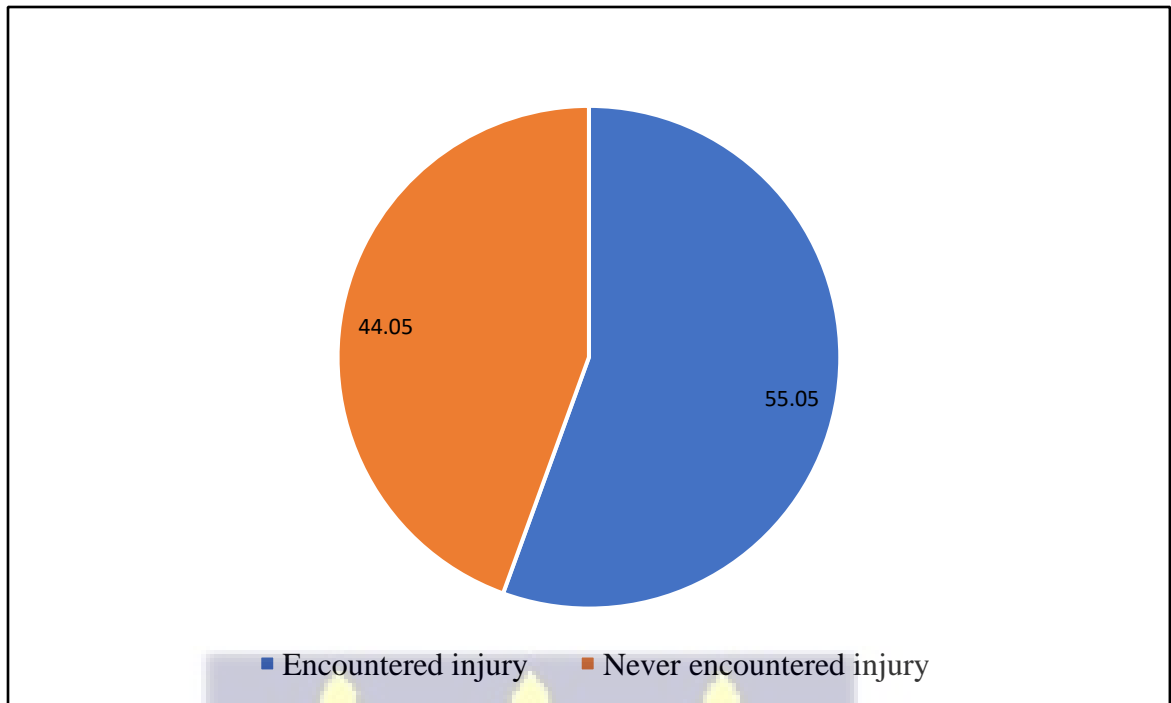


Figure 4 4: Healthcare related injuries among healthcare workers in NBER, 2021



CHAPTER FIVE

5,0 Discussion

5.1 Sociodemographic characteristics of healthcare workers

In resource-poor countries like the Gambia, compliance with IPC standards is a cost-effective method to prevent HCAs. This study showed the magnitude of healthcare workers compliance with IPC standards and individual and organizational factors that influence compliance with IPC standards among healthcare workers.

In relation to sociodemographic characteristics, this study observed that both sex and age of health workers had no positive correlation with compliance with IPC standards, unlike reports in the literature that certain sociodemographic variables such as age, and sex, were associated with compliance with IPC standard (Haile et al., 2017). Furthermore, in another previous study, work experience was cited as a determinant of compliance with IPC standards (Assefa et al., 2020). This study, however, failed to establish a relationship between health workers work experience and compliance with IPC standards. This study, however, found the majority of the health workers to be 30 years and above; conversely, a study by O. K. Helmut (2016) had indicated a predominant age range of less than 30 years.

5.2 Healthcare workers knowledge and attitude on IPC standards

The majority of the healthcare workers in the North Bank East Region of the Gambia were knowledgeable. Among the health workers, 172 (78.9%) had adequate knowledge of IPC standards, which is a positive thing since knowledge allows them to be aware and, as much as possible, adopt and comply with IPC standards. However, having adequate knowledge does not necessarily imply compliance with IPC standards. Our finding was comparable to that of a similar

study at Northern Ugandan referral Hospitals that showed a knowledge score of 69.3% (Amanya et al., 2021). However, a pre-pandemic study conducted in Nigeria by Ghadamgahi et al. (2011) indicates that only (28.75%) of the health workers had good knowledge of standard precautions. This disparity could be due to increased IPC training and awareness due to the current COVID-19 pandemic, which has improved healthcare workers' IPC knowledge due to their exposure to multiple IPC training and information sources in the context of Covid-19.

