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FACTORS INFLUENCING ADHERENCE TO HAND HYGIENE PRACTICES AMONG HEALTH CARE WORKERS AT AKATSI SOUTH DISTRICT HOSPITAL

BY

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DECLARATION

I, Micah Duke Boye hereby declare that this dissertation is my own work and that all literature used have been duly referenced. This study has not been submitted to any institution for the award of any certificate.

Signature:  Date: 6/04/2021

Duke Micah (Student)

Signature: …… Date: 6/04/2021

Dr. Reginald Quansah (Academic Supervisor)

DEDICATION

I dedicate this piece of work to my mother Veronica Mortey and staff of Akatsi South District Hospital.

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My gratitude is to the Almighty God for life and successful completion of Master of Public Health Programme. I am very grateful to Dr Reginald Quansah for guidance and supervision during this dissertation. I sincerely thank Mr. Hope Edem Kordorwu for his support. To all my research assistants and staff of Akatsi South District Hospital, thank you very much.

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LIST OF ABBREVIATIONS

AOR	Adjusted odds ratio
APIC	Association for Professionals in Infection Control
CDC	Centre for Disease Control
CI	Confidence interval
COR	Crude odds ratio
COVID-19	Coronavirus disease-19
GSS	Ghana Statistical Service
HAI	Healthcare acquired infections
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HCW	Health Care Worker
HCW	Healthcare workers
HH	Hand Hygiene
HIV	Human Immune Virus
ICU	Intensive Care Units
MDRO	Multi Drug Resistance Organisms
SP	Standard Precaution

UP	Universal Precaution
US	United States
WHA	World Health Alliance
WHO	World Health Organization

DEFINITION OF TERMS

- Hand hygiene: It is the practice of keeping the hands free from pathogens by washing with soap and water or using alcohol-based hand sanitizers whenever indicated and per the 5 moments of hand hygiene.
- Hand hygiene practice: A general term referring to any action of hand cleansing
- Hand hygiene adherence: The act of hand cleansing either by soap and water or alcohol hand sanitiser according to Ministry of Health protocol.
- Healthcare workers: All staff working in the hospital who give care to patient including Doctors, nurses, lab scientist, X-ray technician, unit helpers and cleaning attendants.

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ABSTRACT

Objectives: One of the most important measures to prevent healthcare-associated infections is Hand hygiene. The objective of this study was to determine hand hygiene adherence and factors that influence adherence to hand hygiene among healthcare workers in Akatsi South District hospital in the Volta region of Ghana.

Methodology: The study employed cross sectional design using census to assess all healthcare workers in the hospital. Direct observation of participants on hand hygiene practice was done without participants' prior knowledge, using an adopted hand hygiene checklist from the "National Policy and Guidelines for Infection Prevention and Control in Health Care Settings in Ghana". Sociodemographic factors, individual related factors, culture and religion as well as institutional factors were collected using structured questionnaire and examined against hand hygiene adherence. Bivariate analyses and binomial logistic regression were performed to determine factors associated with adherence to hand hygiene at 95% confidence interval. Variables with p-values less than 0.05 were considered statistically significantly related with hand hygiene adherence.

Results: 157 healthcare workers partook in the study. Hand hygiene adherence rate was 56.7% (95% CI: 48.6% – 64.6%). Having knowledge about hand hygiene and the method of hand hygiene performed by participants during the observation were predictors of hand hygiene adherence among healthcare workers in Akatsi South District hospital.

Conclusion: Regular in-service training on hand hygiene and provision of hand hygiene materials will encourage healthcare workers to perform hand hygiene appropriately.

CHAPTER ONE

INTRODUCTION

1.1 Background

Globally, hand hygiene (HH) has been recognised as the leading and cost-effective means of preventing cross-transmission of microorganisms (World Health Organisation, 2009). It is very beneficial in reversing the impact of healthcare associated infections (HAI) that leads to protracted periods of stay in hospital, life-long impairment with sickness and increased antimicrobial resistance, as well as increased extra economic costs to the sick and their families (Allegranzi et al., 2011). The adoption of hand hygiene as the number one cornerstone to publicise the Global Patient Safety Challenge of the WHO World Alliance (WHA) for Patient Safety shows its significance in the patient safety agenda (World Health Organisation, 2009). Studies have demonstrated that, hand hygiene practices among healthcare workers have improved the safety of patients, minimised cost and ensured healthy environment for work, however adherence to standardised hand hygiene practice in many healthcare settings globally, is a major challenge (Erasmus et al., 2010).

According to the World Health Organisation (WHO), many patients tend to acquire infections during provision of care in healthcare settings. Globally, millions of people seeking healthcare are affected by these acquired infections which results in many preventable deaths and loss of money to health systems (Allegranzi et al., 2011). Among admitted patients in hospitals, as many as 7 out of every 100 patients in developed countries and 10 out of every 100 patients in developing countries were reported to be

infected with at least one hospital acquired infections (Allegranzi et al., 2011). In the developed countries, 5% to 15% of patients admitted to regular wards and 50% or more patients admitted to intensive care units (ICUs) were infected with hospital acquired infections (Salama et al., 2013).

So as to minimize the occurrence of diseases and other infections among healthcare workers and patients, the United State (US) Centre for Disease Control (CDC) published a document in 1983 that recommended that healthcare workers should take precautions when caring for patients who were known or presumed to be infected with pathogens which are blood-borne (Haque et al., 2018). They subsequently brought about the idea of Universal Precautions (UPs) whereby with or without prior knowledge of patient's infection status, the Universal precautions should be routinely used (Haque et al., 2018). Universal precautions are a number of precautions which have been drafted to prevent transmission pathogens of blood-borne origin including human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) to and or from healthcare workers when caring for all patients irrespective of patient's infection status (Esu et al., 2019; World Health Organisation, 2009).

The CDC in 1996 added the universal precautions in a new prevention concept called standard precautions. These are the least infection prevention practices that apply to all patient care, with or without prior knowledge of presumed or confirmed infection status of the patient in any setting where healthcare is delivered (Haque et al., 2018). These precautions are drafted to protect the healthcare workers, patients and their relatives from transmission of infections to each other. It is very necessary for all healthcare workers to

observe these precautions when caring for patients as part of a consistent measure for control of infections in settings where healthcare is delivered(Haque et al., 2018).

Standard precautions (SP) require that healthcare workers presuppose that either blood or body substances of patients are potential sources of infection, irrespective of the diagnosis, or presupposed infectious status (World Health Organisation, 2009). Hand washing as well as the use of protective clothing and properly disposing wastes are examples of the standard precautions (World Health Organisation, 2009).

Compliance with standard precautions especially hand hygiene by healthcare workers has been seen as a profitable way to prevent and control pathogen infections and HAIs among health care workers (Nuvials et al., 2015). Hand hygiene compliance has been defined as performing hand hygiene during an indication per recommended guideline (Olena et al., 2017) while adherence to hand hygiene has been explained as the act of hand cleansing either by soap and water or alcohol hand rub in accordance with a laid down procedure (hand hygiene protocol) (World Health Organisation, 2009). This study sought to identify factors that influence adherence to hand hygiene practices among health workers in Akatsi South District hospital.

1.2 Problem Statement

The hands of the healthcare workers (HCWs) are the most common source of transmission of micro-organisms from patient to patient, from one part of the patient's body to another, and from a polluted environment to patients. Therefore, practice of hand hygiene is the easiest and most efficient policy to prevent and control HAIs and the spread of multi-drug resistance organisms (MDRO) in healthcare settings (Huskins et al., 2011).

There has been an evidence-based guideline development by the WHO on hand hygiene in healthcare to strengthen the help given to healthcare facilities to enhance HH and thus minimize HAI (World Health Organisation, 2009). In spite of this, several research works have found that the adherence to hand hygiene among healthcare workers is undesirably low, especially in developing countries (Olena et al., 2017). It has been of a greater challenge to the WHO in implementing guidelines for hand hygiene in healthcare facilities.

In Ghana, there is a standard precaution guideline that is to support and improve healthcare workers knowledge and practice on hand hygiene (Ministry of Health et al., 2015). **According to the Volta Regional Health Directorate Holistic Checklist for Hospital Peer Review, all healthcare workers are expected to wash their hands according to hand hygiene guidelines developed by the "National Policy and Guidelines for Infection Prevention and Control in Health Care Settings**" (Ministry of Health et al., 2015; Volta Regional Health Directorate, 2019). In the recent regional peer review conducted in Akatsi South District hospital, only 33% of the staff were able to wash their hands according hand hygiene protocols (Volta Regional Health Directorate, 2019).

It has been of a greater challenge to the WHO in implementing guidelines for hand hygiene in healthcare facilities. The foremost stride to implementing a comprehensive HH programme is to identify and evaluate the prevalence of hand hygiene adherence, knowledge on hand washing and people's perception as well as basic tools to carry out the practice within the healthcare organization (World Health Organisation, 2009). **However, no such studies have been conducted in Akatsi South District Hospital, though a study was conducted in the two northern region of Ghana (Labi et al., 2019)**. This study therefore sought to determine factors that influence adherence to hand hygiene practice

among healthcare workers at Akatsi South District Hospital in the Volta region of Ghana based on the "National Policy and Guidelines for Infection Prevention and Control in Health Care Settings".

1.3 Justification/Significance

The benefits of washing hands in the health care set up have been clearly demonstrated by many studies. Despite this, achieving and sustaining acceptable hand hygiene adherence rates among healthcare workers remains a major challenge (Esu et al., 2019). Additionally, fewer studies have been conducted in resource poor settings, with respect to hand hygiene adherence by healthcare workers (Amissah et al., 2016). In addition to exploring what has being done, surveillance has been determined as one of the factors of significance that influences adherence to hand hygiene practices. This is because health workers know their practices as well as its impact are being observed with or without their knowledge (Alshehari et al., 2018).

A better understanding of the reasoning behind healthcare workers' behaviour related to hand hygiene provides a better understanding as to what influences hand hygiene adherence rates and why the rates are low. This enables formulation of a more comprehensive framework from which interventions that are developed have better chances of being successful in effecting change among healthcare workers.

1.4 General Objectives

To assess factors influencing adherence to hand hygiene practices among healthcare workers at Akatsi South District hospital.

1.5 Specific Objectives

1. To estimate proportion of healthcare workers who adhered to hand hygiene practices.
2. **To determine individual-related factors influencing adherence to hand hygiene practice according to national protocol.**
3. To examine the association between sociodemographic factors and adherence to hand hygiene practices.
4. To examine the relationship between institutional factors and hand hygiene and adherence.
5. To assess the relationship between culture and religion and adherence to hand hygiene practices among healthcare workers.

1.7 Conceptual Framework

Theoretically, conceptual framework describes the foundational perspectives and ideas that are related to the study. Frameworks play vital roles in guiding the study process through the description of concepts and theories that explain why the research problem being studied existed (Adom et al., 2018).

Studies have identified sociodemographic factors, individual related factors, culture and religion and institutional factors as some factors identified in literature to influence adherence to hand hygiene among health workers (Kalata et al., 2013; Olena et al., 2017; Sethi et al., 2012). **For instance sustaining education and provision of resources for hand hygiene practices improve adherence to hand hygiene among healthcare workers (Labi et al., 2019).**

Socio-demographic factors include age, sex, educational level, occupation, duration of service, grade and income. Individual related factors include knowledge on hand hygiene, ever trained on hand hygiene, healthcare worker attitude and behaviour towards hand hygiene. Institutional factors also include availability of hand hygiene protocols and availability of hand hygiene facilities (such as soap, running water, towel for hand drying etc.). These factors are shown in the pictorial diagram in Figure 1 below.

