FACTORS AFFECTING COMPLIANCE WITH STANDARD PRECAUTIONS AMONG HEALTHCARE WORKERS IN PUBLIC HOSPITALS ABUJA

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A DISSERTATION SUBMITTED TO THE DEPARTMENT OF COMMUNITY MEDICINE, AHMADU BELLO UNIVERSITY IN PART FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER IN PUBLIC HEALTH (FIELD EPIDEMIOLOGY)

DECEMBER, 2016

ATTESTATION

I hereby declare that this study, or part of it, has not been, and will not be submitted for any other diploma, fellowship or any other examination.

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Irene Esu Date

CERTIFICATION

This is to certify that this dissertation titled "**FACTORS AFFECTING COMPLIANCE WITH STANDARD PRECAUTIONS AMONG HEALTH CARE WORKERS IN PUBLIC HOSPITALS ABUJA, 2016**" was carried out by Irene Esu, a postgraduate student in the Department of Community Medicine, Ahmadu Bello University Zaria, Kaduna state under our supervision.

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DEDICATION

This book is dedicated to my dear husband Mr. Etim Esu, you believed in me, you saw in me what I couldn't see for myself and you stood by me. Your love, support and prayers is overwhelming and I appreciate all of it.

ACKNOWLEDGEMENT

I am very grateful to my supervisor, Dr. A.A Gobir for the motivation and enormous support he provided throughout this research and my training program. I am also grateful to my second supervisor Prof. M.N. Sambo for all his support in this research. My gratitude also goes to Dr. Patrick Nguku, Prof. Sabitu, Prof. Olayinka, Dr. Aisha A. Abubakar, Dr. Said Gidado and all my teachers for all their support in my postgraduate training.

My appreciation beyond expression goes to my husband and hero Mr. Etim Esu for his truly overwhelming support. I am also grateful to my wonderful mother; Mrs. Anna Baror, you laboured to see me through my undergraduate training and you are still labouring for me in prayers, I love you mum. I thank God for all my family members, their love and prayers made all the difference. I want to thank my friend and sister Dr. Ibitein Okeafor for always being there encouraging me and helping to look at my work to ensure that am doing the right thing, dear friend I thank God for you. Finally, my immeasurable and greatest appreciation goes to my lord and saviour JESUS CHRIST who makes life beautiful. Thank you for the grace to complete this work.

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LIST OF ACRONYMS

AIDS	-	Acquired Immune Deficiency Syndrome
CDC	-	Centre for Disease Control and Prevention
HAI	-	Hospital Acquired Infection
HAV	-	Hepatitis A Virus
HBV	-	Hepatitis B Virus
HCV	-	Hepatitis C Virus
IPC	-	Infection Prevention and Control
NSSI	-	Needle Sticks and Sharps Injury
PEP	-	Post-Exposure Prophylaxis
PPE	-	Personal Protective Equipment
Ups	-	Universal Precautions
US	-	United States
SIGN	-	Safe Injection Global Network
SOP	-	Standard operating procedure
SPs	-	Standard Precautions
SPSS	-	Statistical Package on Social Science
WHO	-	World Health Organization

SUMMARY

Health care workers are at risk of various occupational hazards such as blood borne and other pathogens infections in the hospital in the course of carrying out their duties due to exposure to needle sticks and sharps injuries (NSSI) and other sharps related injuries during the process of recapping, disassembly and inappropriate disposal of used syringes and other sharps. There are over 20 Blood borne pathogens transmitted through NSSI including human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV).

In order to reduce the occurrence of these hazards, the CDC came up with the concept of Standard Precautions (SPs). Compliance with SPs is the recognized efficient means to prevent and control Hospital associated infections in both the patients and health workers, however health care workers compliance with SPs has been found to be sub-optimal worldwide. This study aimed to assess healthcare worker's compliance with standard precautions and determine factors affecting their compliance

A cross sectional survey of 332 health care workers involved in clinical services from 19 Government health facilities selected from the six area councils in Abuja was undertaken. A self-administered semi-structured questionnaire was distributed to study the factors affecting health care workers compliance with SPs. Data was analysed using Epi-info 7.

The mean age of the respondents was 37.2 ± 8.28 and about two third 223(67.2%) of the respondents were females. Knowledge was above average in 274 (82.6%) of the respondents out of which 141 (42.5%) had good knowledge and 133 (40.1%) had fair knowledge. Majority of the respondents (253 (76.2%)) were compliant with SPs although most 204 (61.4%) of those compliant falls within average level of compliance. The factors significantly affecting health care worker's compliance with SPs in this study were: Health facility type (p=0.022) and years of practice of profession (p=0.044)). Multivariate analysis showed that level of health facility is a determinant of health care worker's compliance with SPs i.e

Health care workers working in primary health facilities were two times less likely to be compliant with SPs than those in tertiary health facilities (AOR = 0.476, 95%C.I. = 0.253 - 0.892).

This study therefore recommends that hospital management board should pay more attention to health care workers in primary health facilities by setting up functional infection control committees that will conduct regular training and retraining on infection prevention and control and ensure constant availability of commodities for SPs such as water, gloves, face masks, hand sanitizers, goggles, etc

Key words: Standard Precautions, Compliance, Healthcare workers

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Health care workers are at a high risk of percutaneous exposure to blood borne pathogens from needle stick injuries (NSSI) and other sharps related injuries during the process of re-capping, disassembly, and inappropriate disposal of used syringes and other sharps equipment as they perform their clinical activities.[1] Percutaneous exposures to blood and body fluids through contaminated NSSI, other sharps injuries and splashes of contaminated blood and blood products constitutes a means of exposure to blood borne pathogens which is a major cause of morbidity and mortality amongst health care worker.[2] There are well over 20 blood borne pathogen transmitted through NSSI including Human immunodeficiency virus (HIV), Hepatitis B virus (HBV), Hepatitis C virus (HCV) and a host of others.[3–7] NSSI is however not the only source of exposure of health care workers to blood borne pathogen as other activities such as mucous membrane or non-intact skin exposure to blood has also been reported to expose health care workers to blood borne pathogens infections. The risk of transmission of these pathogens through muco-cutaneous exposure is however considered lower than the risk associated with a percutaneous exposure.[8] The World Health Organization (WHO) in its 2002 World Health report noted that out of the 35 million health-care workers worldwide, 2 million experience percutaneous exposure to infectious diseases each year, furthermore 37.6% of HBV, 39% of HCV and 4.4% of HIV/AIDS occurring in health care workers around the world are due to occupational exposures to blood borne pathogen through NSSI.[9]

Health care workers are not the only ones at risk of exposure to blood borne pathogens infections, patients and even relations of patients that are being taken care of by the health care workers are also at risks. Health care-acquired infections (HAI) are those infections

acquired in hospitals or healthcare service units, that first appear 48 hours or more after hospital admission or within 30 days after discharge following an in-patient care, they are unrelated to the original illness that brings patients to the hospital and neither present nor incubating as at the time of admission.[10] According to WHO, HAI are the most frequent adverse event in health-care delivery worldwide, hundreds of millions of patients are affected by HAI worldwide each year, leading to significant mortality and financial losses for health systems.[11] Out of every 100 hospitalized patients at any given time, 7 in developed and 10 in developing countries will acquire at least one HAI.[11] In developed countries, HAI affects from 5% to 15% of hospitalized patients in regular wards and as many as 50% or more of patients in intensive care units (ICUs).[12] In developing countries, the magnitude of the problem remains underestimated or even unknown largely because HAI diagnosis is complex and surveillance activities to guide interventions require expertise and resources.[11] However in a meta-analysis to assess the burden of HAI in developing country, it was found that Prevalence of HAI was much higher (15·5 per 100 patients) than proportions reported from Europe and the USA.[13]

Health care workers worldwide are at risks of this occupational accidents, however those in developing countries, are particularly at increased risk of exposure to infections from blood borne pathogens.[14] This is because under-resourced African regions not only suffer from a critically low ratio of health care workers to total population, but also lack essential personal protective equipment (PPE) to practice standard infection control measures.[15] In addition, the occurrence of NSSIs is higher in developing countries for the higher rate of injection with previously used syringes,[16] NSSIs were also reported as the most common occupational health hazard in a Nigerian teaching hospital.[6]

In order to reduce the occurrence of blood borne pathogens infections among health care workers and patients the US Centre for Disease Control (CDC) in 1983 published a document that recommended that health care worker should take precautions when dealing with blood and body fluid in a patient who was known or suspected to be infected with blood borne pathogens and in 1987, the US CDC later came up with the concept of Universal Precautions (UPs) whereby regardless of patient's infection status, the precautions must be consistently used.[14] UPs include a set of precautions devised to prevent transmission of all known blood borne pathogens including HIV, HBV, and HCV to/from health care workers when providing care to all patients regardless of patient's infection status.[14,17]

In 1996, the CDC included the universal precautions in a new prevention concept called SPs and SPs are the minimum infection prevention practices that apply to all patient care, regardless of suspected or confirmed infection status of the patient in any setting where healthcare is delivered.[18] These precautions are designed to both protect health care workers, the patient and their relations from transmission of infections from patients to health care personnel and from personnel to patients. it is thus important for every health care workers to observe SPs when caring for all patients as part of a routine strategy for infection control in healthcare settings.[19] SPs require that health care workers assume that the blood and body substances of all patients are potential sources of infection, regardless of the diagnosis, or presumed infectious status.[20] The different components of SPs include: 1) hand hygiene, 2) use of personal protective equipment (e.g., gloves, gowns, masks), 3) safe injection practices, 4) safe handling of potentially contaminated equipment or surfaces in the patient environment, 5) appropriate waste disposal and 6) respiratory hygiene/cough etiquette.[21]