The importance of having a positive attitude towards infection prevention is undeniable when it comes to preventing HAIs. More than half 128 (58.7%) of the participants had a poor attitude. Since one of the most critical pillars of IPC compliance is a positive or good attitude of IPC, there is a need for healthcare workers to improve their attitude towards IPC standards. This result is similar to the finding of a study by Unakal et al. (2017) in Trinidad and Tobago, which indicated that less than half of the participants (46.7%) had a positive attitude towards infection prevention.

In contrast, this current finding differs from the finding published in previous studies in Ghana and other African countries. For instance, a study on Surgical health workers knowledge and attitude on infection prevention and control in Tamale teaching hospital in Ghana indicated that about 55.1% of the study participants had a good attitude (Alhassan et al., 2021). Furthermore, Bayleyegn et al. (2021) found that more than half of the health workers (57.2%) had a positive attitude toward infection prevention and control in a comprehensive specialized hospital in Northwest Ethiopia.

5.3 Most common mode of occupational exposure and frequency of exposure to occupational hazards

The most common mode of occupational exposure among healthcare workers was also investigated in this study. The majority (76.5%) of health workers indicated contact with blood and other body

fluids, 12.44% indicated airborne transmission, 4.6% indicated droplet, and 6.45% indicated others. This finding is consistent with the result of a previous study by O. K. Helmut (2016), conducted in Kenya, which found that 42% indicate contact transmission, 37% indicate airborne, and 21% indicate droplets.

The researchers also wanted to know how often healthcare workers in North Bank East Region were exposed to occupational health hazards. This was necessary to determine the likelihood of healthcare workers contracting HCAs. Most participants (56.63%) were sometimes exposed, 21.94% were constantly exposed, while 21.43% were rarely exposed. This reveals that healthcare workers may acquire an infection while performing their duties, especially when they fail to comply with IPC standards.

5.4 Handwashing habit of healthcare workers

In a healthcare setting, hand hygiene is one of the most cost-effective ways of preventing HCAs. The majority, 81.19%, of the participants stated that they performed hand washing both before and after handling patients, 15.6% performed hand washing only after handling patients. However, interesting to note that 3.21% performed hand washing before handling patients only. Our finding is in contrast with a previous study by Shobowale et al. in Babcock University Teaching Hospital that used the observation method for data collection. Shobowale et al. noted that numerous personnel did not perform hand hygiene before conducting a procedure. The disparity could be related to methodological differences, as self-reported studies are more likely to provide high percentages.

5.5 Accessibility of PPEs and Availability of IPC guidelines

To comply with IPC standards, HCWs need direct access to PPEs. Sometimes PPEs are stored or even locked away from the point of care, and it becomes impossible to use them in certain situations such as emergencies. In our study, accessibility of PPEs was reported to be high (61.8%)

among health workers. This finding is lower as compared to an earlier study in Queen Elizabeth Hospital, Malawi by Madziatera et al. (2020), which stated that in the wards, 71.4% of HCW had access to PPEs. However, it is higher than that of a study conducted among frontline health workers in Pakistan where (34.44%) health workers reported never having any access to PPE, 168 (37.09%) had access to PPE only occasionally, and 129 (28.48%) always had access (Hakim et al., 2021).

The majority of the health workers (68.3%) were aware of infection prevention and control guidelines. This finding was supported by previous research finding that 86% of health workers had heard about IP guidelines (Mukwato et al., 2009). In a similar study, the result indicated that many health workers were aware of written sterilization policies (W. Gichuhi, 2015).

5.6 Monitoring of IPC practice among staff

Effective IPC is directly dependent on the smooth operation of numerous management systems, all of which are influenced by company culture. Strong leadership was encouraged to be necessary for effective IPC campaigns. Studies on the correlation between organizational culture and IPC behaviour have shown that Healthcare institutions with more efficient leadership have shown greater enforcement and increased staff compliance. (De Bono et al., 2014). In the current study, more than half, 67.9%, indicated that their management monitored IPC practice among staff.

5.7 Workload

It is essential to understand the factors that can serve as a barrier to Compliance with IPC standards. This research looked at some factors that affect the HCWs Compliance with IPC standards. Less than half 104/218 (47.7%) of health workers in this study indicated high workload as an impeding factor affecting Compliance with IPC standards.

5.8 Compliance with IPC standards and associated factors

The finding of this study indicates that Compliance with IPC standards among HCWs in the North Bank East Region was low even though the knowledge level was high among HCWs. More than

half 110/218(50.5%) of the health workers were not compliant with IPC standards. This result was estimated lower than that of a study conducted by Mukwato et al. (2009), which indicates that compliance with hand hygiene was moderate at 61%. This result of high HCW knowledge and low HCW compliance with IPC standards in this study was also supported by the finding of Ward (2011) that infection prevention and control cannot be achieved merely by Education. Hence the attitude of HCWs towards IPC standards and monitoring of IPC practice among HCWs is crucial in achieving high compliance with IPC standards. Another vital factor in achieving high HCWs compliance with IPC standards was the availability and accessibility of PPEs at all times.