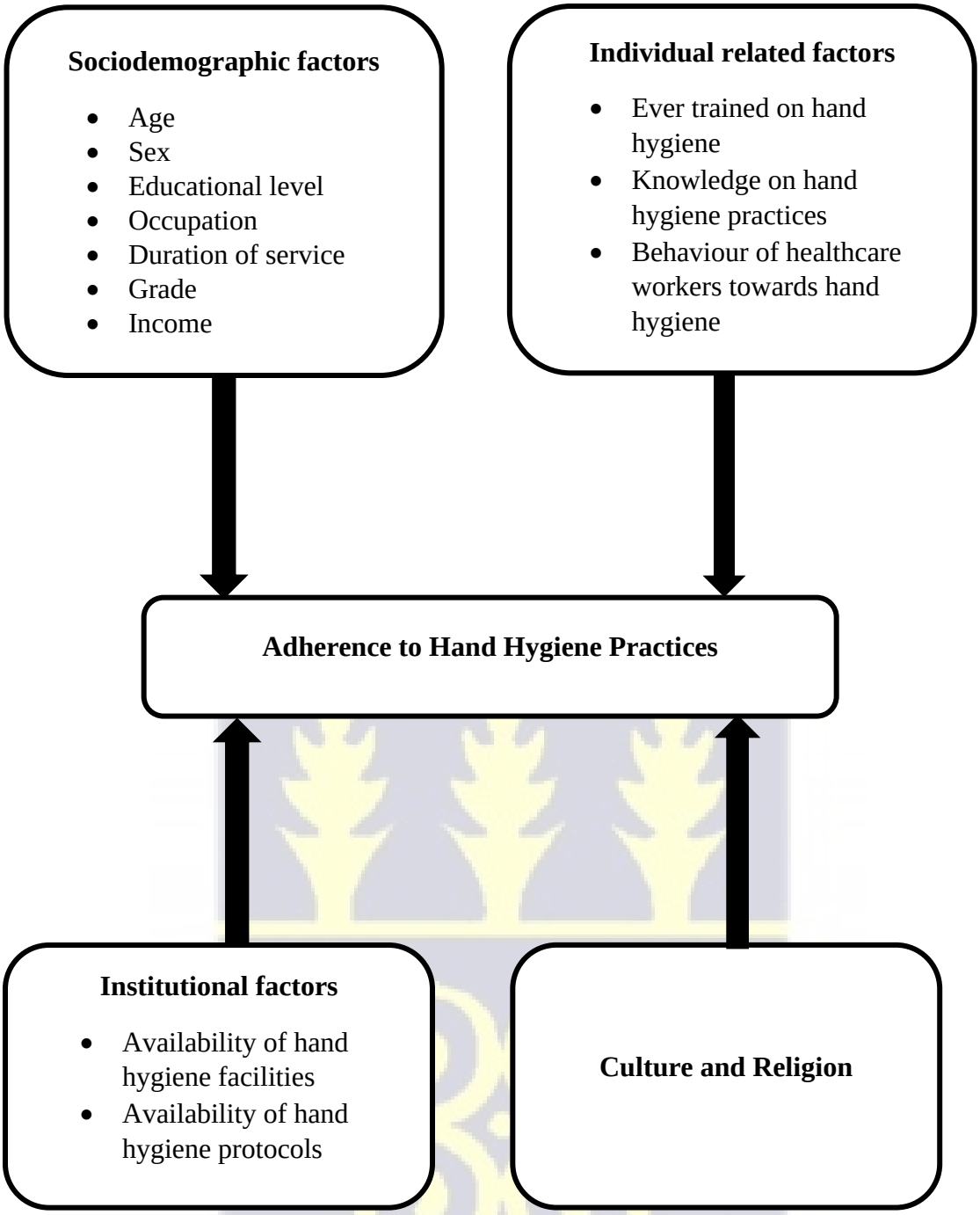

Figure 1: Conceptual Framework on Factors Influencing Adherence to Hand Hygiene Practice

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

The literature review chapter gives a synopsis of hand hygiene practices and challenges healthcare workers face. The literature review was conducted searching for information from different of sources. The discussion of the literature focussed on adherence to hand hygiene practices among healthcare workers globally, regionally, nationally and current practices in hospitals.

2.2 History of hand hygiene

Handwashing has been a pillar of personal hygiene and religious and cultural custom for several years. However, the linkage between handwashing and health was first made less than two centuries ago where even in 1940s school children were seen washing their hands before eating lunch (Ekwere & Okafor, 2013). The father of hand hygiene is Ignaz Semmelweis, a Hungarian doctor who during his practice in Vienna General Hospital made striking observations that lead to the discovery of hand hygiene (washing) (Kadar et al., 2018). In 1846, Ignaz identified that women who were birthing in the maternity ward run by medical students and doctors were more prone to develop puerperal fever and die in comparison to those women who were birthing in the maternity ward run by midwives (Kadar et al., 2018). He decided to explore, seeking variations between the two wards. He recognized that doctors and medical students usually visited the maternity ward right after performing an autopsy on cadavers. Based on this observation, he came up a theory that those performing autopsies got ‘cadaverous particles’ on their hands, which they then carried from the autopsy room into the maternity ward. Midwives did not conduct surgery

or autopsies, so they do not carry these particles on their hands. As a result, Semmelweis instituted a new rule making it compulsory for all doctors to wash their hands with chlorine (Kadar et al., 2018). After imposing a strict policy of handwashing with a chlorinated antiseptic solution, mortality rates reduced from 7.8% to 1.8% within 3 months, showing that transfer of the disease can be significantly reduced by this simple hygienic practice of hand washing. (Kadar et al., 2018). This was the first evidence that handwashing could prevent infection (Blevins & Bronze, 2010). However, the introduction of the new concept of hand washing was not common at the time. The doctors became angry at Semmelweis and stopped performing the hand washing because they felt he was blaming them for the cause of death of women since everyone believed during those period that water was rather the possible cause. Semmelweis did his best to convince the doctors to wash their hands since it was beneficial to reducing mortality rates in the European hospitals but his colleagues and other doctors did not heed to his advice (Kadar et al., 2018).

In Scutari, Italy, some few years later, a new champion for hand washing came on the scene during the Crimean War in the person of Florence Nightingale (Mitchell et al., 2017). During such era, many believed the cause of infections were as a result of obscene (foul) odours referred to as miasmas, but Florence Nightingale ensured the practice of hand hygiene was real and practicable during the war with water and soap in the hospital she nursed the wounded soldiers (Mitchell et al., 2017). Although the main aim of these practices was to fight the miasmas, Nightingale's handwashing practices helped reduced infections (Mitchell et al., 2017).

Unfortunately, promotion of hand washing did not see the light of day over a century since many did not accept the findings and practice of Semmelweis and Nightingale. In the

1980s, there were series of disease outbreaks from food and healthcare infections causing panic in the public. This led to the Centre for Disease Control and Prevention in the United States acknowledging that washing hands was so important and relevant to breaking the disease transmission. The CDC, therefore championed the first ever internationally approved endorsement of guidelines to support appropriate hand washing practices for healthcare workers and all people, followed by many more guidelines (Mitchell et al., 2017).

2.3 Hand Hygiene Practices

Continually, the human hands have contact with the environment every now and then. The hand is also one part of the body that constantly communicates with the rest of the body by scratching and it is used in eating (Srigley et al., 2014). Hand hygiene involves two main actions including washing hands using running water and soap and the rubbing of hands with effective alcohol containing antiseptics, to reduce the growth of temporarily resident bacteria on the hands (Ngugi et al., 2019).

The first national guidelines for hand hygiene were published in the 1980's. However, in 1995 and 1996, it was recommended that when entering and leaving all rooms where patients were kept, hands should be cleansed with either waterless antiseptic agents or antimicrobial soap to minimise the effect of organisms causing drug resistance among patients (Mitchell et al., 2017; World Health Organisation, 2009).

Standards are relevant in maintaining a consistent lifestyle, therefore hand hygiene among other practices has certain action that need to be maintained. Recommendations were made in 1961 by United States of America's public health service, which states that personnel should wash their hands with soap and water for 1–2 minutes before and after patient

contact (Ngugi et al., 2019). It was believed that rinsing the hand using alcohol containing antiseptic agent was ineffective compared to washing hands with soap and water, so alcohol hand rubs were endorsed to be used only in urgent situations or at working areas where sinks for hand hygiene were not available (Görig et al., 2019; Mitchell et al., 2017). In 1988 and 1995,the Association for Professionals in Infection Control (APIC) published guidelines similar to those of the CDC which included the discussion of alcohol-based hand sanitizers and backed their usage in more clinical settings than had been recommended earlier (Boyce & Pittet, 2002).

To promote the safety of patients globally, washing of hands was explicitly identified as the best possible action recognised in the agenda for patient safety (Rynga et al., 2017). Studies emphasized that decreasing the rate of HAI was dependent on a several influences but it was very important to pay attention to procedures and activities carried out by healthcare workers including washing of hands (Haruna, 2013). The World Health Organization as part of its world alliance for patient safety in 2005, introduced the first Global Patient Safety Challenge "Clean Care is Safer Care". Advanced draft guidelines on "Hand Hygiene in Health Care" was out doored and tools developed for implementation were tested in 2006 (Sax et al., 2009). Five Moments for hand hygiene was developed from the WHO guidelines on hand hygiene in healthcare to add value to any hand hygiene improvement strategy (Rynga et al., 2017).

Many people generally do not cleanse their hands when the hands are used for activities that requires washing such as after using the toilet. (Azor-Martinez et al., 2020). Some studies believed that lack of basic equipment for washing hands account for the people not washing their hands even when they feel like (Rabbi & Dey, 2013). In Ghana huge sum

of money about 250 million US dollars is lost due to poor sanitation and diarrheal illnesses (Mireku-Gyimah et al., 2018). Recently some improvements have been achieved in the area of providing access to safe and clean water in many communities in Ghana, but there are still reports of oral-faecal contamination of foods leading to diarrhoeal diseases, which is the ripple effect of poor sanitation and hand hygiene among the people (Oppong et al., 2019). The hand has been recognised to play a major role in transfer of microbes especially among young children in Ghana (Oppong et al., 2019).

The focus of hand hygiene adherence campaigns in healthcare institutions is mainly hand hygiene practices because of the benefits derived from washing hands like reducing hospital acquired infections. Though there are wide spread gastrointestinal conditions arousing from dirt and poor sanitation in the country, more priority has not been given to effective washing of hands according to laid down protocols within healthcare settings (Mireku-Gyimah et al., 2018).

2.4 Adherence to Hand Hygiene Practices

Hand hygiene is a simple and basic infection control measure. However, adherence to the World Health Organization (WHO)'s Five Moments for Hand Hygiene is generally lower in healthcare settings(Alp et al., 2014). Several studies indicate the need to adhere to hand hygiene practices especially in healthcare settings. To collect hand hygiene adherence data, It is recommended by WHO for an anonymous observer secretly record the actions of healthcare workers (Suchomel et al., 2020).

A study conducted at Queen Elizabeth Central Hospital Malawi, Blantyre to investigate adherence to hand hygiene protocols by clinicians and medical students, clinicians were discovered to have disinfected their hands more often than medical students but adherence

to hand hygiene practices was low among the two group. Generally, hand hygiene adherence was 23% (Kalata et al., 2013). Similarly in a study to evaluate the effectiveness of infection control program in adult intensive care units, hand hygiene adherence was seen to have risen from 30.5% in 2004 to 43.5% by 2010 (Alp et al., 2014). This adherence was also judged as low among healthcare workers. During a pilot study of an open-source application for mobile devices and an interactive analytical dashboard for the collection and visualization of healthcare workers' hand hygiene adherence data, the overall, hand hygiene adherence rose from 32.4% to 57.4% before and after the intervention respectively (Lenglet et al., 2019).

In Ghana hand hygiene adherence rose from 67% to 92% overall during interventions to reduce neonatal sepsis at the neonatal intensive unit of the Greater Accra Regional hospital (Kallam et al., 2018). **Also, hand hygiene adherence improved significantly from 28.8% at baseline through 51.7% at midline to 67.9% at end line among healthcare workers in two Northern districts of Ghana (Labi et al., 2019).**

Also in improving hand hygiene adherence in hospital, following interventions such observation and reporting, administrative support education and training, recruiting hand hygiene champions and maintenance of hand hygiene supplies and reminders, the overall adherence to hand hygiene practices by healthcare workers increased significantly from 39.8% to 64.9% for medical doctors and from 68.2% to 80.2% for nurses but overall adherence increased from 58.8% to 73.2% for all healthcare workers (Abdo & Al-Fadhli, 2018).