Compliance with SPs by health care workers has been recognized as an efficient means to prevent and control blood borne pathogens infections and HAIs in the patients and Health

Workers.[22] The level of compliance with practice of SPs by health care workers may differ based on their knowledge and attitude towards SPs.[14] Several factors ranging from personal to organizational factors have been found to be responsible for non-compliance with the basic principles of SPs among health care workers.[23] In a study carried out in South-Western Nigeria health care workers reported that their inability to comply fully with the SPs is due to unavailability of Personal protective equipment (PPE) and other SPs consumables.[24]

1.2 Problem Statement

The WHO in its 2002 World Health report noted that out of the 35 million health care workers in the world, 2 million experience percutaneous exposure to infectious diseases each year; it further noted that 37.6% of HBV, 39% of HCV and 4.4% of HIV/AIDS in health care workers around the world are due to occupational exposures to blood borne pathogen through NSSI.[9] A strict compliance with SPs among health care workers is key to reducing the occurrence of blood borne pathogens infections in health care settings. This is essential to reduce morbidity and mortality from blood borne pathogens infections in health care workers, patients and visitors. Unfortunately, under-resourced African regions not only suffer from a critically low ratio of health-care workers to total population, but also lack essential personal protective equipment to practice standard infection control measures.[15] Despite the obvious importance of SPs, there is still a low level of compliance among health care workers.[25]

Various studies done among health care workers recorded below average level of compliance with SPs.[25–27] In a study carried out in Texas, Houston, it was found that compliance with SPs as less than optimal amongst health care workers in emergency rooms, surgical suites and critical care units.[28] In a similar study done among health care workers in India, compliance with SPs was suboptimal, i.e. only 32% wore eye protection when indicated, and 40% recapped needles at least sometimes.[29] According to the WHO the last Ebola outbreak in

West Africa affected as much as 401 health care workers with 232 deaths as at the end of 5th October, 2014.[30] These cases and deaths may have been prevented if there was strict compliance with SPs among the affected health care workers. In another study done in South-South Nigeria amongst Medical and Nursing students, compliance with SPs was found to be less than optimal.[3]

A number of policy strategies are available for avoiding the disease burden associated with percutaneous injuries, including vaccination against HBV; PEP for HBV and HIV; reducing the number of injections and invasive procedures where appropriate; using safer devices; and properly disposing of needles and other sharps.[31] Prevention and control policies for sharps injuries have been developed in many industrialized countries, in part because surveillance systems and *ad hoc* surveys provide the governments with information on exposures and outcomes in the health-care setting, most developing countries however lack a written country specific guideline or policies for the strict implementation of SPs by health care workers. [31]

1.3 Study Justification

Several studies have been done on knowledge, attitude and compliance with SPs in both developed and developing countries.[3,5,14,18,23,25,32–35] In spite of the studies carried out in the developed countries showing various factors affecting health care worker's compliance with SPs, in Nigeria most studies have also looked at knowledge attitude and practice/compliance and few has sought to find out the factors affecting compliance with SPs. Therefore, there is a need to study in-depth the effect of several factors on compliance in a developing country like Nigeria where infectious diseases is still a major problem. In Abuja all the studies done so far only assessed knowledge, attitude and practice of SPs without assessing factors that could be responsible for compliance or non-compliance.[36] In order to have optimal compliance with SPs by health care workers, it is important to assess factors responsible for

compliance and noncompliance with SPs, this will help in designing educational programs for hospital staff and in making policies that will improve the lives of health care workers.[25]

The study will not only have an in-depth look at those challenges that affects health care worker's compliance with SPS at the three levels of healthcare and among the three major health professional groups in public hospitals in Abuja but will add to the body of knowledge and make recommendations to relevant authorities and inform policy makers on strategies and educational programs that will help to provide a supportive environment that is conducive to the routine and long-term application of SPs by health care workers with the aim of improving health care worker's compliance with SPs health and health seeking behaviour of health care workers in general and thus ultimately reducing the incidence and prevalence blood borne pathogens infections among health care workers and HAI among patients and their visitors.

1.4 Research Questions

1. What is the health care worker's level of knowledge of SPs?
2. What is the health care worker's level of compliance with the various aspects of SPs?
3. What factors are associated with health care worker's compliance with SPs?

1.5 Objectives of the Study

1.5.1 General Objective

To assess the factors affecting compliance with SPs among Health care workers in public hospitals in Abuja

1.5.2 Specific Objectives

1. To assess the level of knowledge of SPs amongst healthcare workers in public hospitals in Abuja.
2. To assess healthcare workers compliance with various aspects of SPs in public hospitals in Abuja.
3. To determine factors that are associated with healthcare worker's compliance with SPs in public hospitals in Abuja.

CHAPTER TWO

LITERATURE REVIEW

Introduction

Percutaneous exposures to blood and body fluids through contaminated NSSIs and other sharps injuries are an important occupational hazard among health care workers that ultimately lead to morbidity and mortality from infections with blood borne pathogens among health care workers.[7] The WHO estimates that about 2.5% of HIV cases and 40% of HBV and HCV cases among health care workers worldwide are the result of these exposures.[9] The risk of sero-conversion following a NSSI from an HCV-antigen-positive patient is estimated to range from 1.2% to 10%,[31] it is therefore important to prevent infection by preventing exposure to NSSIs. In order to reduce the occurrence of blood borne pathogens infections among health care workers and patients the US Centre for Disease Control (CDC) in 1983 published a document that recommended that health care worker should take precautions when dealing with blood and body fluid in a patient who was known or suspected to be infected with blood borne pathogens and in 1987, the US CDC later came up with the concept of Universal Precautions (UPs) whereby regardless of patient's infection status, the precautions must be consistently used.[14] UPs include a set of precautions devised to prevent transmission of all known blood borne pathogens including HIV, HBV, and HCV to/from health care workers when providing care to all patients regardless of patient's infection status.[14,17] In 1996, the CDC included the universal precautions in a new prevention concept called SPs.[14]

2.1 Standard Precautions: Definition

SPs are a set of infection prevention practices that apply to all patients, regardless of suspected or confirmed diagnosis or presumed infection status.[4] Standard Precautions is a combination and expansion of Universal Precautions and Body Substance Isolation and it is based on the principle that all blood, body fluids, secretions, excretions except sweat, non-intact skin, and mucous membranes may contain transmissible infectious agents.[3,4,14] Standard Precautions includes hand hygiene and depending on the anticipated exposure, use of gloves, gown, mask, eye protection or face shield and equipment or items in the patient environment likely to have been contaminated with infectious fluids must be handled in a manner to prevent transmission of infectious agents, (e.g. wear gloves for handling, contain heavily soiled equipment, properly clean and disinfect or sterilize reusable equipment before use on another patient).[21,22]

SPs is applied to blood and body fluids that has been implicated in the transmission of blood borne pathogens infections such as semen, breast milk, vaginal secretions, synovial fluid, cerebrospinal fluid, amniotic fluid, and any other body fluids contaminated with blood.[4,14] Since medical history and examination cannot reliably identify all patients infected with blood and body fluid-borne pathogens such as HIV, and HBV infections, amongst others, SPs should be consistently used for all patients regardless of their infectious status or perceived risk.[37] Components of SPs include: 1) hand hygiene, 2) use of PPE (e.g., gloves, gowns, masks), 3) safe injection practices, 4) safe handling of potentially contaminated equipment or surfaces in the patient environment, 5) Appropriate waste disposal and 6) respiratory hygiene/cough etiquette.[21]

2.2 Knowledge of SPs amongst Health workers

Knowledge and compliance with standard precautions is essential to prevent hospital associated infections and protect patients as well as medical workers from exposure to infectious agents.[38] Having knowledge of SPs entails that healthcare workers must have a good understanding of the various aspects of SPs thus it is very important that health care workers have good understanding about the risk of blood-borne pathogens at work place and about the preventive measures for reducing risk of occurrence of such hazards.[14] Several studies had been carried out to assess health care worker's knowledge of SPs worldwide,[17,18,33,34,36,38–43] from these studies varying degrees of knowledge has been reported. In a study carried out in Texas, USA to assess knowledge of and compliance with SPs amongst residents and students, knowledge was as high as nearly 100%.[28] similarly in a study carried out among nurses in Brazil, it was discovered that Knowledge of SPs received a high score.[2] High level of knowledge (97%) was also seen among amongst university hospital nurses in the UAE.[43] The level of knowledge was not so high a study carried out in Jamaica where almost two-thirds (64.0%) of the respondents were very knowledgeable of universal precautions with significantly more females (75.4%) than males (42.9%), more nurses (90.0%), medical doctors (88.0%) and medical technologists (70%).[14]

In Nigeria, studies carried out in different part of the country also gave varying degree of health care workers compliance with SPs. In a study carried out in Southern Nigeria to compare knowledge, attitude and practice of UPs among health care workers in public and private health facility, knowledge of SPs was found to be 64.2% among healthcare workers in the public health facility, compared to 54% in the private health facilities.[41] In contrast to this a study carried out in two tertiary institutions in Nigeria Knowledge of SPs was found to be as high as 97%.[40] In north eastern part of Nigeria, a study conducted found that only 13% of the respondents had adequate knowledge of SPs.[39] In another study conducted among health

care workers in secondary health facilities in north central Nigeria, the knowledge level was reported to be 16.6%.[36]