In assessing the relationship between the independent and dependent variables, variables such as Education, attitude, accessibility of PPEs, and monitoring of IPC practice by management were found to influence compliance significantly.

This study showed that healthcare workers with secondary education were 3.70 times more likely to comply with IPC standards than those who did not attend school (AOR=3.70 (1.16 – 11.82), p-value 0.03)

The possible explanation for this result could be that when HCWs attain tertiary Education, their awareness of infection increases, increasing their compliance with IPC standards.

In our study, healthcare workers with good attitudes towards infection prevention and control were more likely to comply with IPC standards than those with poor attitudes towards infection prevention and control. This finding could be explained by the fact that healthcare workers with good attitudes tend to obey rules and regulations and are extra careful about infection.

In line with the Ethiopian study (Bekele et al., 2020), this study also showed that healthcare workers who have access to PPEs were more likely to comply with IPC standards than those who

did not have PPEs readily accessible. The explanation for this finding could be that compliance with IPC standards would require some personal protective equipment in most cases. Also, recurrent inaccessibility of PPEs could demotivate staff who were previously compliant.

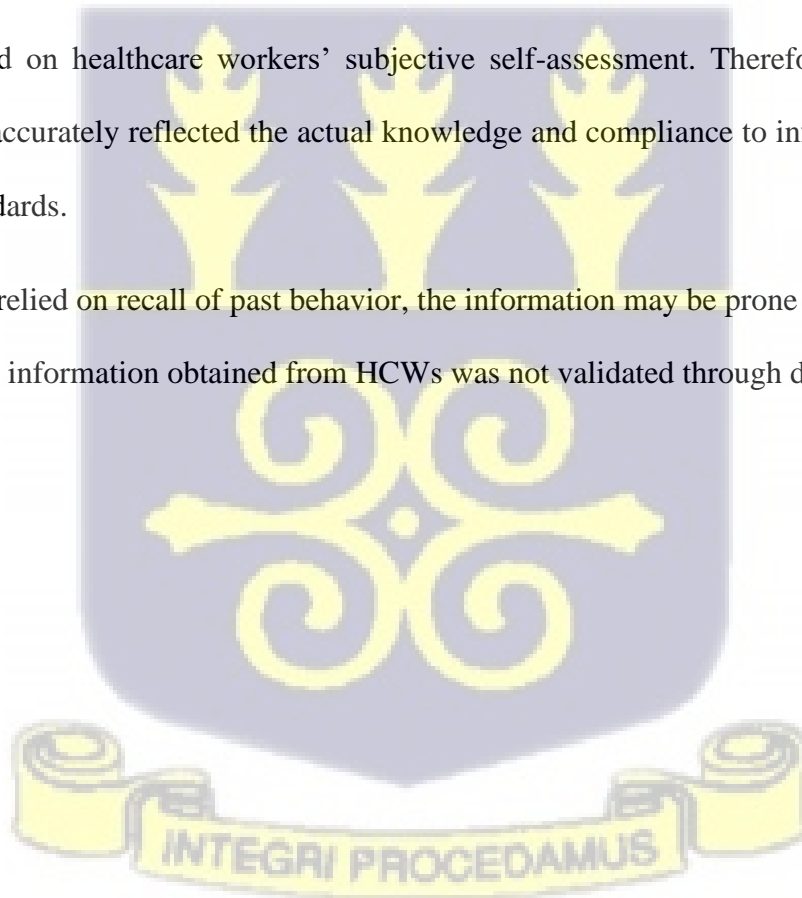
Evidence from this study suggests that the knowledge of IPC standards among health workers was high but lack of access to personal protective equipment hinder their compliance with IPC. Improving sustained compliance with IPC standards among healthcare workers will require the Ministry of health to ensure availability and accessibility of all the logistics required for healthcare workers to comply with IPC standards to guarantee their safety during service delivery.

5.9 Limitation

This study relied on healthcare workers' subjective self-assessment. Therefore, the responses might have not accurately reflected the actual knowledge and compliance to infection prevention and control standards.

Since this study relied on recall of past behavior, the information may be prone to recall bias.

Furthermore, the information obtained from HCWs was not validated through direct observation.



CHAPTER SIX

6.0 Conclusion and Recommendations

6.1 Conclusion

The aim of this study was to assess compliance with infection prevention and control standards among healthcare workers and to identify the associated factors. Based on the study findings, it can be concluded that more than 50% of the HCWs were not compliant with IPC standards even though the knowledge level was high among HCWs.