Compliance to hand hygiene has been defined as the number of hand hygiene actions performed by the total number of hand hygiene opportunities (Salama et al., 2013). In a

study where hand hygiene compliance was measured by directly observing healthcare workers using observation forms during patient care, healthcare workers' overall compliance to hand hygiene increased from 42.9% to 61.4% basically due to recommendations on hand hygiene adherence (Salama et al., 2013).

2.5 Factors associated with adherence to hand hygiene

Factors influencing adherence to hand hygiene are numerous. Different studies made varied classifications of the multiple factors that affect adherence to hand hygiene. Observational and interventional studies conducted to improve hand hygiene practices have identified many reasons for non-adherence to hand hygiene protocols among healthcare workers (Alp & Damani, 2015). Mathur in his study classified the various factors/reasons into three main groups including healthcare staff related factors, clinical factors, environmental, institutional, behavioural and others (Mathur, 2011). This review will look at the factors generally.

Factors identified influencing hand hygiene adherence in a study that looked at healthcare-associated infections in intensive care units, included in being a nurse or doctor, place of work within the hospital, work shifts, use of gloves and gowns, activities performed posing high risk of cross-transmission and having many opportunities for hand hygiene per hour of patient care (Alp & Damani, 2015; Salama et al., 2013). Other studies identified hand hygiene adherence to the WHO's five moments to be generally lower in ICUs than in other clinics due to the heavy workload (Alp et al., 2014). Hand hygiene adherence is also low and associated with poor hand hygiene facilities (such as poor water supply, inadequate alcohol hand sanitisers and lack of sinks), inadequate training, healthcare worker attitude

towards hand hygiene, poor staffing and inadequate infection control measures in low and middle income countries (LMICs) (Alp et al., 2014).

A study conducted in Blantyre, Malawi which looks at hand hygiene adherence showed that a major contributing factor to hand hygiene adherence were forgetfulness and negligence, which were worsened by inadequate knowledge of the recommended hand hygiene technique and low staff strength in the hospital. (Kalata et al., 2013). In a project named "Activation of patients, persons in need of care and care givers for a Hygiene-conscious participation in Infection control (AHOI)", where patients were active participants on infection control and prevention adherence to hand hygiene was correlated with active involvement of patients (Görig et al., 2019).

In another study conducted in Ghana, using collaborating systems outline to improve hand hygiene practice in a tertiary hospital, hand hygiene adherence was greater for clinical procedures in comparison to routine care. For instance there was 100% adherence to hand hygiene when staff were observed providing bag and mask ventilation, however during change of diaper only 53% of staff adhered to hand hygiene protocol (Kallam et al., 2018). It was also noted that those who worked at night shifts had lower adherence rates (Kallam et al., 2018). A similar study conducted in Ghana in a Teaching hospital in showed that hand hygiene adherence was hindered by heavy patient load, forgetfulness, inadequate water, non-availability of clean hand drying towels and lack of hand air dryer. However participants' professional status and knowledge on hand hygiene were statistically significantly correlation to hand hygiene adherence (Amissah et al., 2016).

Hand hygiene compliance was noted to have increased significantly among healthcare workers especially nurses after the implementation of interventions such as observation

and reporting, education and training, administrative support recruiting champions, and maintenance of hand hygiene supplies and workplace reminders on hand hygiene (Abdo & Al-Fadhli, 2018). Other studies identified that inadequate knowledge on guidelines for hand hygiene, inability to recognize hand hygiene opportunities during patient care, and lack of awareness of the risk of cross-transmission of pathogens are barriers to good hand hygiene practices (Chou et al., 2012). Tenna and his colleagues reported that lack of hand hygiene agents (77%), sinks (30%), and proper training (50%) as well as irritation and dryness (67%) caused by hand sanitizer were some barriers to adhering to hand hygiene (Tenna et al., 2013).

Another study that explored the knowledge, attitude and practice on hand hygiene among healthcare workers in healthcare settings revealed that the main barriers to hand hygiene were related to being overworked, lack of resources and inadequate training on the same ((Diwan et al., 2016). A cross-sectional study among healthcare workers on hand hygiene practices in the newborn unit of a tertiary referral hospital in Kenya showed that inadequate supplies, forgetfulness and use of gloves were the major setbacks that impact on adhering to hand hygiene practices (Ngugi et al., 2019).

2.6 Sociodemographic factors influencing adherence to hand hygiene practices

WHO guidelines for hand hygiene in healthcare identifies the grade and category of healthcare workers to be associated with hand hygiene adherence. Certain professional category of healthcare staff including paramedics such as physiotherapists, and clinical staff like medical officer and nurses were critical to observing adherence to hand hygiene practice (World Health Organisation, 2009). A study where professional culture change was discussed to improve infection control practices, nurses were reported to easily

understand and practice hand hygiene than doctors when using the five moments for hand hygiene. Doctors usually avoid these opportunities to wash their hands appropriately, citing more urgent and important commitments as reasons for poor adherence to hand hygiene (Gilbert, 2014).

2.7 Knowledge on hand hygiene among healthcare workers

Hand hygiene knowledge assessed among healthcare workers trained on hand hygiene revealed that all 19 staff scored more than the 70% with 11 staff scoring 100%, 5 staff scored 90% and 3 staff scored 80% (Kallam et al., 2018). Another study also revealed that 51.2% participants had fair knowledge on hand hygiene practices (Amissah et al., 2016). In India where participants' attitude, knowledge and practice were assessed, a score greater than 75% was considered good knowledge, 50-74% was considered as moderate knowledge and less than 50% was considered as poor knowledge on hand hygiene. Majority, 90.9% (250 out of 275) participants had moderate knowledge (Ravichandran et al., 2019). Tenna and his colleagues identified in their study, that knowledge on infection control which include hand hygiene was good (more than 90% correct) (Tenna et al., 2013).

Another study on the knowledge and practices of hand hygiene among healthcare providers in a tertiary hospital, South West of Nigeria found that doctors had poor knowledge on hand hygiene than nurses (Ekwere & Okafor, 2013). Some studies believed that because doctors hold significant positions in hospitals, this tend to affect their behaviour, attitudes and practices towards hand hygiene which unreasonably further influence hand hygiene practice among other health workers (Hwang et al., 2019; Smiddy et al., 2015).

2.8 Behaviour associated with hand hygiene adherence

Pittet in his review of hand hygiene from research to action recognised that washing of hands is the main pillar of preventing and controlling infection and when adhered to, it reduces healthcare-associated infections and minimises the spread and antimicrobial resistance (Pittet, 2017). Poor adherence to hand hygiene practices remains a problem for healthcare providers all over the world mainly due to behavioural challenges towards the practice (Pires et al., 2017).

A number of factors such as biology, culture, environment and education influence one's behaviour. Some factors mentioned earlier effect on one's behaviour than others (Pittet, 2017). Many scientists and psychologists employed various means to understand behaviours. Some used cognitive variables such as perception, knowledge and intentions, to understand the driving force behind various behaviours. It was argued out that healthcare workers behaviour in relation to hand hygiene were not appropriately analysed using various behavioural theories and that is what is accounting for poor understanding of healthcare workers attitude and poor behaviour towards adhering to hand hygiene. Additionally, it was argued that the using one behavioural theory was inadequate to comprehending how behaviours affect adherence (Karaoglu et al., 2010)

Erkan and his colleagues conducted a survey in which hand hygiene behaviour and knowledge of nurses were examined before and after training. They discovered that training increases knowledge of hand hygiene among nurses, their frequency and time spent washing hands and the quality of hand hygiene practiced (Erkan et al., 2011).

Another group did a study to assess factors that determined behaviours leading to hand hygiene adherence in the intensive care units. The main conclusions were that having

knowledge on hand hygiene guidelines does not translate into practicing hand washing. Also, nurses who had poor attitude, undesirable social influence and low self-esteem were identified not to observed the appropriate steps in washing their hands but they had the prerequisite knowledge on how to wash the hands (De Wandel et al., 2010) . In Pakistan, another study revealed that less than 50% healthcare workers had positive attitude towards washing their hands meaning majority were unable to demonstrate appropriate washing of hands (Salama et al., 2013). To complicate matters, when people were not observed by senior colleagues to wash their hands in the clinical settings, they were likely not to practice hand hygiene at all (Jones et al., 2017).

Another interesting study showed that chances of healthcare workers washing their hands was higher if they were reminded or when they knew someone was observing them than when they were left alone and expected to carry out the procedure as expected (Gluck et al., 2010). A study that looked into the factors influencing hand hygiene practice amongst occupational therapy students indicate that introducing practical educational and role modelling on hand hygiene practices in student's curriculum, improved students' hand hygiene behaviour, practices and knowledge (Wall & Smiddy, 2017).

2.9 Culture/Religion and Hand Hygiene Practices

Culture and religion are inherent and play a major role in people's behaviour towards standards and protocols in the healthcare setting. However, multifaceted relationship between religion, culture, and health, in particular hand hygiene practices among healthcare workers has not been deeply explored, though few studies report some findings on the effect of religion and culture on hand hygiene practices (Allegranzi et al., 2009; Zhang & Ma, 2018). The WHO recognises that guidelines are interpreted differently in

different regions and cultures due to people's beliefs and cultural practices since religion or faith and medicine are entangled. Culture and religious beliefs usually inspire people's health behaviour (Sax et al., 2009; WHO, 2009).

In evaluating hand hygiene methods in some cultures, it has been realised that religion and culture contribute to hand hygiene adherence according to deep-seated beliefs or available resources. For example, in the Hindu culture, hands are rubbed vigorously with ash or mud and then rinsed with water. The faith behind this practice is that soap should not be used as it contains animal fat. If water is not available, other substances such as sand are used to rub the hands. In a scientific study performed in Bangladesh to assess faecal coliform counts from post-cleansing hand samples, hand cleansing with mud and ash was demonstrated to be as efficient as with soap (WHO, 2009).

Religion promotes the wellbeing of people in a community through demonstration of positivity in everything they do. Healthcare workers who are religious engage in positive actions that promote health and wellbeing of staff and patients. Some of these positive actions include washing of hands and adhering to protective measures that forestall the spread of infections between patients and healthcare providers (Allegranzi et al., 2009).

In Islamic religion, the use of alcohol is a taboo, therefore among staunch Muslims who are healthcare workers, preference will be given to washing hands with water and soap compared to the use of alcohol hand rubs (Edmonds-Wilson et al., 2015). During a hospital-based survey conducted on hand hygiene in Ghana, the writers also identified socio-cultural factors as the main reasons for non-adherence to washing hand appropriately (Abruquah & Lambon, 2014).

2.10 Institutional factors and hand hygiene adherence

The WHO evidence-based guidelines on hand hygiene suggests that to make hand hygiene better among healthcare workers, it is imperative to conduct baseline evaluation of hand hygiene infrastructure/facilities within any healthcare setting (Bharara et al., 2020). These infrastructures include clean running water, carbolic soap or liquid soap, soap dispensers, sink for hand hygiene, clean towels for hand drying or air hand dryer, alcohol hand rub/sanitiser, basin for used towels or dustbins for used tissues. These structural factors influence hand hygiene since the structure of the healthcare setting affect how healthcare workers behave (Bharara et al., 2020).

In a study to assess the feasibility and effectiveness of the WHO's hand hygiene improvement strategy in a low income African countries, severe deficiencies were identified in hand hygiene infrastructure prior to project interventions (Allegranzi et al., 2010). A study conducted during Ebola crises to investigate hand hygiene practices reported that hand hygiene practices were not adequately implemented in some hospitals, which explains why identified microbes were not totally removed; rather, new ones were acquired after hand hygiene practices. The impediments to appropriate implementation of hand hygiene practices identified were lack of hand hygiene materials, poor infrastructure, and behavioural orientation (Ibeneme et al., 2017). In a multicentre prospective observational study conducted using WHO's hand hygiene observation tool in obstetric and gastrointestinal surgery through six public hospitals in Benin, hand hygiene adherence was low due to absence of permanent hand hygiene infrastructures such as sink, soap, towels and clean water (Yehouenou et al., 2020). A group of researchers also identified that the lack of guidelines, inadequate hand hygiene resources and poor attitude towards

hand hygiene among healthcare workers contributed to poor hand hygiene adherence (Alp & Damani, 2015).