The wide disparity in knowledge level seen in studies done in Nigeria may have been due to the different hierarchy of health care workers and their educational background and different study designs used in all the studies. Interventions such as training has been seen to have effect on health care worker's knowledge of SPs, the effect of education was seen in an interventional study carried out in Southern Nigeria on medical and nursing students, whereby the medical and nursing students were assessed before and after infection control training, it was noted that they had a knowledge of 7.1% and 6.7% respectively before training and 64% and 8.1% after training.[3] This thereby demonstrates the effect of training on knowledge of SPs among health care workers

2.3 Health care worker's compliance with SPs

Compliance is the extent to which health care workers follow the rules, regulations and recommendations of Standard Precautions (SPs) and Infection Control (IC).[24] Compliance with SPs has been recognised as the efficient means to prevent and control HAIs.[44] It has however been observed from several studies that health care worker's compliance with SPs was not optimal.[14,25,28,35] In a study done to measure compliance with hand washing among healthcare workers working in the ICU in the USA it was observed that compliance with hand washing was low (36%) after any care was given, glove use was 62% and gown use was 63%.[30] However in a comparative study carried out in Texas among resident doctors and students, compliance with universal precautions was high although it was better among students (96%) than among residents (88%).[28] The findings in this is similar to a study done among student nurses in the Philippine where a total of 89.7% compliance was found among them.[38] In a study across four medical staffing groups in Iran, despite high level of

knowledge i.e. median levels of knowledge ranged from 6 to 7 (maximum score 9), and a high level of attitude to SPs (median attitude scores were high ranging from 35 to 36 (maximum score 45), the practice was low (median practice scores were low, ranging from 2 to 3 (maximum score 9). Therefore no significant correlation was found between knowledge and practice between the groups.[18]

Health care worker's compliance with SPs in studies done in Nigeria is similar to what was seen in other parts of the world. In a study conducted amongst nurses and midwives in a tertiary hospital in south-western Nigeria, 96.1% of the respondents complied to hand hygiene, 98.6% disposed all used sharp objects appropriately, 96% of the respondents disposed waste appropriately, 95.2% treated all patients and materials as if they were infectious, and 89.9% complied with environmental hygiene.[24] In contrast another study among health care workers in the same south-western part of Nigeria compliance with SPs was not high whereby less than two-thirds of respondents (63.8%) always used PPE, and more than half of all respondents (56.5%) had never worn goggles during deliveries and at surgeries. However a high percentage (94.6%) of Health care workers observed hand washing after handling patients.[45] Compliance with SPs was also low in a study amongst health care workers in two tertiary hospitals.[40] In another study done in the northern part of Nigeria compliance with SPs was higher than the knowledge recorded.[39]

2.3.1 Health care worker's compliance with Hand hygiene

Good hand hygiene practices including use of alcohol-based hand rubs and hand washing with soap and water, is critical to reduce the risk of spreading infections in ambulatory care settings.[21] Hand hygiene is a general term that applies to hand washing, antiseptic hand-wash, antiseptic hand rub, or surgical hand antisepsis. In a study done to compare hand hygiene practice among doctors in two different hospital in Israel, it was found that compliance with

hand hygiene differs among doctors in the different health facility with one facility having as high as 77% compliance while the other was 33%.[46] This difference in compliance was thought to be due to non-availability of hand washing basins and in patient rooms in several wards in the hospital with low compliance and heavier workload for the physicians.[46] In another study carried out in north central Nigeria, majority of the health care workers (96.38% of doctors and 97.94% of nurses) reported that they practiced hand washing with soap and water after any direct contact with patients. The few that were non-compliant said they did not always wash hands with soap and water after any direct contact with patients due to irregular availability of water and soap.[36]

2.3.2 Health care worker's compliance with use of PPE

Studies done to assess health care worker's compliance with the use of PPE varies among health care worker's, while some studies showed that there was a high level of compliance others showed low compliance. A Study done in India revealed that 40% of the health care workers wore eye protection when indicated.[29] However in a study done in north central Nigeria it revealed that health care workers always used gloves when they anticipated contact with body fluids, non-intact skin and mucus membranes however use of gowns, aprons, masks and eye protection during procedures likely to generate splashes of blood and body fluids was low and the main constraint given for the irregular use of PPE was lack of regular supplies.[36] This was in agreement with a study done among radiology staff in a tertiary hospital in northern Nigeria whereby the study found that management did not fairly provide PPEs. health care workers in that study gave the following reasons for non-compliance; non availability of gloves 96.8%, non-availability of mask 58.7% and non-availability of aprons 84.5%.[47]

2.3.3 Health care worker's compliance with safe injection practices

A safe injection is one that does not harm the recipient, does not expose the provider to any avoidable risks and does not result in waste that is dangerous for the community.[48] Injection safety includes practices intended to prevent transmission of infectious diseases between one patient and another, or between a patient and healthcare provider during preparation and administration of parenteral medications.[21] Unsafe injection practices can lead to percutaneous exposures to blood and body fluids through contaminated NSSIs leading to morbidity and mortality from infections with blood borne pathogens such as HBV, HCV and HIV among health care workers. The estimated global burden of disease for the year 2000 from unsafe injection practices for these pathogens included, 21 million HBV infections (32% of new HBV infections), 2 million HCV infections (40% of new HCV infections) and 260 000 HIV infections (5% of new HIV infections).[7]

Health care workers compliance with the injection safety practices differs in different settings. In a study carried out among surgeons in Egypt, findings indicated that out of 57.5% of the surgeons sampled who were compliant with standard precautions 59.8% of them had been exposed to at least one needle-stick injury in the previous 3 months due to improper training on injection safety practices.[25] A study done in south western Nigeria revealed findings where one third of the participants always recapped used needles [45] and another study carried out in northern Nigeria among Health care workers only 3.3% had a sharp disposal system in their various workplaces.[39]

2.3.4 Health care worker's compliance respiratory hygiene/cough etiquette

Various studies has been carried out to assess compliance with respiratory hygiene, in a study to assess respiratory hygiene compliance in an emergency departments of a hospital in Canada, it was found that compliance was low.[49] In another study done in Korea, knowledge of respiratory hygiene/cough etiquette was 56.1% and in this study it was found that Predictors of respiratory hygiene/cough etiquette practice were carrying a handkerchief or tissues, prior education on respiratory hygiene/cough etiquette, awareness level of respiratory hygiene/cough etiquette, daily frequency of hand washing, and knowledge level of respiratory hygiene/cough etiquette.[50]

2.4 Factors affecting health care workers Compliance with SPs

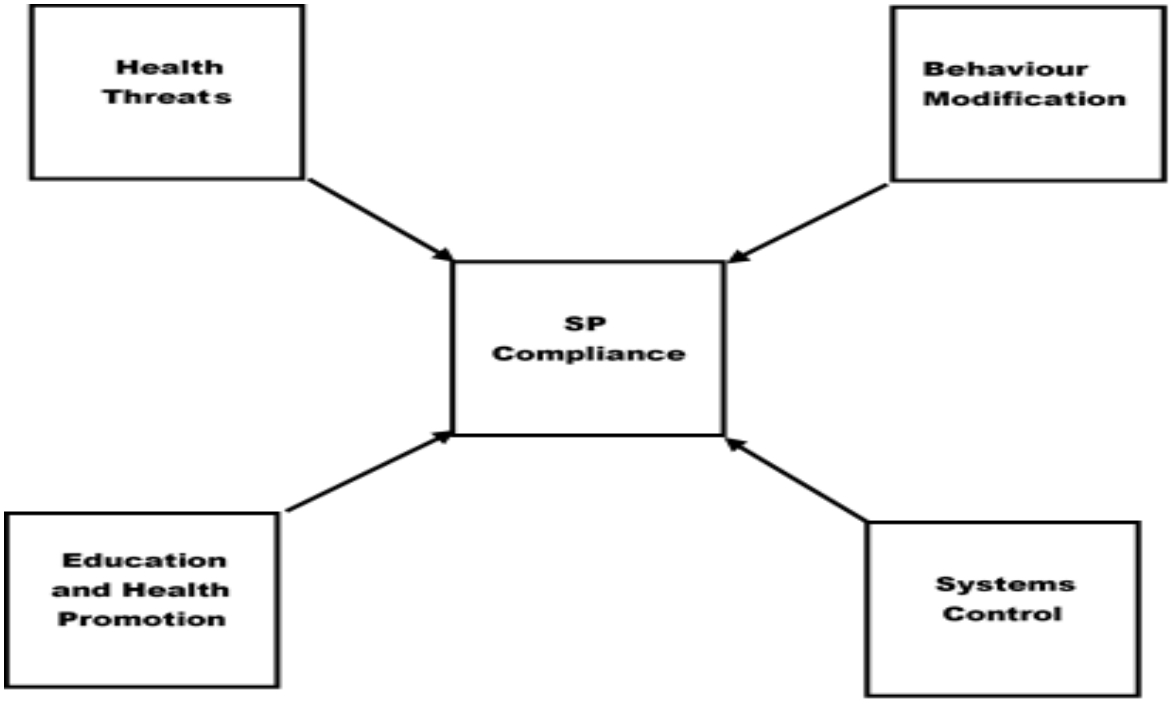


Figure 2.1. Concept of the factors affecting SPs Compliance

In a Meta-analysis carried out in Malaysia, it was concluded that factors such as health threats, behaviour modification, education/health promotion and systems control (i.e presence of infection prevention and control committees in hospitals) all have effect on health care worker's compliance with SPs.[32] It is expected that health care worker's knowledge of SPs should translate to compliance; however this is not the case in some circumstances, it is therefore important to look into factors that affect compliance with SPs despite health care worker's knowledge of SPs. Several factors have been found to affect health care worker's compliance with SPs, these factors may be either positively or negatively influence health care worker's compliance with SPs. In a study carried out in Texas, USA the effect of the years of practice of health care workers on compliance was seen.[28] The observed rate of compliance with universal precautions by participants indicates that individual compliance was inversely related to the years of experience (overall compliance rate of students was 96%; for first-year residents, 92%, second-year residents, 89%, third-year residents, 84%, fourth-year residents, 78%.[28] In another study carried out among nurses in Cyprus, the factors positively affecting health care worker's compliance with SPs includes regular training, continuous reminder, supervisor's instructions and patient's personal characteristics like low personal hygiene body tattoos and foreigner. The study further found that factors such as non-availability of PPE, provision of care to children, time constraints and interference with work negatively influence compliance with SPs.[23]