The study also aimed to determine the individual-level factors associated with compliance with IPC standards. Among the individual-level factors assessed in this study, education level and attitude of healthcare workers towards IPC practice were found to be significantly associated with compliance with infection.

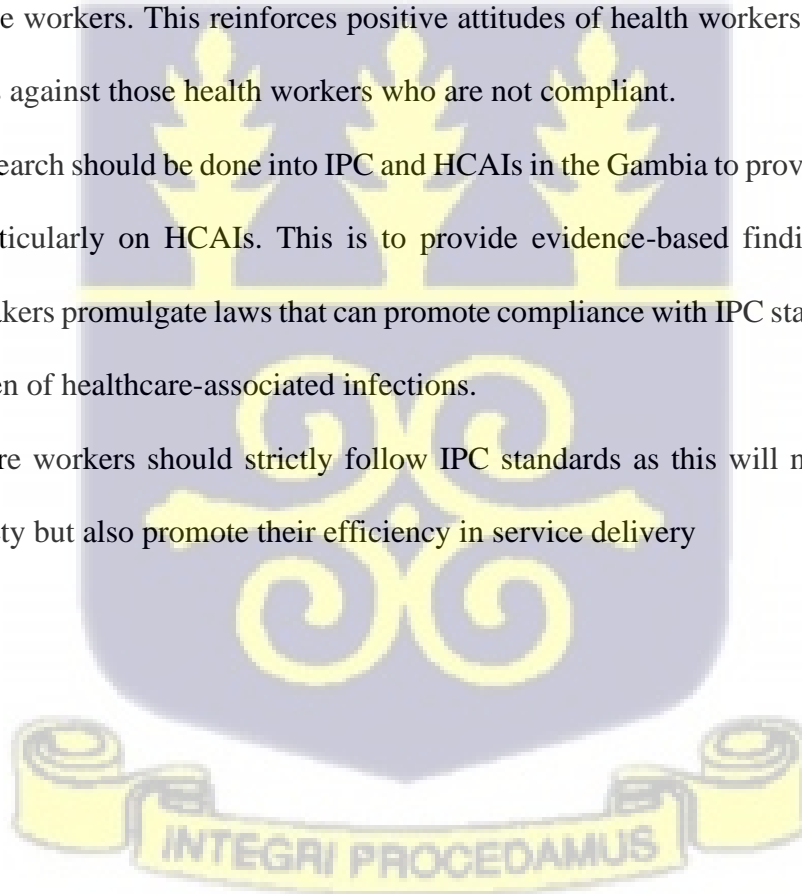
Furthermore, organizational level factors associated with compliance with infection prevention and control standards include accessibility of personal protective equipment and monitoring of IPC practice among staff by management. This indicated that for health workers to comply with IPC standards they must have access to personal protective equipment, and their IPC practice needs to be monitored by the management as this reinforces the positive attitudes and mitigate the negative attitude of health workers towards infection prevention and control practice.

More than 75% of the healthcare workers had adequate knowledge of IPC standards, but this high knowledge among the healthcare workers did not reflect in their compliance with IPC standards because more than half of the healthcare workers were not compliant.

6.2 Recommendation

Based on the findings of the study, the following recommendations were drawn.

1. The Ministry of Health should institute an IPC program that will target compliance with IPC standards among the entire healthcare workers in the country.
2. Ministry of Health should institutionalize the surveillance of HCAs to provide accurate and reliable data on HCAs. This will provide evidence-based data on the actual burden of healthcare-associated infection that can be utilized by future researchers in the area of IPC.
3. The management of health facilities should Regularly monitor IPC practice among healthcare workers. This reinforces positive attitudes of health workers and uses punitive measures against those health workers who are not compliant.
4. More research should be done into IPC and HCAs in the Gambia to provide evidencebased data, particularly on HCAs. This is to provide evidence-based findings that can help policymakers promulgate laws that can promote compliance with IPC standards and reduce the burden of healthcare-associated infections.
5. Healthcare workers should strictly follow IPC standards as this will not only guarantee their safety but also promote their efficiency in service delivery



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APPENDICES

Appendix I: participant information sheet

Research Title: Factors influencing compliance with infection prevention and control standards among healthcare workers in North Bank East Region the Gambia

SCC Number:

Background

Dear Participant,

I wish to invite you to participate in academic research involving healthcare workers in the North Bank East Region. My name is **Sheriffo MK Darboe**, a masters student at the School of Public Health, University of Ghana. As mentioned above, I am undertaking research on the above topic. The objective of this study is to assess the factors associated with compliance with infection prevention and control standards among healthcare workers in the North Bank East Region. The findings of this study will help to influence policy-makers decisions in promulgating regulations to promote compliance with infection prevention and control standards among health workers in the entire country. This research would form part of my work for the award of a Master of Philosophy degree (MPhil) in Epidemiology and Disease Control.