Additionally, it was identified in Nigeria that the absence of infection prevention machinery were the main factors promoting healthcare workers' inability to adhere to universal precaution in infection prevention precautions (Amoran & Onwube, 2013). In Ghana it was also identified that poor and lacking hand hygiene infrastructure including inadequate alcohol hand sanitisers and liquid soap dispensers contributed to healthcare workers' non-adherence to hand hygiene practices in many settings within a teaching hospital (Yawson & Hesse, 2013).

2.11 Conclusion

This literature review identified what has been done elsewhere especially concerning the history of hand hygiene, adherence to hand hygiene and factors influencing adherence to hand hygiene among healthcare workers.

This review of literature demonstrated that hand hygiene is influenced by multiple factors even in the midst of many interventions available to close the gap. However, since hand hygiene is the most cost-effective intervention to reduce nosocomial infections and reduce drug resistance, it is imperative to study and identify hand hygiene gaps in healthcare settings. Notwithstanding, existing studies identified some factors that influence adherence to hand hygiene practices among healthcare workers in Ghana. However, not many studies on factors influencing hand hygiene practices among healthcare workers in Ghana have been conducted. Also, the few studies seen in literature were conducted in other regions to the best of my knowledge. It is, therefore, essential to conduct similar study at Akatsi South District hospital in the Volta region of Ghana among groups of health care workers.

CHAPTER THREE

METHODOLOGY

3.1 Study Design

The study was cross-sectional design based in a hospital conducted between May and June, 2020 among healthcare workers at Akatsi South District Hospital in the volta region of Ghana.

3.2 Study Area

The study was conducted in Akatsi South District Hospital within Akatsi South District. Akatsi South District is one of the 25 districts in the Volta Region. Akatsi is located between latitudes 6º S 7º N and longitudes 0º W 1º E. It shares boundary with Keta Municipal toward the south, Ketu North District toward the East, South Tongu District toward the west and Akatsi North District toward the north. It has a total landmark of 536 square kilometres. Akatsi South District has a total population of 98,684 (GSS; GHS; ICF International, 2015). Two thirds of the district reside in the rural areas. Figure 1 below depicts health facilities within the district.

The Akatsi South District Hospital is located at Kpotame along the Akatsi-Tadzewu road. It was built as a Dental Clinic in 1992 by the Social Security and National Insurance Trust (SSNIT) and was handed over to the Ministry of Health in 1994 as a Health Centre. The Health Centre was upgraded to the status of a District Hospital in the year 2006. The hospital provide 24-hour services and operates 75 bed capacity. Services provided during the study period included outpatient and inpatient care, obstetric and gynaecological care, surgical care, ophthalmic care, pharmacy services as well as public health services. They

also provided mental health care and diagnostic services such as; x-ray and ultrasound scans. Averagely, yearly outpatient attendance stood at 40,146 patients.

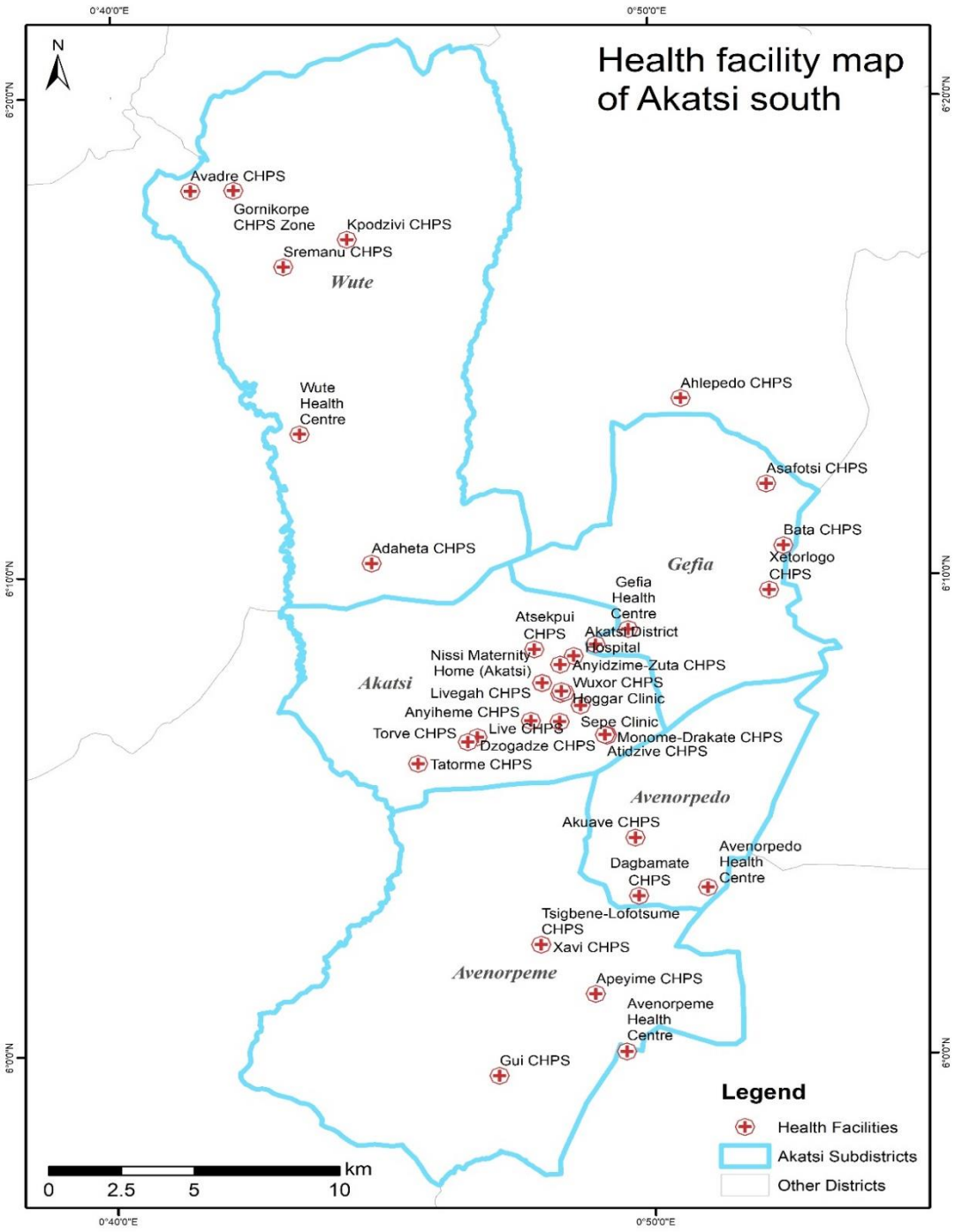

Figure 2: Map of Akatsi South District Showing the Health Facility 2017

3.3 Study Population

The population for this study was healthcare workers (e.g., such as Medical officers, Nurses, Midwives, Medical laboratory scientist and their assistants, Pharmacist and Dispensary Assistants, Anaesthetist, Nutrition officers and Dentist/Dental technicians) in Akatsi South District hospital.

3.4 Study Variables

The dependent variable

was adherence to hand hygiene practice. Hand hygiene adherence was defined as performing at least 80% of the steps (14 out of the 17 steps for hand washing with soap and 10 out of the 12 steps for alcohol hand rub) involved in hand hygiene protocol (Appendix 3).

Independent variables

included sociodemographic characteristics such as age in years, sex, educational level, category of profession (Medical officer, Nurse, Midwife, Laboratory Technician, Dispensary Assistants etc.) grade (junior staff, senior staff, principal, chief, specialist) and income level. Individual related factors include knowledge on hand hygiene, ever trained on hand hygiene and healthcare worker attitude and behaviour towards hand hygiene (the way they conduct themselves). Institutional factors also include availability of hand hygiene protocols (hand hygiene checklist) and availability of hand hygiene facilities (such as sinks, soap, running water, towel for hand drying etc.) other independent variables include culture (taboos) and Religion (Christianity or Islam).

3.5 Sample Size and Sampling Methods

The total number healthcare workers in the hospital (nominal roll) were 203 healthcare staff during the period of the study. All those who met the inclusion criteria were recruited for this study. Participants were observed as they work and perform hand hygiene without their knowledge and then structured questionnaire was administered to additional collect data.

3.6 Inclusion criteria

All healthcare workers available within the study period, who were involved in patient care and consented to the study were involved in the study.

3.7 Exclusion criteria

Healthcare workers who were on leave, health administration and those who did not consent to the study were excluded from the study.

3.8 Data Collection Methods and Instrument

The data collection was in two phases: interview with a questionnaire and an observation

Observation

The study employed single-arm observation technique where all participants were observed performing hand hygiene either with the use of soap under running water or with alcohol hand rub one time. This observation was done independently by well-trained research assistants without participants' prior knowledge. The study adopted hand hygiene checklist (using soap and water and alcohol hand rub/sanitisers to perform hand hygiene) from the Ghana, National Policy and Guidelines for Infection Prevention and Control in Health Care Settings (Ministry of Health et al., 2015). The adopted checklist (see appendix 3) was used to score hand hygiene adherence of each participant. Each step was scored 1

point. Total score was converted into percentage score. Hand hygiene adherence was defined as performing at least 80% of steps involved in the hand hygiene checklist.

Interview

Participants were then approached respectfully and purpose of the study explained to them. Those who consented, were provided a structured questionnaire (see appendix 4) to complete. The structured questionnaire sought information on sociodemographic characteristics such as age, sex, level of education, income level, profession and grade.

Participants' knowledge on hand hygiene was assessed using the 8 parameters. These included the WHO five moments of hand hygiene and other self-generated questions. The WHO five moments which were washing hands before performing clean or aseptic procedure, washing hands immediately after exposure to body fluids, washing hands before touching a patient, washing hands after touching a patient and washing hands after touching patient's environment were each scored 1 point. The self-directed questions asked about appropriate times to wash hands and were rated on a scale of 1 to 4, where 1 was the least answer and 4 was the best answer. These questions include:

- "When caring for patients in non-isolation rooms"
- "When contact period with patient is less than 2 minutes"
- "When there is low risk of acquiring infection from patients"
- "When caring for patients recovering from clean or clean contaminated surgery in post-anaesthesia care unit"
- "When there are staff shortages"
- "When performing activities with high risk of cross-transmission"

- "When there are opportunities for hand hygiene per hour of patient care"

The score obtained from the WHO five moments were added to the scores obtained from the self-directed questions giving an expected total score of 33 [i.e., 5+(4*7)]. Knowledge scores obtained by participants were converted to percentage scores and categorised as poor knowledge (below 50%), moderate knowledge (50%-74%) and good knowledge (75-100%). Knowledge score was then category.

Other variables included culture and religion, number of hand hygiene facilities, appropriate time to wash hands and the availability of MOH hand hygiene protocols etc.

On each working day between the morning hours from 8am to 3pm, six (6) well trained research assistants were stationed in various units to observe healthcare staff wash their hands without their knowledge. Thereafter, research assistants administered the structured questionnaires on factors influencing hand hygiene adherence among healthcare workers to those who consented to the study. The same procedure was repeated in all units/wards each working day until all staff had performed hand hygiene and responded to the questionnaires administered.

3.10 Data Processing and Analyses

Data was entered into IBM SPSS Statistics 23 for data cleaning and coding. Data was exported to Stata 16 for analyses. Microsoft Excel 2019 was used for graphs. Participants' knowledge on hand hygiene was assessed using the 8 parameters. These included the WHO five moments of hand hygiene and other self-generated questions.

The WHO five moments which were washing hands before performing clean or aseptic procedure, washing hands immediately after exposure to body fluids, washing hands before

touching a patient, washing hands after touching a patient and washing hands after touching patient's environment were each scored 1 point. The self-directed questions asked about appropriate times to wash hands and were rated on a scale of 1 to 4, where 1 was the least answer and 4 was the best answer, the score obtained from the WHO five moments were added to the scores obtained from the self-directed questions giving an expected total score of 33 [i.e., 5+(4*7)]. Knowledge scores obtained by participants were converted to percentage scores and categorised as poor knowledge (below 50%), moderate knowledge (50%-74%) and good knowledge (75-100%).