Another reason for health care worker's noncompliance with SPs was lack of training on SPs, in an study carried out in South-South Nigeria, it was noted that doctors recorded the highest practice of SPs while the nurses recorded the lowest in both selected public and private facilities South-South Nigeria.[41] In a study carried out in South west Nigeria among nurses and midwives, they reported that factors that affect their noncompliance with SPs are personal factors (53.7%) and institutional factors (81.6%) were found to influence the

practice of standard precautions; the study further revealed a significant association between compliance with standard precautions and availability of PPE.[24] In a study carried in north central Nigeria, it was noted that a good proportion of the Health care workers reported irregular washing of hands with soap and water after any direct contact with patients, which is a simple routine infection prevention measure. The major constraint reported by respondents who said they did not always wash hands with soap and water after any direct contact with patients was irregular availability of water and soap.[36]

CHAPTER THREE

METHODOLOGY

3.1 Study Area

The study was conducted in Abuja, the capital city of Nigeria. Abuja was formed in 1976 and is located just north of the confluence of the rivers Niger and Benue and bordered by Niger state to the west and north, Kaduna to the northeast, Nasarawa to the east and south, and Kogi to the southwest. The population comprises of 1,405,201 individuals disaggregated into 740,489 males and 664,712 females according to the 2006 national census, with an annual growth rate of 9.3%, the projected population for 2016 is 3,190,586.[51] Abuja is geographically located in the centre of the country, it lies between longitude 7002'29.69''E, 7007'24.11''E and latitude 8052'34.37''N, 9000'00.00''N at an altitude of 1,200 - 1,700 feet above sea level. According to the United Nations, Abuja grew at the rate of 139.7% between 2000 and 2010, making it the fastest growing city in the world.[52] As of 2015, the city is still experiencing an annual growth of at least 35%, still retaining its position as the fastest growing city on the African continent and one of the fastest in the world. It is situated within the Savannah region with moderate climatic conditions. The FCT is made up of six area councils namely; the Abuja Municipal Area Council (AMAC), Bwari, Gwagwalada, Kuje, Kwali and Abaji Area councils. Each Area Council has 62 political wards.

Abuja has a total of 738 hospitals made up of 2 Tertiary health facilities, 14 Secondary health facilities, 179 Primary health Centres, 5 Private Tertiary health facilities, 79 Private Secondary health facilities and 459 Private Primary health facilities in the six Area Councils. There was a total of 2,404 health professionals (which is made up of 887 males and 1,517 females). Nurses/midwives constituted the highest number (1,176), followed by the medical officers (350), pharmacists (138), Community Health Extension Workers (CHEWs) (135), medcal laboratory scientists (121) and the medical record assistants (110).[53]

The doctor population ratio in 2011 was 1: 2,678 which was short of the recommendation of the World Health Organization (WHO) which is 1:1,000. The percentage of pregnant women that received Ante-natal Care (ANC) was less than half (44.8%). The leading causes of morbidity were malaria (68.5%) and malnutrition (23.0%) especially in children and hypertension (50.0%) in adults. Other important causes of morbidity were diarrhoea (in children), HIV/AIDS, other sexually transmitted infections (STIs), pneumonia, tuberculosis, diabetes and asthma. The case fatality rates for tuberculosis, diarrhoea and malaria were as high as 29.4%, 17.7% and 11.8% respectively.[53]

3.2 Study Design

The study was a cross sectional descriptive study

3.3 Study Population

The study population for this study comprises Health care workers (Doctors, Nurses/CHEWs and Laboratory scientists/technicians) involved in patient's care at the selected hospitals.

3.3.1 Inclusion Criteria

Health care workers that were included in the study consist of:

1. Doctors, Nurses/CHEWs and Laboratory scientists/technicians who are involved in clinical activities in the selected hospitals
2. Doctors, Nurses/CHEWs and Laboratory scientists/technologists who are involved in clinical activities and have worked for more than 6 months
3. Doctors, Nurses/CHEWs and Laboratory scientists/technologists who are involved in clinical activities and are willing to participate in the study.

3.3.2 Exclusion Criteria

1. Doctors, Nurses/CHEWs and Laboratory scientists/technologists involved in clinical services but are too ill to respond to the questionnaire.

2. Doctors, Nurses/CHEWs and Laboratory scientists/technologists involved in clinic activities but are on leave (annual, study and maternity)

3.4 Sample Size Determination

The sample size was calculated using the sample size formula for descriptive studies. [54]

$$n = \frac{(Z_{\alpha})^2 \times p\,(1-p)}{d^2}$$

Where

- n= minimum sample size
- $Z\alpha$= 1.96 (standard normal deviate at 95% confidence level)
- p= Proportion of health care workers with Knowledge of SPs in a similar study 0.73 [36]
- q (1 – p) = 1 – 0.73 = 0.27
- d^2 = Desired level of precision = 0.05^2

$$n = \frac{1.96^2 \times 0.73 \times 0.27}{0.05^2}$$

- n= 302.8
- Considering a non-response rate of 10%
- Therefore total sample size = 335 ≈ 340

3.5 Sampling Technique

Multi-stage sampling method was employed to recruit subjects into the study.

Stage 1: Selection of Health Facilities

The health facilities were stratified into primary, secondary and tertiary health facilities. Stratified sampling via proportionate allocation was used to select 12 primary health facilities, 6 secondary health facilities, and 1 tertiary health facility from a list of 193 government facilities situated in Abuja, using a ratio of 12:6:1, respectively. This ratio was

determined in view of existing records of number and relevant staff strength of each of the levels of health facilities, as obtained from the Federal Capital Territory Authority (FCTA). List of selected health facilities is shown on appendix 3

Stage 2: Selection of Health care workers based on Professional Cadre

Health care workers were stratified based on professional cadre into three; Doctors, Nurses/CHEWs and Laboratory Scientists/Technicians. Proportionate sample size allocation was then used to determine the number required from each of the professional groups from the selected health facilities. The proportionate allocation is shown on appendix **4**

Stage 3: Selection of Respondents

A sampling frame was drawn from the list of the staffs in the selected professional groups obtained from the health facility. Simple random sampling via table of random numbers was employed in selection of the respondents.

3.6 Study Instruments

3.6.1. Description of study instruments

Section A: Socio-demographics

Section B: Question on Knowledge of Standard Precaution

Section C: Question on Compliance with Standard precaution

Section D: Questions on factors affecting Compliance

A total of 130 questionnaires were distributed equally to each of the selected type of health facility. A semi structured self-administered questionnaire having the four sections was administered to the respondents. The questionnaire on knowledge, compliance and factors affecting health care workers with Standard Precaution was adapted from Luo et al, [35] and modified in order to suit the study objectives. The socio-demographic variables of interest includes age, sex, marital status, occupation, name of health facility, type of health facility

and length of time the respondent has been employed in the health facility. Knowledge questions were based on the various aspects of SPs covering 10 items, with possible responses of 'yes' or 'no', 'yes' is given a value of 1 point, and 'no' with 0 points; the maximum possible score is 10. Result of responses was interpreted and graded as good, fair and poor. The higher the score, the greater the assumed knowledge about standard precautions the health care workers has.

Knowledge scoring

Good knowledge	> 7.5 - 10 (>75%)
Fair	5 – 7.5 (50-75%)
Poor knowledge	0 - 5 (<50%)

There are 9 compliance items with a scale of 0–4 points: 0 = never, 1 = seldom, 2 = sometimes, 3 = usually, and 4 = always, giving a score range of 0–36 and mean score range of 0–4. In determining the level of compliance, the mean score was used and graded as high, average, low and very low compliance. The higher the mean score, the better the health care worker complies with SPs.

Compliance scoring

High compliance	3.51 – 4.00
Average compliance	2.51 – 3.50
Low compliance	1.51 – 2.50
Very low compliance	0 – 1.50

3.6.2. Pre-testing of Study Instrument

The questionnaire was pretested prior to commencement of the study among health care workers in another secondary health facility in Abuja (Wuse General Hospital) which is not one of the selected health facilities for the study. The essence was to assess the clarity, comprehensiveness and the ease of completion of the questionnaire. Ten percent (34) of the calculated sample size (340) of the respondents were selected after the application of the eligibility criteria. The outcome of this exercise showed that the questionnaires were well understood by the subjects and required 10 - 15 minutes for completion.

3.7 Data Management

3.7.1 Measurement of variables

Respondents who met the eligibility criteria were given the study questionnaire. The variables measured include:

Independent variables: Age, Sex, Marital status, Occupation, type of health facility, Years of practice and Knowledge of Standard Precaution

Dependent variables: Compliance with SPs

3.7.2 Statistical analyses

Data was entered into a Microsoft excel spread sheet, cleaned and analysed using the statistical package EPI info version 7. The Socio-demographic and other variables were presented in tables and graphs. Means and standard deviation for the quantitative variables was calculated while the qualitative variables were expressed as frequencies and proportions. Chi square test was used to compare proportions. Multivariate analysis using binary logistic regression was used to identify determinants of compliance with SPs and the level of statistical significance was set at $p<0.05$.