Methods

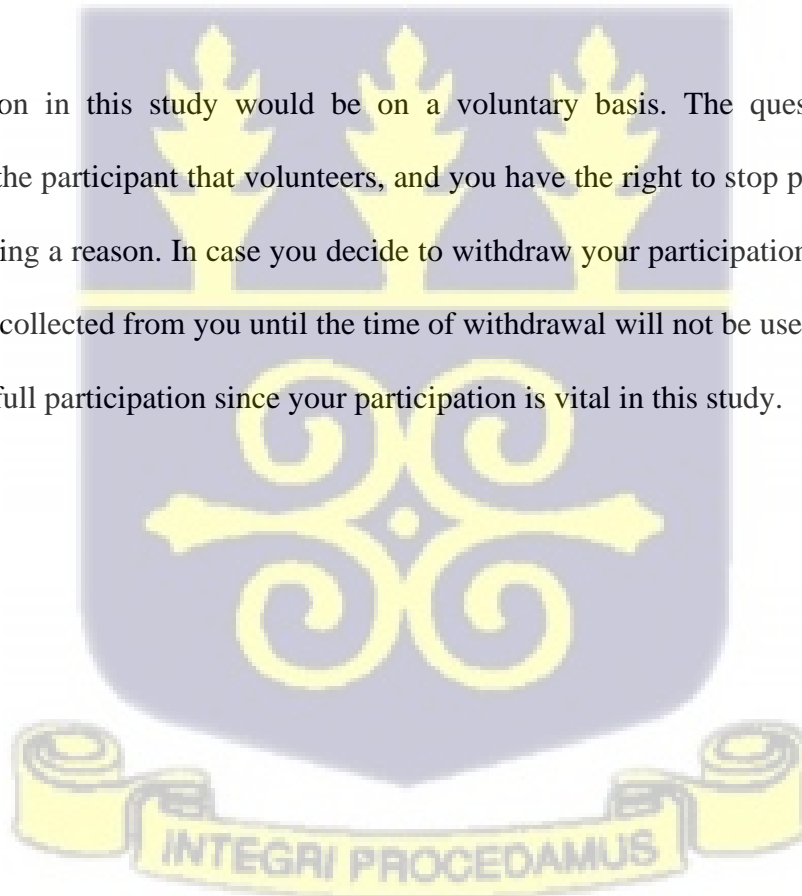
The study seeks to interview and collect demographic data, data related to IPC practice and Factors influencing the practice of IPC among HCWs. The data will be collected through face-to-face interviews of the participants. The participants will be informed about the purpose of the study before the start of the interview. A questionnaire regarding the factors that influence compliance with IPC will be administered, which will take approximately 25-30 minutes of your time. The information will be collected by the researcher or a research assistant.

Risks and Benefits

There is little or no harm in collecting the data. The information you provide will help the researcher understand factors that influence IPC compliance. The data you provide will also enable the researcher to determine the factors that affect compliance with IPC standards. Furthermore, the conduct of this study will significantly help policymakers and HCWs to better understand the factors that influence compliance with IPC standards among HCWs for better planning in terms of infection prevention and control in healthcare settings. The information you provide will be handled with confidentiality.

Right to refuse

Your participation in this study would be on a voluntary basis. The questionnaire will be administered to the participant that volunteers, and you have the right to stop participating at any time without giving a reason. In case you decide to withdraw your participation during the study, any information collected from you until the time of withdrawal will not be used. However, I will encourage your full participation since your participation is vital in this study.

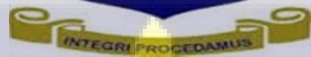


** Only required if the participant is unable to read or write.*

DEPARTMENT OF EPIDEMIOLOGY AND DISEASE CONTROL

SCHOOL OF PUBLIC HEALTH

UNIVERSITY OF GHANA



**FACTORS INFLUENCING COMPLIANCE WITH INFECTION WITH INFECTION
PREVENTION AND CONTROL STANDARDS AMONG HEALTHCARE WORKERS
IN NORTH BANK EAST REGION**

THE GAMBIA

SHERIFFO MK DARBOE

Appendix III: Questionnaire

QUESTIONNAIRE NO:

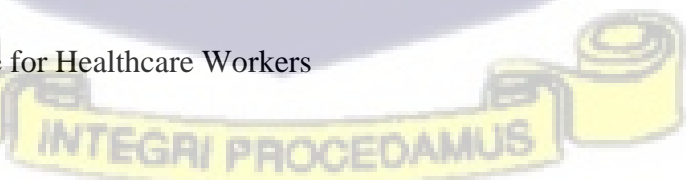
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NAME (OPTIONAL): _____