Sociodemographic variables were presented using frequencies tables. Test of independence were conducted using Pearson Chi square test for independence and fishers exact where one of the four cells of the contingency table had less than 5 observations. All variables that were statistically significant from the test of independence were included in a binomial logistic regression to determine associated factors influencing hand hygiene practice. Variables with p-values less than 0.05 at 95% confidence interval (CI) were considered factors influencing hand hygiene practice.

3.12 Quality Control

Six (6) research assistants with adequate knowledge on the topic of study were recruited and trained from February 10-14th, 2020 at Akatsi South District Hospital on the use of observational hand hygiene checklists and self-developed questionnaire in data collection. They were trained on how to do direct observation without participants' awareness, how to approach participants and communicate clearly the purpose of the study to them. To ensure data collection accuracy, the principal investigator trained and supervised research assistants throughout the study period.

The observational hand hygiene checklist was adopted from the National Policy and Guideline for Infection Prevention and Control in Health Care Setting (Ministry of Health et al. 2015). The structured self-developed questionnaire was edited by my supervisor to ensure accuracy of the tools. The observational hand hygiene checklist and structured questionnaire for hand hygiene adherence assessment and data collection respectively were pre-tested at Sacred-Heart Catholic Hospital, Abor from March 16-20th, 2020. Twenty-five (25) healthcare workers of various category were randomly observed without their prior knowledge, then the structured questionnaire was administered to them. This was done to test the efficiency, reliability, and validity of the data collection tools and to test respondents understanding of the various questions. Changes were made to the questions to answer the objectives of the study.

3.13 Ethical Considerations /Issues

Ethical clearance was received from Ghana Health Services Ethical Review Committee Board numbered GHS-ERC 049/02/20. Official permission was sought and obtained from the Management of the both hospitals (Sacred Heart Catholic Hospital, Abort and Akatsi South District Hospital, Akatsi).

All information on the study were provided to participants individually and their written consent was obtained prior to administering the questionnaires to them. Where participants declined to participate in the study, they were allowed to opt out freely. Confidentiality and anonymity were maintained, and participation was entirely voluntary.

Data collected were coded and kept confidential by the principal investigator. Data were password protected and backed up for safe keeping. Data will be destroyed after 3 years.

The study was solely funded by the principal investigator and there was no conflict of interest.

CHAPTER FOUR

RESULTS

4.1 Sociodemographic characteristics of participants

All participants were between the ages of 24 and 45 years with a mean age of 32 ± 4 years. Most health workers, 52.9% participants were aged between 30-35 years. There were 67.5% females than males (32.5%) who participated in the study. Overall, 72.6% healthcare workers had post-secondary or diploma education at either Nursing and Midwifery Training College or Polytechnic as their highest level of education. Majority participants were nurses (67.5%), junior staff (47.8%) and clinical staff (96.8%). Most respondents were from surgical ward and majority earned between 1000 – 1900gh as net monthly income, shown in Table 1.

Table 1: Sociodemographic characteristic of participants

Variable	Frequency	Percentage
Age		
24-29 years	40	25.48
30-35 years	83	52.87
36-41 years	24	15.29
42 years and above	10	6.37
Sex		
Male	51	32.48
Female	106	67.52
Educational Status		
Postgraduate	12	7.64
Undergraduate	31	19.75
Diploma	114	72.61
Grade		
Junior staff	75	47.77
Senior staff	55	35.03
Principal	22	14.01
Chief	4	2.55
Specialist	1	0.64

Table 1 Continued

Variable	Frequency	Percentage
Professions		
Medical	6	3.82
Nursing	106	67.52
Midwifery	31	19.57
Laboratory Technicians	4	2.55
Dispensary Assistants	6	3.82
Anaesthetist	1	0.64
Nutrition Officer	2	1.27
Dental Technician	1	0.64
Years of Service in Health		
Less than 1 year	21	13.38
1-5 years	68	43.31
6-10 years	47	29.94
11-15 years	19	12.10
16 years and above	2	1.27
Years of Service in Current Hospital		
Less than 1 year	35	22.29
1-5 years	62	39.49
6-10 years	43	27.39
11-15 years	16	10.19
16 years and above	1	0.64
Monthly Salary		
Less than 1000GHC	11	7.01
1000-1900GHC	61	38.85
2000-2900GHC	54	34.39
3000-3900GHC	21	13.38
4000GHC and above	10	6.37
Role		
Clinical	152	96.82
Public health	5	3.18
Working Units		
Medical ward	23	14.65
Surgical Ward	33	21.02
Maternity ward	31	19.75
Paediatric Ward	25	15.92
Psychiatric ward	17	10.83
Public health unit	5	3.18
Laboratory	4	2.55
Pharmacy	6	3.82
Outpatient department	9	5.73
Specialised Units	4	2.55

4.2 Adherence to Hand hygiene practices among healthcare workers

The median hand hygiene score obtained by participants was 82.4% (interquartile range: 66.7%-88.2%). All participants were observed when they cleansed their hands. While 63.1% healthcare workers were seen washing their hands under running water with soap, 36.9% were seen performing alcohol hand rub. Among participants 56.7% (95% CI: 48.6% – 64.6%) representing 90 individuals adhered to hand hygiene practice. Hand hygiene adherence rates among those who used soap and water was higher (63.6%) compared with using alcohol hand rub (44.8%) as shown in figure 3.

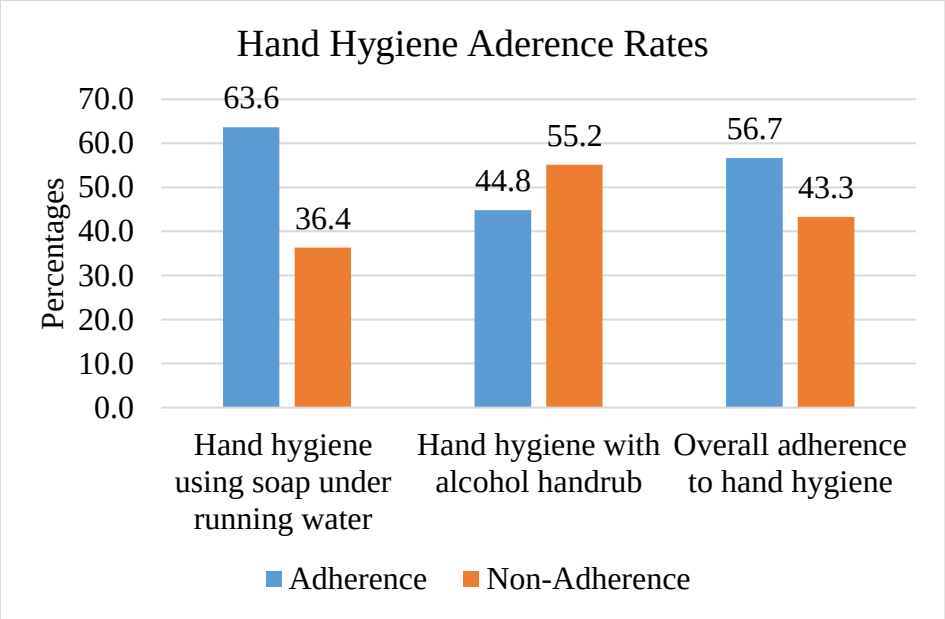

Figure 3: Hand Hygiene Adherence Rates among Health Workers

Also, hand hygiene adherence rate was higher among Nurses than other professionals in the study. Among those who adhered, 64.0% were Nurses, 19.1% were Midwives, 5.6% were Doctors, 5.6% were Dispensary assistants, while the rests were Nutrition officers (2.3%), laboratory technicians (1.1%).

4.3 Hand hygiene practices among participants

The adopted hand hygiene checklist used for this study revealed that more than 80 % of participants were able to perform 11 steps appropriately out of the 17 steps involved in hand hygiene using soap and water. Notable among the steps were that only 63.6% of participants who washed their hands with soap and water discarded single-use hand drying material in an appropriate receptacle or waste bin after washing their hands. Also, only 18% healthcare workers closed tap after wetting their hands when they used taps were not hand-operated but elbow operated and turned-on tap to rinse their hands. Among those who washed their hands using alcohol hand rub, only 34.5% continued applying the alcohol till their hands were dried up. It is most effective when dry. Table 2 explains the distribution of the steps involved in hand hygiene using soap and water by the number of participants who were observed washing their hands. Table 3 depicts the steps of hand hygiene using alcohol hand by participants.

Table 2: Steps in Hand Hygiene Using Soap and Water by participants

Steps in Hand Hygiene Using Soap and Water	Frequency	Percentage
Turn on or open the tap.	99	100
Wet hands. Avoid splashing clothes or other parts of the body.	97	97.98
Dispense soap	96	96.97
Evenly spread soap over palms and dorsum of hands.	84	84.85
Rub hands palm- to- palm using a circular motion.	79	80.61
Rub hands with the right palm over the left dorsum with interlaced fingers and vice versa.	78	78.79
Interlace fingers with palms facing each other and rub the webs of the fingers.	81	81.82
Cup hands together to massage/rub the back of the fingers of the right hand and vice versa.	82	82.83
Rub the tips of fingers of the right hand in the left palm in a circular manner and vice versa.	79	79.8
Clasp the left thumb in the right palm with the thumb of the right hand on the dorsum of the left thumb and rotationally rub the left thumb and vice versa.	75	75.76
Wash the wrists in a rotational manner.	86	86.87
Rinse hands thoroughly with running water	75	75.76
Pick single-use hand drying material.	78	78.79
Dry hands thoroughly with the single-use hand drying material	83	83.84
Use the used single -use hand drying material to turn off the faucet of the tap.	75	75.76
Discard the single- use hand drying material in an appropriate receptacle or waste bin.	63	63.64
Close tap after wetting hand if tap is not hand-operated and turn on or open tap and rinse hands if tap is not hand-operated.	18	18.18

Table 3: Steps in Hand Hygiene Using alcohol hand rub by participants

Hand Hygiene Using Alcohol-Based Hand Rub	Frequency	Percentage
Cup dominant hand (scoop hand)	51	87.93
Dispense 3 to 5mls of alcohol hand rub into the cupped hand.	55	94.83
Insert and rotate fingers of the other hand in the alcohol hand rub.	46	79.31
Tip the alcohol rub into the palm of the second hand.	43	74.14
Insert and rotate fingers of the dominant hand in the alcohol hand rub.	50	86.21
Apply palm-to-palm using a circular rubbing motion.	45	77.59
Apply to the dorsum of left hand by rubbing the right palm over the left dorsum with interlaced fingers and vice versa.	45	77.59
Interlace fingers with palms facing each other and apply to the webs of the fingers.	42	72.41
Cup hands together and rub to apply to the back of the fingers of right hand and vice versa	43	74.14
Clasp the left thumb in the right palm with the thumb of the right hand on the dorsum of the left thumb and rotationally rub to apply to the left thumb and vice versa.	40	68.97
Apply to wrists by rubbing in a rotational manner.	40	68.97
Continue applying the alcohol till the hands dry up. It is most effective when dry.	20	34.48

4.4 Individual related characteristics of participants

Individual related factors assessed were whether participants were ever trained on hand hygiene, their knowledge level on hand hygiene and some behavioural response towards hand hygiene. Among participants, 96.8% confirmed they were ever trained on hand hygiene in the hospital, however, only 79.6% had good knowledge on hand hygiene. Among participants 66.4% of nurses were more knowledgeable than midwives (21.6%) and medical officers (4.8%).

With regards to participants behaviour towards hand hygiene, 85.4% disagreed that hand hygiene interferes healthcare worker-patient relationship, 93.6% disagreed that wearing gloves replaces hand hygiene, 80.9% also disagreed that completing a task was more

important than hand hygiene while 86.6% also disagreed that performing hand hygiene causes interruption in patient care. Among participants, while 86.6% use water and soap to routinely wash their hands and 84.7% routinely wah their hands with alcohol hand rubs/sanitisers. On the reasons for not washing hands, only 2.6% of the participants do not wash their hands because their environment was clean, 8.9% participant do not also wash their hands because they cared for minor cases in their wards/ unit while 12.8% were uncomfortable with the place designated for hand hygiene. Majority (94.8%) of the healthcare workers affirmed they knew the implications of not washing hands. Individual related factors are presented in Table 4 below.