3.8 Ethical Considerations

The approval of the Ethical Committee of the Federal Capital Territory Authority (FCTA) to carry out this study was sought and clearance obtained before the commencement of the study. Permission to carry out the study was also sought in each of the selected health facilities and approval obtained.

The details of the study were explained to the respondents. Those who were willing to participate in the study signed a written informed consent before the questionnaire was administered. Participation was voluntary and confidentiality was maintained during the entire study period by using respondent's initials for identification instead of respondents' names.

Beneficence: Health care workers from the different health facilities were trained on various aspects of SPs and the need to comply with SPs after the process of questionnaire administration in a two days training sessions.

3.9 Limitations

1. Tendency for overestimation of compliance because health care workers might give false information on compliance to SPs. Previous studies that used observation and self-reporting mechanisms found that by comparing self-reported with observed compliance of standard precautions, health care workers tend to overestimate their compliance.[5] Measures such as confidentiality and informing the health care workers that the information provided will not be divulged were employed in this study to reduce the possible over estimation of compliance with SPs by the health care workers.

2. Non-response bias due to the Health care workers unwillingness to participate in the study as a result of their busy schedules, however the researcher minimized this by arranging a convenient time when the workload of the health care workers was less and also allowing the respondents to answer the questionnaire at their convenient time.

CHAPTER FOUR

RESULTS

A total of 332 health care workers participated in this study, 129 respondents from the primary health facilities, 123 and 80 respondents from the secondary and tertiary health facilities respectively. Out of 340 questionnaires distributed to respondents, 332 responded giving a response rate of 97.6%.

4.1 Socio-demographic characteristics of respondents

Table 4.1: Socio-demographic Characteristics of respondents

Socio-demographic variables	Frequency (n=332)	Percent (%)
Age categories (years)		
21-30	84	25.3
31-40	137	41.3
41-50	84	25.3
51-60	27	8.1
Mean age (SD)	**37.2 ± 8.28**	
Sex		
Female	223	67.2
Male	109	32.8
Marital Status		
Single	71	21.4
Married	254	76.5
Separated/Divorced	7	2.1
Occupation		
Laboratory scientist/technician	76	22.9
Nurses	204	61.4
Medical doctors	52	15.7
Years of practice of profession		
>10 years	293	88.2
>10 years	39	11.7
Mean (SD)	6.0 ± 5.28	
Type of Health facility		
Primary	129	38.9
Secondary	123	37.0
Tertiary	80	24.1

Mean age of respondents was 37.2 ± 8.28 years and most of them were females 223(67.2%). Most of the respondents were nurses and majority of the respondents had not worked for up to 10 years in their current health facilities.

4.2 Knowledge of SPs among Respondents

Table 4.2: Knowledge of various components of SPs among health care workers

SPS Components	Knowledge of Standard Precaution	
	Yes n (%)	No n (%)
Hand hygiene	277 (83.4)	55 (16.6)
PPE	197 (59.3)	135 (40.7)
Safe injection	175 (52.7)	157 (47.3)
Safe handling of potentially contaminated surface	153 (46.1)	179 (53.9)
Respiratory hygiene	120 (36.1)	212 (63.9)

Most of the respondents (83.4%) knew about hand hygiene, less than half knew about safe handling of potentially contaminated surface (46.1%) and respiratory hygiene (36.1%)

Table 4.3: Knowledge of SPs among health care workers in public hospital, Abuja

Level of knowledge	Frequency (n=332)	Percent (%)
Good (≥ 75 %)	141	42.5
Fair (50 - 74 %)	133	40.1
Poor (< 50 %)	58	17.5

Most of the respondents 82.6% (sum of 42.5% and 40.1%) had above average (score of 50% and above) level of knowledge of standard precautions. While 58 (17.5%) of them scored below average (less than 50%), thus corresponding to low level of knowledge of SPs.

Table 4.4: Knowledge of SPs among health care workers in the different level of Health facilities

Type of Health facility	Knowledge on SP		Total n (%)
	Adequate n (%)	Not adequate n (%)	
Primary	91 (70.5)	38 (29.5)	129 (100.0)
Secondary	111 (90.2)	12 (9.8)	123 (100.0)
Tertiary	72 (90.0)	8 (10.0)	80 (100.0)

Chi-Square = 21.029; p value = 0.001* *Statistically significant SP-Standard Precaution

Knowledge was graded as adequate (knowledge score of ≥ 50%) and not adequate (knowledge score of < 50%). Respondents from tertiary and secondary health facilities had more adequate knowledge than those working in primary health facilities and the difference was statistically significant ($p<0.01$).

Table 4.5: Knowledge of SPs among health care workers in different professional cadre

Occupation	Knowledge on SP		Total n (%)
	Adequate n (%)	Not adequate n (%)	
Doctors	50 (96.2)	2 (3.8)	52 (100.0)
Nurses	164 (80.4)	40 (19.6)	204 (100.0)
Laboratory Scientist/ Technician	60 (78.9)	16 (21.1)	76 (100.0)

Chi-Square = 8.017; p value = 0.018* *Statistically significant SP-Standard Precaution

Knowledge was graded as adequate (knowledge score of ≥ 50%) and not adequate (knowledge score of < 50%). Knowledge appeared to be adequate among all the health cadre, although Doctor have more adequate knowledge (96.2%) than other health cadre. The differences seen in the knowledge level was statistically significant ($p<0.01$).

4.3 Compliance with SPS among Respondents

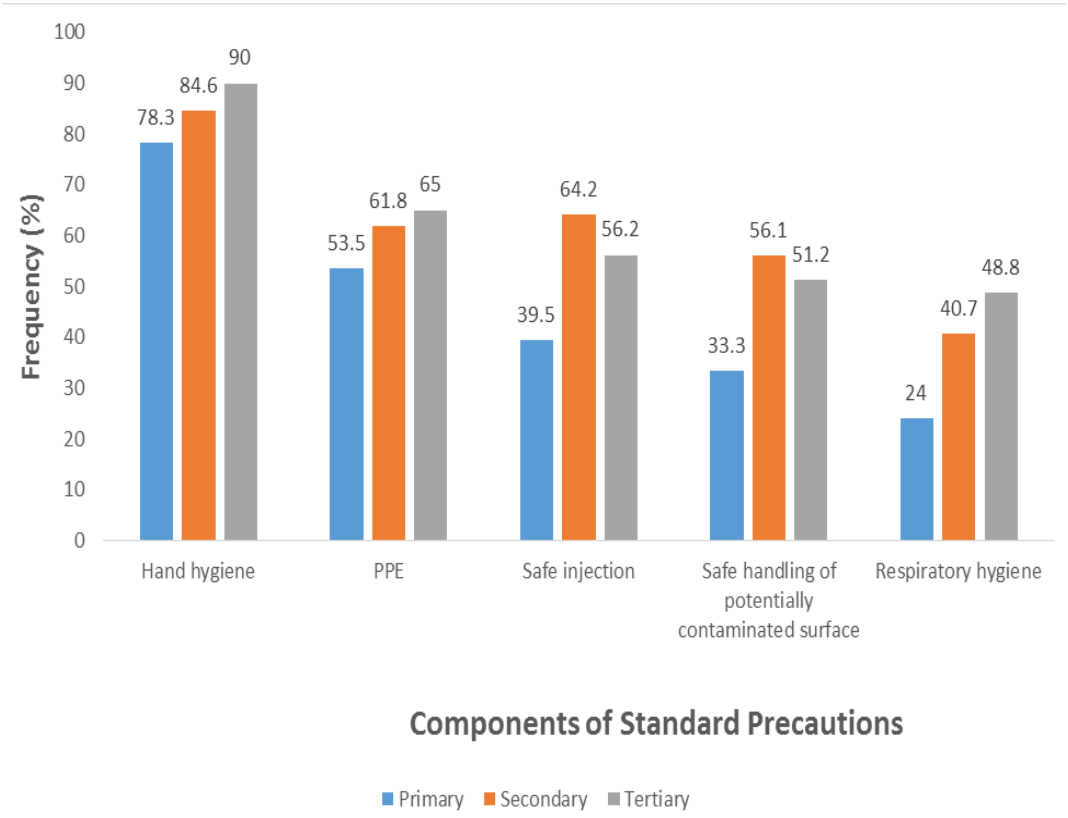


Figure 4.1: Compliance with Components of Standard Precaution

Health care workers in tertiary health facility were more compliant with hand hygiene (90%) compared to other health facilities. Health care workers in secondary health facilities are however more compliant with safe injection practices and safe handling of potentially contaminated surfaces (64.2% and 56.1%) compared to other type of health facilities.

Table 4.6: Level of Compliance with SPS among health care workers in public health facilities in Abuja

Compliance category	Frequency (n=332)	Percent (%)
High (3.51-4.00)	49	14.8
Average (2.51-3.50)	204	61.4
Low (1.51-2.50)	77	23.2
Very low (0.0-1.50)	2	0.6

Most of the respondents (61.4%) had average level of compliance with SPs and very few of the respondents had very low level of compliance with SPs. The mean compliance score of all the respondents was 2.89 (SD=0.54).