INTERVIEWER

Appendix I: Questionnaire for Healthcare Workers

Dear healthcare worker



I am Sheriffo MK Darboe, a Master of Philosophy (MPhil) student at the University of Ghana, I am carrying out research on Factors Influencing Compliance with IPC standards among healthcare workers in the North Bank region; I humbly request you to spare a portion of your precious

moments to participate in this study by answering a few questions. The responses you provide will be used only for the study and not anywhere else. Be assured that your responses will be treated confidentially, and in order to ensure this you may or may not write your name or the name of your institution anywhere in the questionnaire. What is required of you is simply to provide honest and adequate answers according to the instructions given in the questionnaire.

Thank you.

SECTION A

Healthcare workers general information

No	Question	Response	Code
Q1	Date of Survey		Q1date
Q2	Healthcare worker's ID		Q2id
Q3	Name of Region		Q3district

Sociodemographic characteristics

No	Question	Response	Code
This section captures data on the healthcare worker sociodemographic characteristics. Please tick in the box of your chosen response.			
Q4	What is your age (healthcare worker)	Q4age
Q5	What gender of the healthcare worker?	<input type="checkbox"/> Male 1 <input type="checkbox"/> Female 2	Q5gender
Q6	How long have you been working (Healthcare worker's experience)	Q6we
Q7	What is your highest-level education	<input type="checkbox"/> Did not attend school 1 <input type="checkbox"/> Primary 2 <input type="checkbox"/> Secondary 3 <input type="checkbox"/> Tertiary 4	Q7edu
Q8	What is your cadre?	<input type="checkbox"/> Doctor 1 <input type="checkbox"/> Nurse 2 <input type="checkbox"/> Public Health Officer 3 <input type="checkbox"/> Lab Personnel 4 <input type="checkbox"/> Others 5	Q8cadre

SECTION B: Individual Factors

No	Knowledge of infection prevention and control standards	Resp.	Code
Q9	Are you aware of the infection control and prevention practices?	<input type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q9kw

Instruction: Please indicate Strongly Agree (SA), Agree (A) Neutral (N), Disagree (D), Strongly Disagree (SD) with the following statement.
For this set of questions, consider how YOU felt about the statement.
Please select one answer for each question.

No	Statements	Code										
Q10	Gloves should be worn whenever there might be contact with blood and body fluids, mucous membranes, or non-intact skin. Strongly Agree Strongly Disagree	Q10kw										
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1		2	3	4	5						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
Q11	Gloves are not a substitute for hand washing Strongly Agree Strongly Disagree	Q11kw										
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1		2	3	4	5						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
Q12	Wearing gloves, mask, and protective eyewear are HCAs control measures Strongly Agree Strongly Disagree	Q12kw										
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1		2	3	4	5						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
Q13	HCWs' hands are a vehicle for transmission of pathogens in healthcare settings Strongly Agree Strongly Disagree	Q13kw										
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1		2	3	4	5						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
Q14	Hand hygiene measures reduce the risk of HCAs among patients. Strongly Agree Strongly Disagree	Q14kw										
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1		2	3	4	5						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								

Q15	Hands hygiene measures reduce the risk of HCAs among HCWs					Q15kw
	Strongly Agree		Strongly Disagree			
	1	2	3	4	5	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Q16	Hands hygiene after removing gloves is a control measure of HCAs.					Q16kw
	Strongly Agree		Strongly Disagree			
	1	2	3	4	5	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

No	Mandatory infection control training	Resp.	Code
Q17	Do you receive mandatory infection control training?	<input type="checkbox"/> Yes1 <input type="checkbox"/> No 2	Q17mt
Q18	If yes, how frequently?	<input type="checkbox"/> Monthly <input type="checkbox"/> Every six month <input type="checkbox"/> Yearly	Q18mt

Healthcare Workers practice of IP

Instruction: This section will look at healthcare workers' practices in terms of infection prevention and control standards; please indicate one that best applies to you			
No	Question	Resp.	Code
Q19	Which of the following describe your handwashing habit?	<input type="checkbox"/> Perform hand hygiene after handling the patient <input type="checkbox"/> perform hand hygiene; before handling the patient <input type="checkbox"/> perform hand hygiene before and after handling the patient. <input type="checkbox"/> Did not perform hand hygiene at all.	Q19hh
Q20	What do you use to perform hand hygiene (please tick all that applied)?	<input type="checkbox"/> Soap <input type="checkbox"/> Gels <input type="checkbox"/> Alcohol-based hand rub <input type="checkbox"/> Others specify	Q20hh

Instruction: Please think about the hand hygiene practice of HCWs. For each of the statements below, please indicate whether you; Strongly Agree (SA), Agree (A), Neutral (N) Disagree (D), Strongly Disagree (SD)

For this set of questions, consider how YOU felt about the statement.