Table 4: Individual related characteristic

Variables	Frequency	Percentage
Ever trained on hand hygiene		
No	5	3.18
Yes	152	96.82
Knowledge on hand hygiene		
Poor knowledge	1	0.64
Moderate knowledge	31	19.75
Good knowledge	125	79.62
Hand hygiene interferes healthcare worker-patient relationship		
Agree	23	14.65
Disagree	134	85.35
Wearing gloves replaces hand hygiene		
Agree	10	6.37
Disagree	147	93.63
Task completion important than hand hygiene		
Agree	30	19.11
Disagree	127	80.89
Hand hygiene cause interruption in patient care		
Agree	21	13.38
Disagree	136	86.62
Routinely wash hands with soap and water		
No	21	13.38
Yes	136	86.62

Table 4 continued

Variables	Frequency	Percentage
Routinely use alcohol – based hand rub		
No	24	15.29
Yes	133	84.71
No Hand hygiene due to clean hospital environment		
No	153	97.45
Yes	4	2.55
No hand hygiene because I care for minor cases		
No	143	91.08
Yes	14	8.92
Uncomfortable with place for hand hygiene		
No	136	87.18
Yes	20	12.82
Understands implications of not washing hand		
No	8	5.16
Yes	147	94.84

4.6 Culture and religion toward hand hygiene

Findings from the study showed that, majority (99.4%) of the participants did not have any cultural or religious dictates that had influence on their hand hygiene practice in the hospital. None of the participants confirmed that they only washed their hands when going to pray or their religion only permitted them to wash their hands after visiting and using the washroom. Less than 1% of the participants confirmed a taboo as barrier towards hand hygiene as shown in Table 6.

Table 6: Culture and religious beliefs toward Hand Hygiene

Culture and religion factors	Yes	No
Culture or religion has influence on hand hygiene practice	1(0.64)	156(99.36)
It is a taboo to use the same hand washing tool with other persons	1(0.64)	156(99.36)
I only wash my hands in this facility when I am going to pray	0(0.00)	157(100)
My religion only permits me to observe hand hygiene practice after visiting the wash room	0(0.00)	157(100)

4.7 Institutional factors

Among institutional factors were availability of hand hygiene facilities and protocol for hand hygiene. More than half (57.4%) of participants said there were few hand hygiene facilities in the hospital but 98% confirmed that the standardised hand hygiene protocol was available in the hospital. Details shown in Table 7 below. **Additionally, it was observed that there was standardised protocol for hand hygiene but the hospital is less equipped with hand washing facilities.**

Table 7: Institutional factors

Variables	Frequency	Percentage
Number of hand hygiene facilities in the hospital		
Few	89	57.42
Many	66	42.58
Availability of hand hygiene protocol		
Not Available	3	1.99
Available	148	98.01

4.8 Test of independence.

Pearson chi square test for independence was performed to determine statistically significant relationship between all sociodemographic factors, knowledge factors and behavioural factors and hand hygiene practice. Chi square results with p-values less than 0.05 were considered statistically significant.

4.8.1 Sociodemographic factors and hand hygiene adherence

None of the sociodemographic factors (including age, sex, educational level, profession, income level, years of service and working area) were related to hand hygiene practices ($p>0.05$) as shown in Table 8.

Table 8: Sociodemographic factors and hand hygiene adherence

Variable	Non-Adherence n (%)	Adherence n (%)	Total n (%)	χ^2	P-value
Age				1.67	0.644
24-29 yrs	18(45.00)	22(55.00)	40(25.48)		
30-35 yrs	33(39.76)	50(60.24)	83(52.87)		
36-41 yrs	13(54.17)	11(45.83)	24(15.29)		
42 yrs and above	4(50.00)	6(60.00)	10(6.37)		
Sex				0.10	0.754
Male	23(45.10)	28(54.90)	51(32.48)		
Female	45(42.45)	61(57.55)	106(67.52)		
Educational Status				0.25	0.884
Postgraduate	6(50.00)	6(50.00)	12(7.64)		
Undergraduate	13(41.94)	18(58.06)	31(19.75)		
Diploma	49(42.98)	65(57.02)	114(72.61)		
Professions				8.57	0.313
Medical	1(16.67)	5(83.33)	6(3.82)		
Nursing	49(46.23)	57(53.77)	106(67.52)		
Midwifery	14(45.16)	17(54.84)	31(19.75)		
Laboratory Technicians	3(75.00)	1(25.00)	4(2.55)		
Dispensary Assistants	1(16.67)	5(83.33)	6(3.82)		
Anaesthetist	0(0.00)	1(100.00)	1(0.64)		
Nutrition Officer	0(0.00)	2(100.00)	2(1.27)		
Dental Technician	0(0.00)	1(100.00)	1(0.64)		
Grade				4.30	0.370
Junior staff	29(38.67)	46(61.33)	75(47.77)		
Senior staff	25(45.45)	30(54.55)	55(35.03)		
Principal	13(59.09)	9(40.91)	22(14.01)		
Chief	1(25.00)	3(75.00)	4(2.55)		
Specialist	0(0.00)	1(100.00)	1(0.64)		

Table 8 Continued

Variable	Non-Adherence n (%)	Adherence n (%)	Total	χ^2	P-value
Years of Service in Health				3.69	0.418
Less than 1 year	9(42.86)	12(57.14)	21(13.38)		
1-5 years	28(41.18)	40(58.82)	68(43.31)		
6-10 years	18(38.30)	29(61.70)	47(29.94)		
11-15 years	12(63.16)	7(36.84)	19(12.10)		
16 years and above	1(50.00)	1(50.00)	2(1.27)		
Years of Service in Current Hospital				5.19	0.252
Less than 1 year	14(40.00)	21(60.00)	35(22.29)		
1-5 years	28(45.16)	34(54.84)	62(39.49)		
6-10 years	15(34.88)	28(65.12)	43(27.39)		
11-15 years	10(62.50)	6(37.50)	16(10.19)		
16 years and above	1(100.00)	0(0.00)	1(0.64)		
Monthly Salary				6.36	0.174
Less than 1000GHC	3(27.27)	8(72.73)	11(7.01)		
1000-1900GHC	26(42.62)	35(57.38)	61(38.85)		
2000-2900GHC	24(44.44)	30(55.56)	54(34.39)		
3000-3900GHC	13(61.90)	8(38.10)	21(13.38)		
4000GHC and above	2(20.00)	8(80.00)	10(6.37)		
Area of practice				2.83	0.092
Clinical care	64(42.11)	88(57.89)	152(96.82)		
Public health	4(80.00)	1(20.00)	5(3.18)		
Working Units				11.43	0.272
Medical ward	10(43.48)	13(56.52)	23(14.65)		
Surgical Ward	14(42.42)	19(57.58)	33(21.02)		
Maternity ward	14(45.16)	17(54.84)	31(19.75)		
Paediatric Ward	14(56.00)	11(44.00)	25(15.92)		
Psychiatric ward	4(23.53)	13(76.47)	17(10.83)		
Public health unit	4(80.00)	1(20.00)	5(3.18)		
Laboratory	3(75.00)	1(25.00)	4(2.55)		
Pharmacy	1(16.67)	5(83.33)	6(3.82)		
Outpatient department	3(33.33)	6(66.67)	9(5.73)		
Specialised Units	1(25.00)	3(75.00)	4(2.55)		

4.8.2 Individual related factors and adherence to hand hygiene

There was statistically significant association between hand hygiene adherence and ever being trained on hand hygiene [$\chi^2(1,157) = 6.76$, $p=0.009$] as well as knowledge on hand hygiene [$\chi^2(1,157) = 5.95$, $p=0.026$]. Also, not washing hands due to clean hospital environment was statistically related with adherence to hand hygiene [$\chi^2(1,157) = 5.37$, $p=0.020$].

All other variables examined on individual related factors were not statistically significantly related with adherence to hand hygiene at the bivariate analyses ($p<0.05$) as shown in Table 9 below.

Table 9: Individual related factors and hand hygiene adherence

Variable	Non-Adherence n (%)	Adherence n (%)	Total	χ^2	P-value
Ever trained on hand hygiene				**6.76**	**0.009**
No	5(100.00)	0(0.00)	5(3.18)		
Yes	63(41.45)	89(58.55)	152(96.82)		
Knowledge on hand hygiene				5.95	0.026
Good knowledge	59(47.20)	66(52.80)	125(79.62)		
Moderate knowledge	8(25.81)	23(74.19)	31(19.75)		
Poor knowledge	1(100.00)	0(0.00)	1(100.00)		
Hand hygiene interferes with nurse-patient relationship				0.00	0.986
Agree	10(43.48)	13(56.52)	23(14.65)		
Disagree	58(43.28)	76(56.72)	134(85.35)		
Wearing gloves replaces hand hygiene				0.05	0.827
Agree	4(40.00)	6(60.00)	10(6.73)		
Disagree	64(43.54)	83(56.46)	147(93.63)		
Task completion important than hand hygiene				0.17	0.680
Agree	14(46.67)	16(53.33)	30(19.11)		
Disagree	54(42.52)	73(57.48)	127(80.89)		
Hand hygiene cause interruption in patient care				2.15	0.143
Agree	6(28.57)	15(71.43)	21(13.38)		
Disagree	62(45.59)	74(54.41)	136(86.62		

Table 9: Individual related factors and hand hygiene adherence continued

Variable	Non-Adherence n (%)	Adherence n (%)	Total	χ^2	P-value
Routinely wash hands with soap and water				0.18	0.669
No	10(47.62)	11(52.38)	21(13.38)		
Yes	58(42.65)	78(57.35)	136(86.62)		
Routinely use alcohol – based hand rub				1.15	0.284
No	8(33.33)	16(66.67)	24(15.29)		
Yes	60(45.11)	73(54.89)	133(84.71)		
No hand hygiene due to clean hospital environment				5.37	**0.020**
No	64(41.83)	89(58.17)	153(97.45)		
Yes	4(100.00)	0(0.00)	4(2.55)		
No hand hygiene because I care for minor cases				0.36	0.548
No	63(44.06)	89(55.94)	143(91.08)		
Yes	5(35.71)	9(64.29)	14(8.92)		
Uncomfortable with place for hand hygiene				1.36	0.244
No	56(41.18)	80(58.82)	136(87.18)		
Yes	11(55.00)	9(45.00)	20(12.82)		
Understands implications of not washing hand				1.14	0.285
No	2(25.00)	6(75.00)	8(5.16)		
Yes	65(44.22)	82(55.78)	147(94.84)		

4.8.3 Culture and religion and adherence to hand hygiene

There was no relationship between cultural and religion variables examined with adherence to hand hygiene ($p>0.05$) as shown in Table 10 below.

Table 10: Culture and religion and adherence to hand hygiene

Variable	Non-Adherence n (%)	Adherence n (%)	Total	χ^2	P-value
Culture and religion have influence on hand hygiene				0.77	0.381
No	68(43.59)	88(56.41)	156(99.36)		
Yes	0(0.00)	1(100.00)	1(0.64)		
Taboo to use same hand washing facilities with others				1.32	0.251
No	67(42.95)	89(57.05)	156(99.36)		
Yes	1(100.00)	0(0.00)	1(0.64)		

4.8.4 Institutional factors and adherence to hand hygiene

Factors examined at the institutional level were not statistically related with adherence to hand hygiene ($p>0.05$) as shown in Table 11 below

Table 11: Institutional factors and adherence to hand hygiene

Variable	Non-Adherence n (%)	Adherence n (%)	Total	χ^2	P-value
Number of hand hygiene facilities in the hospital				0.23	0.630
Few	37(41.57)	52(58.43)	89(57.42)		
Many	30(45.45)	36(54.55)	66(42.58)		
Availability of hand hygiene protocol				**0.70**	**0.404**
Not Available	2(66.67)	1(33.33)	3(1.99)		
Available	63(42.57)	85(57.43)	148(98.01)		

4.8.5 Methods of hand hygiene and hand hygiene adherence

It was however identified that the method of washing hand with either soap and water or alcohol hand rub/ sanitiser was statistically related to hand hygiene adherence [$\chi^2(1,157) =5.27$, $p=0.022$].