4.4 Factors affecting health care worker's Compliance with SPS

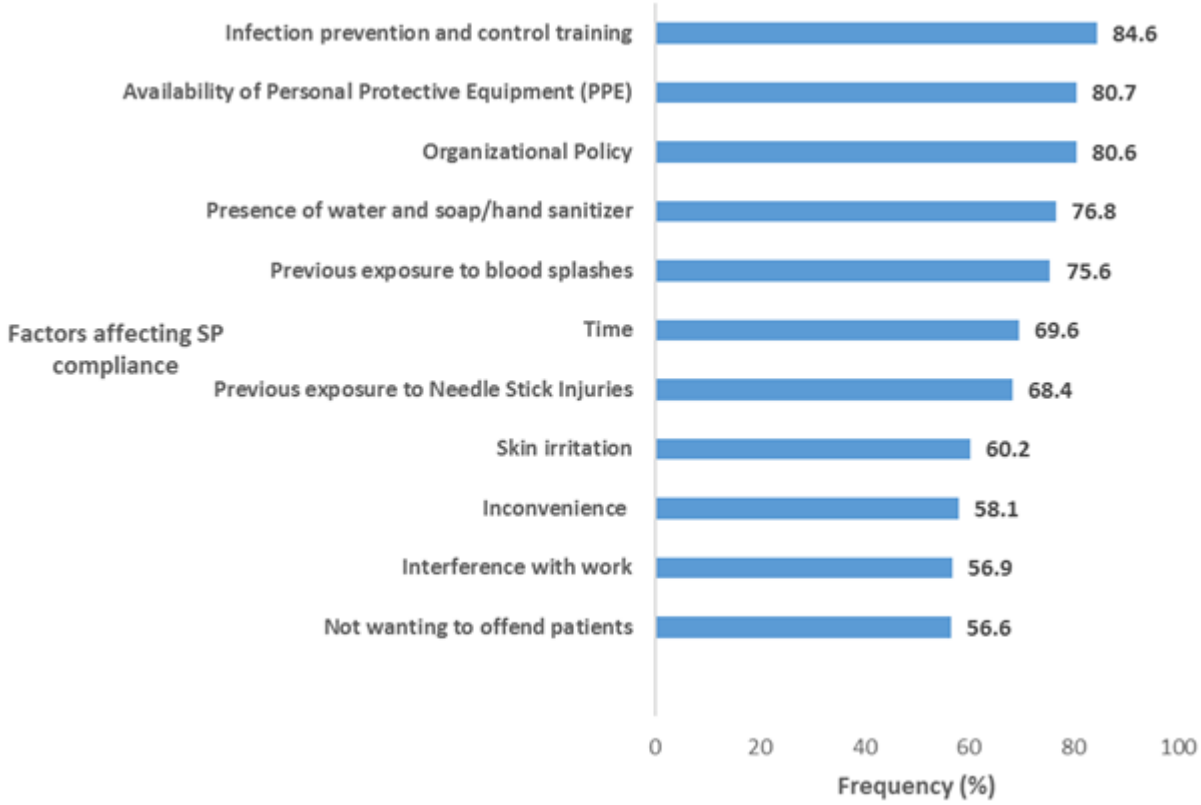


Figure 4.2: Factors affecting compliance to standard precautions among the study population

Infection prevention and control training had the most (84.6%) effect on health care worker's compliance with SPs while interference with work (56.9%) and not wanting to offend patients (56.6%) had the least effect on health care worker's compliance with SPs.

Table 4.7: Effect of socio-demographic factors on health care worker's compliance with Standard Precautions

Variables	Standard Precautions			Chi-Square	P value
	Compliant n (%)	Non-compliant n (%)	Total n (%)		
Age (years)					
≤40	163 (73.8)	58 (26.2)	221 (100.0)	2.187	0.139
>40	90 (81.8)	21 (18.9)	111 (100.0)		
Sex					
Female	173 (77.6)	50 (22.4)	223 (100.0)	0.707	0.401
Male	80 (73.4)	29 (26.6)	109 (100.0)		
Marital status					
Single	50 (70.4)	21 (29.6)	71 (100.0)	1.915	0.384
Married	197 (77.6)	57 (22.4)	254 (100.0)		
Separated/Divorced	6 (85.7)	1 (14.3)	7 (100.0)		
Occupation					
Laboratory scientist/technician	60 (78.9)	16 (21.1)	76 (100.0)	0.414	0.813
Nurses	154 (75.5)	50 (24.5)	204 (100.0)		
Medical doctors	39 (75.0)	13 (25.0)	52 (100.0)		

Compliance with Standard Precautions is not associated with age (p value=0.139), sex (p value=0.401), marital status (0.384) and (p value= 0.813).

Table 4.8: Bivariate analysis of factors associated with health care worker's compliance with standard precautions

Variables	Standard Precautions Compliance			Chi-Square	P value
	Compliant n (%)	Non-compliant n (%)	Total n (%)		
IPC Training					
Yes	218 (77.6)	63 (22.4)	281 (100.0)	1.908	0.167
No	35 (68.6)	16 (31.4)	51 (100.0)		
Availability of PPE					
Yes	206 (76.9)	62 (23.1)	268 (100.0)	0.335	0.563
No	47 (73.4)	17 (26.6)	64 (100.0)		
Organizational policy					
Yes	207 (76.4)	64 (23.6)	271 (100.0)	0.026	0.872
No	46 (75.4)	15 (24.6)	61 (100.0)		
Availability of water, soap and hand sanitizers					
Yes	195 (76.5)	60 (23.5)	255 (100.0)	0.043	0.836
No	58 (75.3)	19 (24.7)	77 (100.0)		
Skin irritation					
Yes	150 (75.0)	50 (25.0)	200 (100.0)	0.403	0.526
No	103 (78.0)	29 (22.0)	132 (100.0)		
Interference with work					
Yes	140 (74.1)	49 (25.9)	189 (100.0)	1.099	0.295
No	113 (79.0)	30 (21.0)	143 (100.0)		
Knowledge of SPS					
Poor	39 (67.2)	19 (32.8)	58 (100.0)	3.477	0.176
Fair	106 (79.7)	27 (20.3)	133 (100.0)		
Good	108 (76.6)	33 (23.4)	141 (100.0)		

Compliance with Standard Precautions is not associated with IPC training (0.167), availability of PPE (0.563), organisational policy (0.872), availability of water, soap and hand sanitizers (0.836), skin irritation (0.526), interference with work (0.295) and knowledge of SPs (0.176).

Table 4.9: Bivariate analysis for factors associated with health care worker's compliance with Standard Precautions (continuation)

Variables	Standard Precautions Compliance			Chi-Square	P value
	Compliant n (%)	Non-compliant n (%)	Total n (%)		
Not wanting to offend patient					
Yes	143 (76.1)	45 (23.9)	188 (100.0)	0.005	0.945
No	110 (76.4)	34 (23.6)	144 (100.0)		
Previous exposure to blood splashes					
Yes	187 (74.5)	64 (25.5)	251 (100.0)	1.645	0.200
No	66 (81.5)	15 (18.5)	81 (100.0)		
Time					
Yes	173 (74.9)	58 (25.1)	231 (100.0)	0.722	0.396
No	80 (79.2)	21 (20.8)	101 (100.0)		
Prior exposure to NSSIs					
Yes	169 (74.4)	58 (25.6)	227 (100.0)	1.220	0.269
No	84 (80.0)	21 (20.0)	105 (100.0)		
Inconvenience					
Yes	143 (74.1)	50 (25.9)	193(100.0)	1.133	0.287
No	110 (79.1)	29 (20.9)	139 (100.0)		
Years of practice of profession					
<10 years	206 (74.4)	71 (25.6)	277 (100.0)	6.427	0.040*
>10 years	47 (85.5)	8 (14.5)	55 (100.0)		
Health facility type					
Primary	91 (70.5)	38 (29.5)	129 (100.0)	7.614	0.022*
Secondary	104 (84.6)	19 (15.4)	123 (100.0)		
Tertiary	58 (72.5)	22 (27.5)	80 (100.0)		

At 5% level of significance, compliance was found to be significantly associated with health care worker's years of working experience (0.040) and type of health facility (0.022). Hence health care workers with more than 10 years working experience had significantly higher proportion (85.5%) of compliance with SPs than those with 10 years or less working experience.

Table 4.10: Multivariate Logistic regression of factors associated with Compliance with Standard Precautions

Independent Variables	Coefficient (B)	Adjusted Odds ratio (AOR)	95% Confidence intervals	p value
Years of practice of profession				
<10 years	-0.533	0.587	0.260 – 1.326	0.200
≥ 10 years	Reference			
Type of health facility				
Primary	-0.743	0.476	0.253 – 0.892	0.021*
Secondary	-0.055	0.946	0.507 – 1.766	0.862
Tertiary	Reference			
Constant	-0.836			0.0001

*Statistically significant

As shown in Table 16 above two factors were entered into the multiple logistic regression model, the only factor that was found to be significantly associated with compliance with SPs was type of health facility. Therefore health care workers working in primary health facilities are two times less likely to be compliant with SPS than those working in tertiary health facilities (AOR = 0.476, 95%C.I. = 0.253 - 0.892).