Please select one answer for each question.

No	Statements	Code										
Q21	<p>HCWs nails should be kept short, clean and polished.</p> <p>Strongly Agree Strongly Disagree</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q21hh
1	2	3	4	5								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
Q22	<p>HCWs should avoid wearing of wristwatch and jewelry while on duty</p> <p>Strongly Agree Strongly Disagree</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q22hh
1	2	3	4	5								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
Q23	<p>Cuts and abrasions in the hands of HCWs should be covered with a waterproof dressing</p> <p>Strongly Agree Strongly Disagree</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q23hh
1	2	3	4	5								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
Q24	<p>HCWs hands should be dry properly to prevent recontamination.</p> <p>Strongly Agree Strongly Disagree</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q24hh
1	2	3	4	5								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
Q25	<p>HCW should change gloves before going to another patient</p> <p>Strongly Agree Strongly Disagree</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q25hh
1	2	3	4	5								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								

Instruction: Think about the use of personal protective equipment and indicate the appropriate answer for each question by ticking the appropriate box

No	Questions	Resp.	Code
----	-----------	-------	------

Q26	Do you use personal protective equipment every time you are on duty?	<input checked="" type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q26ppe
Q27	Are you supplied with personal protective equipment?	<input checked="" type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q27ppe
Q28	If yes, which of the following personal protective equipment are you supplied with? (Please tick all that applies)	<input type="checkbox"/> Gloves <input type="checkbox"/> Aprons <input type="checkbox"/> Masks <input type="checkbox"/> Goggles <input type="checkbox"/> Hats <input type="checkbox"/> Footwear <input type="checkbox"/> Others specify	Q28ppe
Q29	How do you dispose of the protective equipment after use?	<input type="checkbox"/> Burning <input type="checkbox"/> Burying <input type="checkbox"/> Dipping in pit latrine <input type="checkbox"/> Incineration <input type="checkbox"/> Dumping <input type="checkbox"/> Others specify	Q29ppe
Q30	Are you supplied with well color corded waste disposal containers within the health facility?	<input type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q30ppe

Compliance with infection prevention and control standards

Instruction: Think about HCWs compliance with IPC standards. For each statement below, please tick the appropriate box: Always, sometimes, or Never with the following statement related to healthcare workers' practices regarding infection control and prevention standards.					
No	Statement			Code	
Q31	I wash my hand with soap under running water	Always	Sometimes	Never	Q31ipc
		1	2	3	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Q32	On removal of glove, I wash my hand after contact with patient or body fluids Always sometimes Never	Q32ipc						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">1</td> <td style="width: 33%; text-align: center;">2</td> <td style="width: 33%; text-align: center;">3</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	1	2	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1	2	3						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Q33	In my unit all disposable PPEs are discarded after use Always Sometimes Never	Q33ipc						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">1</td> <td style="width: 33%; text-align: center;">2</td> <td style="width: 33%; text-align: center;">3</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	1	2	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1	2	3						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Q34	I use glove when handling body fluids Always Sometimes Never	Q34ipc						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">1</td> <td style="width: 33%; text-align: center;">2</td> <td style="width: 33%; text-align: center;">3</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	1	2	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1	2	3						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Q35	I wear goggle and mask to protect myself when handling casualties Always Sometimes Never	Q35ipc						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">1</td> <td style="width: 33%; text-align: center;">2</td> <td style="width: 33%; text-align: center;">3</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	1	2	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1	2	3						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Q36	I wear apron when performing my duties Always Sometimes Never	Q36ipc						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">1</td> <td style="width: 33%; text-align: center;">2</td> <td style="width: 33%; text-align: center;">3</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	1	2	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1	2	3						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Q37	I change gloves before attending to another patient Always Sometimes Never	Q37ipc						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">1</td> <td style="width: 33%; text-align: center;">2</td> <td style="width: 33%; text-align: center;">3</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	1	2	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1	2	3						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Q38	I wash my hands after attending each patient Always Sometimes Never	Q38ipc						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">1</td> <td style="width: 33%; text-align: center;">2</td> <td style="width: 33%; text-align: center;">3</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	1	2	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1	2	3						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						

Occupational hazards healthcare workers encounter when performing their duties.

Instruction: This section looks at the occupational hazards that HCWs encounter during the course of their work. Please tick the appropriate answer for each of the following questions related to occupational hazards			
No	Question	Response	Code
Q39	Have you been exposed to occupational health hazard while on duty?	<input type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q39oh

Q40	If yes, what is the frequency of exposure to these health hazards?	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely	Q40oh
Q41	What is the most common mode of occupational exposure?	<input type="checkbox"/> Contact with blood & body fluids <input type="checkbox"/> Droplet transmission <input type="checkbox"/> Airborne transmission <input type="checkbox"/> Percutaneous exposure <input type="checkbox"/> Others	Q41oh

SECTION C: Organizational Factors.