Table 12: Methods of hand hygiene and hand hygiene adherence

Variable	Non-Adherence n (%)	Adherence n (%)	Total	χ^2	P-value
Method of Hand Hygiene Practice Observed				5.27	**0.022**
With alcohol hand rub	32(55.17)	26(44.83)	58(36.94)		
Under running water and soap	36(36.36)	63(63.64)	99(63.06)		

4.9 Factors associated with hand hygiene practices

Binomial logistic regression analysis was done to determine statistically significantly related factors to hand hygiene adherence. All variables significant at the bivariate level

were included in the multivariable analyses except where there was collinearity, such variables were removed.

Factors that were adjusting for included age, sex, educational status, grade, years of service in the hospital, area of practice (working units), availability of hand hygiene protocol, knowledge on hand hygiene being, wearing gloves replaces hand hygiene, routinely performing hand washing with water and soap, routinely washing hands with alcohol containing sanitisers, understands implications of not washing hand, availability of hand hygiene protocol and the method of hand hygiene practice observed.

Controlling for the factors above, those who had good knowledge on hand hygiene were less likely to adhere to hand hygiene protocol compared with those who had poor knowledge (AOR=0.30, 95%CI: 0.09-0.96, p=0.043). Also, among healthcare workers who washed their hands with water and soap, the odds of adhering were twice as more compared to those who used alcohol hand sanitisers in performing hand hygiene (AOR=2.77, 95%CI: 1.00-7.63, p=0.049). Table 13 below summarises multivariable analysis of influencing factors of hand hygiene adherence among healthcare workers in Akatsi South District Hospital.

Table 13: Factors influencing adherence to hand hygiene practice

Variable	COR	P-Value	95% CI	AOR	P-Value	95% CI
Age						
24-29 yrs	1.00			1.00		
30-35 yrs	1.24	0.581	0.57-2.65	2.20	0.163	0.72-6.69
36-41 yrs	0.69	0.478	0.25-1.91	0.92	0.917	0.21-4.10
42 yrs and above	1.23	0.776	0.29-5.03	1.58	0.649	0.22-11.50
Sex						
Male	1.00			1.00		
Female	1.11	0.754	0.56-2.18	1.29	0.571	0.54-3.08
Educational Status						
Postgraduate	1.00			1.00		
Undergraduate	1.38	0.633	0.36-5.28	0.90	0.905	0.15-5.16
Diploma	1.33	0.642	0.40-4.36	1.28	0.767	0.25-6.44
Grade						
Junior staff	1.00			1.00		
Senior staff	0.76	0.438	0.37-1.53	0.84	0.763	0.26-2.64
Principal	0.44	0.093	0.16-1.15	0.66	0.681	0.09-4.80
Chief	1.89	0.589	0.18-19.06	3.14	0.516	0.10-99.53
Specialist	1.00			1.00		
Years of Service in the hospital						
Less than 1 year	1.00			1.00		
1-5 years	0.81	0.622	0.35-1.87	0.54	0.286	0.17-1.68
6-10 years	1.24	0.642	0.49-3.12	1.27	0.762	0.27-5.83
11-15 years	0.40	0.14	0.11-1.35	0.43	0.496	0.04-4.81
16 years and above	1.00			1.00		
Working Units						
Medical ward	1.00			1.00		
Surgical Ward	1.04	0.938	0.35-3.05	1.21	0.780	0.31-4.70
Maternity ward	0.93	0.902	0.31-2.76	0.94	0.928	0.24-3.57
Paediatric Ward	0.60	0.387	0.19-1.89	0.36	0.151	0.086-1.46
Psychiatric ward	2.50	0.197	0.62-10.04	2.01	0.406	0.38-10.50
Public health unit	0.19	0.168	0.02-1.99	0.33	0.445	0.02-5.67
Laboratory	0.26	0.268	0.02-2.85	0.32	0.472	0.01-7.13
Pharmacy	3.85	0.251	0.38-38.35	4.07	0.336	0.23-70.82
Outpatient department	2.31	0.496	0.20-25.65	6.61	0.177	0.42-102.20
Specialised Units	1.54	0.601	0.31-7.71	1.83	0.527	0.281-2.00

COR- Crude odds ratio, AOR- Adjusted odds ratio, CI- Confidence interval. Bolded p-value are statistically significant

Table 13: Factors associated with adherence to hand hygiene practice continued

Variable	COR	P-Value	95% CI	AOR	P-Value	95% CI
Knowledge on hand hygiene						
Poor knowledge	1.00			1.00		
Moderate knowledge	1.00			1.00		
Good knowledge	0.39	0.035	0.16-0.93	0.30	**0.043**	0.09-0.96
Wearing gloves replaces hand hygiene						
Disagree	1.00			1.0		
Agree	1.16	0.827	0.31-4.27	1.2	0.853	0.20-6.97
Routinely wash hands with soap and water						
No	1.00			1.00		
Yes	1.22	0.669	0.48-3.07	0.91	0.879	0.25-3.25
Routinely use alcohol – based hand rub						
No	1.00			1.00		
Yes	0.61	0.287	0.24-1.52	0.92	0.905	0.25-3.36
Understands implications of not washing hand						
No	1.00			1.00		
Yes	0.42	0.298	0.08-2.15	1.33	0.797	0.15-11.32
Availability of hand hygiene protocol						
Not Available	1.00			1.00		
Available	2.70	0.422	0.24-30.42	1.36	0.843	0.06-28.72
Method of Hand Hygiene Practice Observed						
With alcohol hand rub	1.00			1.00		
Under running water and soap	2.15	0.023	1.11-4.17	2.77	0.049	1.00-7.63

COR- Crude odds ratio, AOR- Adjusted odds ratio, CI- Confidence interval. Bolded p-value are statistically significant

CHAPTER FIVE

DISCUSSION

5.1 Main Findings

The study involved 157 healthcare workers in Akatsi South district hospital. Only 56.7% (95% CI: 48.6% – 64.6%) healthcare workers performed hand hygiene appropriately according to the MOH hand hygiene protocols. Those who had good knowledge on **hand** hygiene were less likely not to adhere to hand hygiene protocol compared with those who had poor knowledge ($p<0.05$) and those who washed their hand using soap and water were 2 times likely to adhere to hand hygiene than those who used alcohol hand rub ($p<0.05$).

5.2 Methodological Validity

Numerous strengths were identified in this study. Even though the study employed census to collect data, selective bias was minimized as the study population included all healthcare workers who consented to the study voluntarily however, power of the study was less due to the sample size of 157. Concerns of change in hand hygiene practice behaviour were raised since everybody was aware of the ongoing research. Concerns of observer bias were raised however; this was reduced drastically by training and supervising research assistants during participants' observation on hand hygiene practice. Also, information bias was lessened as a portion of the data was collected objectively using an adopted observational checklist without participants prior knowledge. This result, can be generalised to second level health facilities within the region. Many other studies have employed similar technique in measuring hand hygiene adherence among healthcare workers (Chavali et al., 2014; Lenglet et al., 2019; Randle et al., 2010). It indicated the true reflection of healthcare workers hand hygiene practice in Akatsi South district hospital.

5.3 Comparing findings with other studies

5.3.1 Hand hygiene practice

Effective hand hygiene has been identified in history as one of the most important and cost-effective ways of minimizing and preventing cross infection among health care workers and patients in all healthcare settings (World Health Organisation, 2009). It is therefore very necessary for all healthcare workers to follow laid down procedures in achieving hand hygiene adherence at all times achieve maximum. The study's main finding on hand hygiene adherence was 56.7% which was consistent with other studies. A study conducted among clinicians and medical students in Malawi revealed that hand hygiene adherence was 23% (Kalata et al., 2013). Another study in Nigeria also recognise 77.3% hand hygiene adherence among health care workers (Braimoh & Udeabor, 2013).

Similarly, in a study where augmented multi-interventional approaches such as administrative supports for hand hygiene, provision of hand hygiene supplies, training and reminders were used to ensure hand hygiene adherence among healthcare workers, only 73% adherence was achieved. Hand hygiene adherence improved from 59% to 73% for all healthcare workers. However, hand hygiene adherence improved from 40% to 65% for medical doctors and from 68% to 80% for nurses (Abdo & Al-Fadhli, 2018). Another study showed that after implementing various activities to improve hand hygiene practices among healthcare workers, hand hygiene adherence increased from 32.4% to 57.4% (Lenglet et al., 2019). All these findings indicate that adherence hand hygiene practice remains a big challenge among healthcare workers generally.

5.3.2 Sociodemographic factors and hand hygiene practice

All sociodemographic factors (including age, sex, educational level, profession, income level, years of service and working area/unit) were not associated with hand hygiene adherence ($p>0.05$) in this study. This is contrary to findings from other studies. For example in a study to describe the determinant factors of hand hygiene adherence in the inpatient ward settings amongst nurses in Indonesia, level of education, age, gender and nurses attitude were identified to contribute to hand hygiene adherence (Handiyani et al., 2019). Also a study that assessed sustainability of hand hygiene adherence 5 years after a contest-based intervention in 3 Japanese hospitals revealed substantial variability in hand hygiene adherence by unit/working area and professional category of healthcare worker (i.e. either being a nurse or doctor) (Sakihama et al., 2020).

However, many observational studies were not able to determine any significant relationship between sociodemographic factors and hand hygiene (Hsu, 2014; Kallam et al., 2018). For instance in one study, no sociodemographic factor contributed to hand hygiene adherence (Sakihama et al., 2016). In another study to describe nurses' hand hygiene practices in the home healthcare setting, nurse adherence to hand hygiene guidelines, and factors associated with hand hygiene opportunities during home care visits, no nurse or patient demographic characteristics were associated with the rate of nurse hand hygiene adherence (McDonald et al., 2020).

5.3.3 Knowledge on hand hygiene

The five moments for hand hygiene been publicize by the World Health Organization are logical and uncomplicated, but some health care workers nevertheless find them confusing. In this study it was found out that nurses were more knowledgeable on hand hygiene than

midwives and doctors. This finding is similar to a study that examined healthcare workers' knowledge on hand hygiene. It was reported that nurses were more likely to understand the five moments of hand hygiene and other reasons for hand hygiene because of their repeated exposure to it than doctors (Gilbert, 2014). In another study knowledge on hand hygiene improved across all 4 main professional categories (including nurses, nursing assistants, doctors and medical students) after training (Allegranzi et al., 2010).

Additionally, this study revealed that those who had good knowledge on hand hygiene were less likely not to adhere to hand hygiene than those who had poor knowledge. This is consistent with a study among nurses on hand hygiene, revealing that those with moderate to high knowledge were adherent to hand hygiene practices (Labrague et al., 2018). However, many other studies reported the proportion of respondents' knowledge but could not indicate the association of knowledge and adherence to hand hygiene. For instance a study conducted in Nigeria reported that those who had good knowledge on hand hygiene were 82.4% of participants and 17.6% had poor knowledge (Ojong et al., 2014). Additionally, a study conducted in a hospital in Southwest Ethiopia showed that 82.97% of healthcare workers were knowledgeable on hand hygiene (Ojong et al., 2014). Another study also reported 66% of its participants to be knowledgeable when it comes to hand hygiene but also failed to specify the degree to which participants' hand hygiene affected their adherence rate (Jemal, 2018).

5.3.4 Methods of hand hygiene practice and adherence to hand hygiene

Washing hands appropriately have been recognised as the most effective means of controlling infection in healthcare setting, but many healthcare worker do not observe the laid down procedures to washing hands properly (Khan et al., 2011). One of the major

finding of this study was the association between the method of hand hygiene performed by participants during the observation and hand hygiene adherence ($p<0.05$). Healthcare workers who washed their hands with soap and water were 2 times more likely to adhere to hand hygiene compared with those who performed hand hygiene with alcohol hand sanitisers. This could be explained by the fear and anxiety surrounding coronavirus disease-19 (COVID-19) pandemic. Therefore more healthcare workers were becoming aware of a hand hygiene with soap and water in particular to reduce their risk of contracting the COVID-19 (Araghi et al., 2020). This finding is not consistent with previous studies. For instance in a teaching hospital in Nigeria where a study assessed healthcare workers' adherence to washing hands and their knowledge, the study reported that, those who used water and soap to wash their hands were more than those who employed alcohol containing sanitisers (95.5% versus 4.5%) (Omiye et al., 2019). The study could not ascertain causality between the use of soap and water in washing hands with hand hygiene adherence. However, it appears that washing hands using soap and water promotes adherence to hand hygiene practice among healthcare workers.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Hand hygiene is one of the most relevant strategies to prevent healthcare-associated infections. The objective of this study was to determine adherence and factors that influence hand hygiene practice. Study findings revealed that 56.7% of healthcare workers in Akatsi South district hospital adhere to hand hygiene practice but those who had good knowledge were less likely not to wash their hands compared with those with poor knowledge on hand hygiene. Also, those who washed their hands with soap and water were 2 times likely to adhere to hand hygiene than those who washed their hands with alcohol hand sanitisers.