CHAPTER FIVE

DISCUSSION

This study explored the factors affecting healthcare worker's compliance with standard precautions in public health facilities in Abuja, Nigeria. In this study the proportion of healthcare workers with good Knowledge of SPs was 82.6%. The finding in this study is similar to what was reported in a study carried out in Northern Nigeria to assess practice of SPs among health care workers where knowledge was reported to be 87.3%.[37] It is also comparable with another study carried out among student nurses in the Philippine where knowledge of SPs was 89.7%. [38] However another study done to assess the knowledge and practice of SPs amongst health care workers in secondary Health facilities in Abuja health care worker's knowledge of SPs was poor 16.6%.[36] This wide discrepancy seen in this study despite the fact that they were carried out in the same locality could be because the latter study looked at only a level of Health care (secondary health facilities) which could be misleading. This study however looked at knowledge of SPs among Health care workers across all level of care (primary, secondary and tertiary) in order to have an unbiased representation of the Health care workers. Another reason for the wide discrepancy could be due to the study design employed in the study. A low level of knowledge of SPs among nurses, midwives, community health extension workers and health assistants was also seen in another study conducted in some rural local government area in north eastern Nigeria where low level of knowledge of 13% was seen among the respondents.[39] The reason for low level of knowledge of SPs among Health care workers in that study could be because the study focused only on Nurses, midwifes, community health officers, community health extension workers and health assistant. Those groups of Health care workers were a lower cadre of Health care workers and are likely to be less educated, another reason might be because that

study was carried among Health care workers working in rural health facilities which have less likelihood to have availability of commodities for SPs and also training on SPs.

In a comparative study to assess knowledge and Practice of Universal Precautions among healthcare professionals in Public and Private Health Facilities in southern Nigeria knowledge of SPS was reported to be higher in public health facilities (64.2%) compared to private Health facilities where knowledge was (54.2%).[41] It is noteworthy to report that in studies carried out in Texas, USA and another carried out in United Arab Emirates, knowledge of SPs among Health care workers was found to be 97.0% and 100% respectively.[28] This near optimal knowledge seen among Health care workers in UAE can be explained by the fact that the study was carried out in a teaching hospital involved in both undergraduate and postgraduate teaching and training and is one of the teaching hospitals affiliated to the Ministry of Higher Education in the UAE. The hospital also had a policy on use of SPs and nurses receive training on SPs when they are hired. The study carried out in Texas, USA may have had a high knowledge score because the study was carried out among residents and students who are more likely to have been trained on SPs as part of their curriculum. Some studies however reported average compliance with SPs, in a study conducted to assess ccompliance with Universal/Standard Precautions among health care workers in rural north India it was observed that knowledge of standard precautions was correct among only 56% of respondents.[29] Another study carried out among Health care workers in Jamaica, knowledge was found to be 64%.[14] In this study knowledge level was compared across the three levels of health facilities to know how adequate knowledge was among health care workers in these facilities, secondary health facilities had the highest knowledge level (90.2%) while primary health facilities had the lowest knowledge level of 70.5%. The differences seen in the knowledge level were statistically significant ($p<0.01$).

Health care worker's good knowledge of SPs in this study does not appear to translate to appropriate compliance with SPs. The overall level of compliance with standard precautions in this study was found to be 76.2% despite recording a good level of knowledge of SPs among the respondents. The findings in this study was similar to what was found in a study carried out to assess hand hygiene compliance among physicians in selected health facilities in Israel where compliance was found to be 77%,[46] it is also similar to what was found in another study carried out among Health care workers in northern Nigeria, where compliance was 72.7%.[37]

There is however a high level of compliance seen in some studies, in a study carried out among student nurses in the Philippine a total of 89.7% of them were found to be compliant with SPS.[38] In a comparative study carried out in Texas among resident doctors and students, compliance with universal precautions was also high 89%, although it was better among students (96%) than among residents (88%).[28] The high level of compliance with SPs among student nurses in Philippine was thought to be due to inclusion of the concepts of standard precautions in the Philippine nursing curriculum.[38] In the study carried out in Texas despite the high compliance to SPs found in the study respondents still argued that they could be more compliant if there were no time constraints and limitations.[28]

In some studies, health care worker's compliance with SPs was lower than what was found in this study. Health care worker's compliance to SPs was found to be low in studies carried among surgeons in a hospital in Egypt, among health care workers in Ethiopia and in studies carried out among Health care workers in China respectively where compliance was 57.5%,[25] 42.9%,[55] and 64.7%[35] respectively. These low level of compliance in these studies may be as a result of different monitoring methods used to score compliance.[35]

Compliance with various aspects of SPs also differs among Health care workers, in this study it was found that compliance to hand washing before and after patient care was 77.7%, hand washing before and after glove use was 67.8%, wearing gloves when touching blood/body fluids 95.5%, gloves before touching mucous membrane and non-intact skin 91.6%, wearing gown/apron to protect when carrying out procedures 73.5%, protecting the eyes during procedures 44%, waste disposal 18.4%, cough etiquette 69.6% and wearing of face mask during procedures was found to be 57.5%.

Many studies on compliance to specific aspects of standard precautions have also shown this varying degree of compliance. The findings in this study is similar to what was found in a study conducted by nurses and midwives on compliance with standard precautions in South Western Nigeria, where 96.1% of the respondents complied to hand hygiene and use of personal protective equipment (PPE), their hands after removal of gloves, 95.3% agreed they discard gloves after care of a single patient while 97.3% agreed that they wear facemask whenever there is a possibility of splash or splatter. Furthermore, it was discovered that 98.6% of the respondents agreed that they disposed all used sharp objects into the sharp boxes, 96% of the respondents agree they separated all waste and disposed according to category, 95.2% treated all patients and materials as if they were infectious, while 89.9% agreed they promptly wiped up all potentially contained spills using disinfectant.[24] Another similar finding was seen in another study carried out in only secondary health facilities in the same study area as this study it was found that hand washing was practiced by 97.46%; 97.83% reported regular use of hand gloves; 88.44% use gown or plastic apron; 68.95% use masks and eye protector.[36]

Findings in some studies showed that compliance was lower than what we found in this study, it is particularly so in an observational study carried in the USA among healthcare

workers working in the ICU it was observed that compliance with hand washing was 36% after any care was given, glove use was 62% and gown use was 63%.[56] The low level of compliance with hand washing in this study was thought to be due to possible lack of consistency that could have resulted from the relatively large number of observers involved in the study. However the result of the observational study could be said to be more reflective of what was really going on among health care workers, because in a non-observational study health care workers tend to over report desirable practices. In another study on compliance to hand hygiene and gloves use carried out in a rural health facility in China, the rate of non-compliance with glove utilization was 61%, the rate of non-compliance with hand hygiene was 40%, and the rate of non-compliance with both was 67%.[57] Furthermore in another study it was found that compliance with non-recapping of used needles was highest among trained nurses and worst with doctors, while use of PPE was 63.8% and use of goggle was 43.5% and hand washing after handling patients had high percentage 94.6%.[45]

In situations where compliance to standard precautions is not optimal, it has been found that several factors may be the reason why healthcare workers are not compliant. Various factors affecting compliance with SPs was assessed in this study including socio-demographic factors such as age, occupation, facility type, number of years that the respondents has been working in present health facility. Other factors assessed are knowledge of standard precautions, availability of consumables for standard precautions, availability of water, previous exposure to blood borne pathogens through needle stick and sharps injuries, Infection prevention and control training, exposure to blood splashes, organizational policy, skin irritation, time, not wanting to offend patients, Interference with work, inconvenience etc.

This findings in this study of effect of factors such as years of working experience to be significantly associated with compliance with SPs is similar to what was found in a study carried out in Texas, USA where observed rate of compliance with universal precautions by participants indicates that individual compliance was inversely related to the years of experience.[28]

Another factor that significantly affects compliance in this study was type of health facility that the Health care workers are working. Therefore it can be deduced from this findings that the longer a healthcare worker spends in a health facility the more training on standard precaution he or she may have attended thus the more compliant he or she may be, seniority also means less workload and more time to comply with standard precautions. Availability of commodities/consumables for standard precautions and the availability of resources to set up infection control committee and to hold regular training and sensitization for healthcare workers on standard precautions may be more in tertiary hospital compared to secondary and primary health facilities thereby making the healthcare workers in tertiary hospitals to be more compliant with standard precautions than those in secondary and primary.

Factors that were found to associated with compliance but these associations was not significant are age of respondents, sex of respondents, marital status, IPC training, availability of PPE in the health facilities, presence of organisational policy in health facilities, availability of water, soap and hand sanitizers in health facilities, skin irritation, interference with their works, not wanting to offend patients, previous exposure to blood splashes and prior exposure to NSSI.

The findings in this study is similar to what was found in a study carried out in India where good compliance with SPs was associated with being in the job for a longer period, knowledge of blood borne pathogen transmission, perceiving fewer barriers to safe practice

and a strong commitment to workplace safety climate.[29] Furthermore a study carried out among Health care workers in north eastern Nigeria it was found that factors such as years of practice has positive effect on healthcare workers compliance with standard precautions.[39] The study further revealed that negative attitude and limited knowledge about standard precautions adversely affects healthcare workers compliance with standard precautions.

The logistic regression analysis of this study reveals that level of Health facility is a determinant of Compliance with SPs, health care workers working in primary health facilities were less like to be compliant with SPs than those in tertiary health facilities.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This study carried out among health care workers to assess the factors affecting compliance with standard precautions made the conclusions that the level of knowledge of SPs among health care workers is good, however the level of knowledge does not directly translate to compliance as the level of health care worker's compliance to SPs is average. It is also concluded that the average compliance seen was the direct effect of factors such as unavailability of PPE and other equipment and lack of regular training. The study also revealed that the type/level of Health facility is a determinant of HCW's Compliance with SPs i.e. HCW working in Primary health facilities were three times less like to be compliant with SPs than those in Tertiary health facilities.