Instruction: This section looks at the availability facilities and materials; please indicate the appropriate answer for each of the following questions by ticking the appropriate box. Please select one answer for each question except **Q55** which require you to select all that applies.

No	Statement	Resp.	Code
Q42	There is a hand washing station with soap, running water and disposable towel/ tissue?	<input type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q42of
Q43	Does water supply consistent on daily basis?	<input type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q43of
Q44	Does the institution provide in-service training/ workshop related to IPC for staff?	<input type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q44of
Q45	Does IPC practice among staff is monitored by management?	<input type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q45of
Q46	Are there adequate supply of resources (sterile needles and syringes, gloves, sharp containers, disinfectants, hand sanitizers etc.) to work with in your facility?	<input type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q46of

Q47	Are Personal protective equipment always accessible?	<input type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q47of
Q48	Are you aware of the existence of infection prevention and control guidelines in your institution?	<input type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q48of
Q49	If yes, do you have access to the document?	<input type="checkbox"/> Yes 1 <input type="checkbox"/> No 2	Q49of
Q50	I am not able to follow IPC standard frequently due to; (please tick all that apply)	<input type="checkbox"/> High workload <input type="checkbox"/> Lack of experience <input type="checkbox"/> Lack of equipment <input type="checkbox"/> Lack of training <input type="checkbox"/> Uncomfortable equipment <input type="checkbox"/> Forgetfulness	Q50of

Appendix IV



UNIVERSITY OF THE GAMBIA



SCHOOL OF MEDICINE & ALLIED HEALTH SCIENCES
RESEARCH AND PUBLICATION COMMITTEE (RePublic)

15th July 2021

Mr. Sheriffo-MK Darboe
c/o Regional Health Directorate
North Bank East Region,
Farafenni

Dear Mr. Darboe,


**R021 039v2: "FACTORS INFLUENCING COMPLIANCE WITH INFECTION
PREVENTION AND CONTROL STANDARDS AMONG HEALTHCARE WORKERS IN
NORTH BANK EAST REGION."**

Thank you for resubmitting the above proposal for consideration by our committee. Many thanks for your responses to the queries raised by the members of the committee. I have gone through these and I'm satisfied with the responses given.

The rationale, questions, sampling methods and field survey are appropriate for the task.

With approval from RePublic, I will now forward the proposal to the Gambia Government/MRC Joint-Ethics Committee Chair for consideration.

Best wishes,

A circular blue stamp with the text "UNIVERSITY OF THE GAMBIA" and "SCHOOL OF MEDICINE & ALLIED HEALTH SCIENCES" around the perimeter. In the center, there is a signature and the date "22/7/21".
Professor Ramiou Njie MD PhD FRCP FWACP
Ag. Provost UTG SMAHS
Chair RePublic

P.O. Box 1646 Banjul; Tel: (00220) 4201407; Mob: 3650002; Email: ranjie@uto.edu.gm

INTEGRI PROCEDAMUS

DEPARTMENT OF EPIDEMIOLOGY AND DISEASE CONTROL
SCHOOL OF PUBLIC HEALTH
UNIVERSITY OF GHANA



18th March 2021

The Chief Executive Officer
Frafrafi General Hospital
Frafrafi
North Bank East Region

Ufs: Director of Health Services
The quadrangle
Banjul

Ufs: Program Coordinator
Epidemiology and Disease Control
Central Medical Store
Kotu

Dear Sir,

RE: SEEKING EDC PERMISSION.

I write requesting for your kind permission to allow me, to work with some of your staff and also collect data for my thesis work in your hospital on the topic: **Factors influencing compliance with infection prevention and control standards among healthcare workers in north bank,** while waiting for my approval letter from the school committee as that is against me.

I am a student currently undertaking an advance course in Field Epidemiology and at the same time doing MPhil in epidemiology and disease control at the University of Ghana. As part of my course requirements, I am here to conduct both my thesis and practical field experience works. I have worked as a public health officer for several years in the field and I think working with your staff will not only contribute to the development of the human capital stock, but also add lots of value to the quality of services delivery in the hospital for both the patients and the healthcare workers.

INTEGRI PROCEDAMUS

I will assure you that I will recognize and respect the policies and regulations during my stay. I therefore look forward to your kind consideration and assist.

Thank you.

Yours sincerely,



Sherville M.K. Darboe
University of Ghana

Cc: EDC Coordinator
R. Director, NHER
File