6.2 Recommendation

1. Hospital management must continue to train healthcare workers to achieve more than 56.7% adherence since from the study training on hand hygiene increases adherence.
2. Hospital management should encourage all practice workers to practice hand hygiene whenever indicated with soap and running water.

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APPENDICES

Appendix 1: Participants Information Sheet

This information sheet provides information about the research for healthcare workers at Akatsi South District to make an informed decision of whether to participate in the study or not. It describes the nature of the research, what the research entails, risks, benefits and compensation.

Title of Study: "**Factors influencing hygiene practices among health care workers at Akatsi South District Hospital**".

Introduction: I am Duke Boye Micah a Master of Public Health (MPH) student at the School of Public Health of the University of Ghana, Legon. My email address is dbmicah@yahoo.com and my telephone numbers are 0246777425 I am conducting a research on the topic: Factors influencing hygiene practices among health care workers at Akatsi South District Hospital.

Nature of research: This study is a quantitative study, focusing on factors influencing hygiene practices among health care workers at Akatsi South District Hospital of the Volta Region of Ghana. I am interested in finding the influencing factors of hygiene practices among healthcare workers. The study will take place right here in this hospital.

Participants Involvement: I would be grateful if you participate in this study because you are a healthcare worker in the Akatsi South District Hospital. I believe that you can help me by providing the appropriate responses.

Duration /what is involved: A self-administered questionnaire will be issued to healthcare workers. If you are interested in participating in this study, you can go ahead and fill in the questionnaire which will be collected afterwards. It will then be entered into a statistical software for analysis. The self-administered questionnaire will take 10-15 minutes of your time.

Potential Risks: There would be no risk anticipated or any harm from the study. The only inconvenience would be the time spent in the interview. For this, the design of the interview guide is well structured to aid the discourse. The respondents will be informed about the general nature of the study and assured of no potential harm during the study.

Benefits: There will be no immediate or direct benefits from the study however, your responses would be helpful in policy planning and formulation of recommendations to appropriate authorities concerning hand hygiene practices among healthcare workers.

Costs: Participation in this study will not cost you any money. You will also not receive any money/incentives for partaking in this study.

Compensation: No form of compensation will be given to you for taking part in this study.

Declaration of Conflict of Interest: The PI has no conflict of interest in this study.

Privacy: Your details will not be taken in this study but the information you will provide will be coded and will be treated with outmost confidence. Please be assured that I will

maintain your confidentiality. Only the PI and the supervisor for this research, will access the information you provided. The data will be coded such that no information will be traced to you. Data files will be kept for 3 years after which they will be discarded.

Voluntary participation/withdrawal: Participation is voluntary. You are free to choose if you want to take part in this study. Also, you can withdraw your consent at any time without further explanation, and without any adverse consequences.

Outcome and Feedback: Data gathered will help to improve policy formulation on hand hygiene practices among healthcare workers in Ghana.

Feedback to participant: No feedback will be given to you as an individual but a report will be given to the various stakeholders involved in formulating policies in the healthcare sector.

Funding information: The principal investigator is funding this study.

Sharing of participants Information/Data: Data gathered will be kept in my possession and will not be shared with any other organization(s) or individuals. It will be solely mine.

Storage of samples: Data files will be kept for 3 years after which they will be discarded.

Provision of Information and Consent for participants: You will be given copy of the Information sheet and Consent after it has been signed or thumb-printed to keep.

Who to Contact for Further Clarification/Questions: If you have a concern about any aspect of this research, please contact Duke Boye Micah at The School of Public Health, Legon or speak to me on telephone number 0246777425. For further clarification on ethical

issues please contact Nana Abena Apatu, the administrator at the Ghana Health Service Ethics Review Committee on telephone 0503539896.

Appendix 2: Participants' Consent Form

Participants' Statement

I acknowledge that I have read the purpose and contents of the Participants' Information Sheet and I understand fully the contents and any potential implications as well as my right to change my mind (i.e., withdraw from the research) even after I have signed this form.

I voluntarily agree to be part of this research.

Initials of Participant……..

ID Code ……..

Participants' Signature ……

Thumb Print…….

Date…….

Investigator Statement

I certify that the participant has been given ample time to read and learn about the study. All questions and clarifications raised by the participant has been addressed.

Researcher's name……... Signature…….

Date ……Participant's ID Code……...

Place……

Appendix 3: Hand Hygiene Checklist

Questionnaire Code							RA Code								
Date of interview	d	d	m	m	y	y	Participant Identifier								

A: Hand Hygiene Using Soap and Water

No.	Task	Score (1 point for each step)
	Procedure- Washing Hands	
1.	Turn on or open the tap.	
2.	*Wet hands. Avoid splashing clothes or other parts of the body.	
3.	Dispense soap	
4.	Evenly spread soap over palms and dorsum of hands.	
5.	Rub hands palm- to- palm using a circular motion.	
6.	Rub hands with the right palm over the left dorsum with interlaced fingers and vice versa.	
7.	Interlace fingers with palms facing each other and rub the webs of the fingers.	
8.	Cup hands together to massage/rub the back of the fingers of the right hand and vice versa.	
9.	Rub the tips of fingers of the right hand in the left palm in a circular manner and vice versa.	
10.	Clasp the left thumb in the right palm with the thumb of the right hand on the dorsum of the left thumb and rotationally rub the left thumb and vice versa.	
11.	Wash the wrists in a rotational manner.	
12.	**Rinse hands thoroughly with running water	
13.	Pick single-use hand drying material.	
14.	Dry hands thoroughly with the single-use hand drying material	

15.	Use the used single -use hand drying material to turn off the faucet of the tap.	
16.	Discard the single- use hand drying material in an appropriate receptacle or waste bin.	
17.	NB: *Close tap after wetting hand if tap is not hand-operated. **Turn on or open tap and rinse hands if tap is not hand-operated.	
	Total Score	**……/17**
	Total Score in Percentage = (Score obtained/17 X 100%)	

Questionnaire Code | | | | RA Code | | | |

Date of interview | d | d | m | m | y | y | Participant Identifier | | | | | | | | |

B: Hand Hygiene Using Alcohol-Based Hand Rub

No.	**Tasks**	**Score (1 point for each step)**
	Procedure	
1.	Cup dominant hand (scoop hand)	
2.	Dispense 3 to 5mls of alcohol hand rub into the cupped hand.	
3.	Insert and rotate fingers of the other hand in the alcohol hand rub.	
4.	Tip the alcohol rub into the palm of the second hand.	
5.	Insert and rotate fingers of the dominant hand in the alcohol hand rub.	
6.	Apply palm-to-palm using a circular rubbing motion.	
7.	Apply to the dorsum of left hand by rubbing the right palm over the left dorsum with interlaced fingers and vice versa.	
8.	Interlace fingers with palms facing each other and apply to the webs of the fingers.	
9.	Cup hands together and rub to apply to the back of the fingers of right hand and vice versa	
10.	Clasp the left thumb in the right palm with the thumb of the right hand on the dorsum of the left thumb and rotationally rub to apply to the left thumb and vice versa.	
11.	Apply to wrists by rubbing in a rotational manner.	
12.	Continue applying the alcohol till the hands dry up. It is most effective when dry.	
	Total Score	**……/12**
	Total Score in Percentage = (Score obtained/12 X 100%)	**……**

Adopted from National Policy and Guideline for Infection Prevention and Control in Health Care Setting (Ministry of Health et al. 2015)

Appendix 4: Questionnaire

FACTORS INFLUENCING HAND HYGIENE PRACTICES AMONG HEALTHCARE WORKERS IN AKATSI SOUTH DISTRICT HOSPITAL

Instruction: Tick and provide appropriate answers to all questions.

Questionnaire Code							RA Code								
Date of interview	d	d	m	m	y	y	Participant Identifier								

Section 1: Sociodemographic Information

Questions	**Responses**
1. Sex	a. Male b. Female
2. Date of birth	……. (day)/……(month)/…. (year)
3. Level of highest education attained	a. Post Graduate b. Undergraduate c. Diploma (Polytechnic, Training College) d. Certificates e. Others specify …….
4. What is your profession?	a. Medical b. Nurses c. Midwives d. Biomedical scientist e. Dispensary assistant f. Anaesthetist g. Nutrition Officer h. Dental technician i. Others specify…….
5. What is your current grade?	a. Junior grade b. Senior grade c. Principal grade d. Chief grade e. Specialist grade f. Others specify …….

6. How long have you been working as a health worker?	a. Less than 1 year b. 1-5 years c. 6-10 years d. 11-15 years e. Above 16 years
7. How long have you been working in Akatsi South District Hospital?	a. Less than 1 year b. 1-5 years c. 6-10 years d. 11-15 years e. Above 16 years
8. What is your net income monthly?	a. Less than 1000gh b. 1000-1900gh c. 2000-2900gh d. 3000-3900gh e. 4000gh and above
9. What area of care do you work?	a. Clinical care b. Public health c. Others specify …….
10. Which unit/ ward do you work?	a. Medical ward b. Surgical ward c. Paediatric/Children's ward d. Mental health unit/ward e. Public health unit f. Laboratory g. Pharmacy h. Specialized unit i. OPD j. Others specify …….

Section 2: Individual factors

Please answer ALL questions in this section.

A. Knowledge on hand hygiene

WHO 5 moments			**Sometimes (1)**	**Always (2)**
11. I wash my hand before I perform clean/aseptic procedures.				
12. I wash my hands immediately after exposure to body fluids				
13. I wash my hands before touching a patient				
14. I wash my hands after touching a patient				
15. I wash my hands after touching patient 16. environment B				
When is it appropriate to perform hand hygiene?	**Never (1)**	**Seldom (2)**	**Sometimes (3)**	**Always (4)**
16. “When caring for patients in non-isolation rooms”				
17. “When duration of contact with patient is < or equal to 2 minutes.”				
18. “When there is low risk of acquiring infection from patients.”				
19. “Caring for patients recovering from clean/clean-contaminated surgery in post-anesthesia care unit.”				
20. “When there are staff shortages”.				
21. “Doing activities with high risk of cross-transmission”.				
22. “High number of opportunities for hand hygiene per hour of patient care.”				

C Training

Ever trained	**Yes (1)**	**No (2)**
23. Did you receive formal training for hand hygiene?		

D Behaviour towards hand Hygiene Practices

What are the reasons for not performing hand hygiene according to the recommended guidelines	**Agree (1)**	**Disagree (2)**
24. Hand hygiene interferes with healthcare worker-patient relationship		
25. Wearing of gloves replace hand hygiene		
26. It is more important to complete my tasks than to perform hand hygiene when too busy		
27. Hand hygiene causes an interruption in patient-care activities		
Other behavioural factors	**Yes (1)**	**No (2)**
28. Do you routinely use alcohol – based hand rub?		
29. Do you routinely wash hands with soap and water?		
30. The hospital environment is so clean that I do not need to wash my hands every time		
31. Patients who come to my department have minor cases which does not need observation of hand hygiene practices		
32. Uncomfortable with place for hand hygiene		
33. Do you know what will happen if you do not practice hand hygiene?		

Culture and Religion	**Yes (1)**	**No (2)**
34. Does your culture or religion have an influence on hand hygiene practices?		
35. It is a taboo to use the same hand washing tool with other persons		
36. I only wash my hands in this facility when I am going to pray		
37. My religion only permits me to observe hand hygiene practice after visiting the wash room		

Institutional factors	Few (1)	Many (2)
38. Do you think the number of hand washing points in this facility are?		
39. Is there is any hand hygiene protocol among health workers or hospital that you are aware of?	Yes (1)	No (2)

Thank you for answering all the questions