6.2 Recommendations

1. In order to ensure that knowledge of health worker about SPs is translated to compliance, health facilities should build the capacity of health workers on Standard Precautions through regular training, retraining and attendance of workshops
2. Management of Health facilities should ensure availability of sufficient practical personal protection equipment and other commodities in order to enhance health care worker's compliance with SPs and thus reduce the occurrence of hospital acquired infections among patients and also reduce the prevalence of blood borne pathogens among health care workers.
3. In order to encourage health workers in Primary health facilities to comply with SPs, Hospital management board should pay more attention to health care workers in primary health facilities by setting up of functional infection control committees that will conduct regular training on infection prevention and control and ensure constant availability of commodities for SPs such as water gloves, face masks, water, hand sanitizers, goggles, etc
4. The Federal Ministry of Health should develop country specific policies and guidelines on the need for compliance of health care workers with SPs and ensure strict implementation of these policies at all levels of health care especially primary health care.

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Appendix 1

CONSENT FORM

SERIAL NUMBER: …….

Dear Sir/Ma,

I am carrying out a study to assess factors affecting compliance with standard precaution amongst healthcare workers. All information you give would be kept confidential and your name would not be used. To further protect your confidentiality, you would drop your completed questionnaire in the slotted box provided.

However you are not in any way bound to give your consent. Your non-participation would not affect your job in any way.

Please I would like to know whether you are willing to participate in the study by your ticking the appropriate box below.

Yes ☐ No ☐

.....

(Signature and Date)

Thank you.

Dr. Irene Esu,
Resident, Nigeria Field Epidemiology
and Laboratory Training Program (NFELTP)

Appendix 2

QUESTIONAIRE ON THE ASSESSMENT OF FACTORS AFFECTING COMPLIANCE WITH STANDARD PRECAUTION AMONGST HEALTHCARE WORKERS IN ABUJA HOSPITALS, 2016

A. SOCIODEMOGRAPHIC DATA

1. Initials: ……
2. Age (in years) as at last birthday: ……
3. Sex: Male ☐ Female ☐
4. Marital Status: Single ☐ Married ☐ Divorced ☐
5. Occupation: Doctor ☐ Nurse ☐ Lab. Sci/Tech ☐ Cleaner ☐
6. Health facility: ……
7. Type of Health facility: Primary ☐ Secondary ☐ Tertiary ☐
8. Years of working in above Health facility: ……

B. KNOWLEDGE OF STANDARD PRECAUTION

9. Do you know what Standard precautions are?

    a. Yes b. No *If no go to next section

10. If yes, what are Standard Precautions?

    ……
    ……
    ……
    ……

11. What are the various components of Standard Precaution?
    a. Hand hygiene (Washing hands before and after procedures) ☐
    b. Head hygiene ☐
    c. Safe handling of food ☐
    d. Use of spoon to eat food ☐
    e. Use of personal protective equipment (e.g., gloves, gowns, masks) ☐
    f. Washing hands only after handling 10 patients ☐
    g. Safe injection practices ☐
    h. Safe handling of potentially contaminated equipment or surfaces in the patient environment ☐
    i. Respiratory hygiene/cough etiquette ☐

12. Who should comply with Standard Precaution?

    a. Doctors ☐ b. Nurses ☐
    b. All Healthcare worker ☐ d. Lab. Sci./Tech ☐

13. When should Standard Precaution be practiced?

    a. For patients with Blood-borne pathogen infections only ☐
    b. For Patients with Respiratory tract infection only ☐
    c. For Adult patients only ☐
    d. For all patients at all times ☐

14. Why is it important to observe Standard Precaution?

    a. To protect patients ☐
    b. To protect the Healthcare worker ☐
    c. To protect both Patients and Healthcare worker ☐

C. COMPLIANCE WITH STANDARD PRECAUTION

15. Do you wash your hands before and after patient care?

    a. Always b. Usually c. Sometimes d. Seldom e. Never

16. Do you wash your hands before and after using gloves?

    a. Always b. Usually c. Sometimes d. Seldom e. Never

17. Do you wash your hands when unwanted touching of blood, body fluids, excretions, and contaminated items occurs?

a. Always b. Usually c. Sometimes d. Seldom e. Never

18. Do you wear gloves before touching mucous membranes and non-intact skin?

a. Always b. Usually c. Sometimes d. Seldom e. Never

19. Do you wear a gown to protect mucous membranes when procedures and activities are likely to generate splashes or sprays of blood and body fluids?

a. Always b. Usually c. Sometimes d. Seldom e. Never

20. Do you wear goggles to protect mucous membranes of the eyes (including persons who wear eyeglasses) when procedures and activities are likely to generate splashes or sprays of blood and body fluids?

a. Always b. Usually c. Sometimes d. Seldom e. Never

21. Do you wear a surgical mask to protect the nose and mouth when procedures and activities are likely to generate splashes or sprays of blood and body fluids?

a. Always b. Usually c. Sometimes d. Seldom e. Never

22. Do you bend needles before disposal?

a. Always b. Usually c. Sometimes d. Seldom e. Never

23. Do you practice safe respiratory hygiene/cough etiquette

a. Always b. Usually c. Sometimes d. Seldom e. Never

D. FACTORS AFFECTING COMPLIANCE WITH STANDARD PRECAUTION

	Yes	**No**
24. Infection prevention and control training:	☐	☐
25. Previous exposure to Needle Stick Injuries :	☐	☐
26. Previous exposure to blood splashes:		☐
27. Presence of water and soap/hand sanitizer:	☐	☐
28. Availability of Personal Protective Equipment (PPE):	☐	☐
29. Organizational Policy:	☐	☐
30. Skin irritation	☐	☐
31. Time	☐	☐

32. Not wanting to offend patients ☐ ☐

33. Interference with work ☐ ☐

34. Inconvenience ☐ ☐

Appendix 3

Tertiary, Secondary and Primary Health facilities selected for the study

Health facility	Doctors	Nurses/ CHEWs	Laboratory Scientist/Technicians	Total
National hospital	**131**	**415**	**49**	**595**
Nyanya General hospital	**15**	**80**	**5**	**100**
Maitama district hospital	**41**	**156**	**18**	**215**
Kubwa General hospital	**17**	**85**	**8**	**110**
Kwali General hospital	**6**	**48**	**5**	**59**

Abaji General hospital	**6**	**25**	**5**	**36**
Kuje General hospital	**22**	**77**	**15**	**114**
Kwali PHCs	**3**	**130**	**8**	**141**
Kuje PHCs	**3**	**126**	**8**	**137**
Abaji PHCs	**4**	**96**	**3**	**103**
Bwari PHCs	**4**	**160**	**13**	**177**
AMAC PHCs	**6**	**112**	**10**	**128**
Gwagwalada PHCs	**2**	**76**	**5**	**83**

Appendix 4

Table 1: Proportionate allocation of Doctors in the selected hospitals

Type of health facility	**Health Facility**	**Sample size required (n)**	**Summation of health care workers (∑N)**	**Total no Doctors (n_d)**	**Proportionate sample size for Doctors Nf= $\frac{n_d * n}{\sum N}$**
Tertiary	National Hospital	130	595	131	28
Secondary	Maitama District Hospital	21	215	41	4
	Kwali General Hospital (n=2)	21	59	6	2

	Nyanya General Hospital (21)	21	100	15	3
	Kuje General Hospital (21)	21	114	22	4
	Kubwa General Hospital (21)	21	110	17	3
	Abaji General Hospital (21)	21	36	6	4
Primary	Kwali PHCs (15)	15	141	3	1
	Kuje PHCs (15)	15	137	3	1
	Abaji PHCs (15)	15	103	4	1
	Bwari PHCs (15)	15	177	4	1
	AMAC PHCs (15)	15	128	6	1
	Gwagwalada PHCs (15)	15	83	2	1

Table 2: Proportionate allocation of Nurses in the selected hospitals

Type of health facility	**Health Facility**	**Sample size required (n)**	**Summation of health care workers (∑N)**	**Total no Nurses (n_d)**	**Proportionate sample size for Nurses Nf= $\frac{n_d * n}{\sum N}$**
Tertiary	National Hospital	130	595	415	89
Secondary	Maitama District Hospital (n=21)	21	215	156	15
	Kwali General Hospital (n=2)	21	59	48	17

	Nyanya General Hospital (21)	21	100	80	17
	Kuje General Hospital (21)	21	114	77	14
	Kubwa General Hospital (21)	21	110	85	16
	Abaji General Hospital (21)	21	36	25	15
Primary	Kwali PHCs (15)	15	141	130	13
	Kuje PHCs (15)	15	137	126	13
	Abaji PHCs (15)	15	103	96	13
	Bwari PHCs (15)	15	177	160	13
	AMAC PHCs (15)	15	128	112	13
	Gwagwalada PHCs (15)	15	83	76	13

Table 3: Proportionate allocation of Laboratory Scientists/Technicians in selected hospitals

Type of health facility	**Health Facility**	**Sample size required (n)**	**Summation of health care workers** $(\sum N)$	**Total no Lab. Sci./Tech.** (n_d)	**Proportionate sample size for Lab. Sci./Tech.** $Nf = \frac{n_d * n}{\sum N}$
Tertiary	National Hospital	130	595	49	11
Secondary	Maitama District Hospital (n=21)	21	215	18	2
	Kwali General Hospital (n=2)	21	59	5	2

	Nyanya General Hospital (21)	21	100	5	1
	Kuje General Hospital (21)	21	114	15	3
	Kubwa General Hospital (21)	21	110	8	2
	Abaji General Hospital (21)	21	36	5	3
Primary	Kwali PHCs (15)	15	141	8	1
	Kuje PHCs (15)	15	137	8	1
	Abaji PHCs (15)	15	103	3	1
	Bwari PHCs (15)	15	177	13	1
	AMAC PHCs (15)	15	128	10	1
	Gwagwalada PHCs (15)	15	83	5	1

Appendix 5

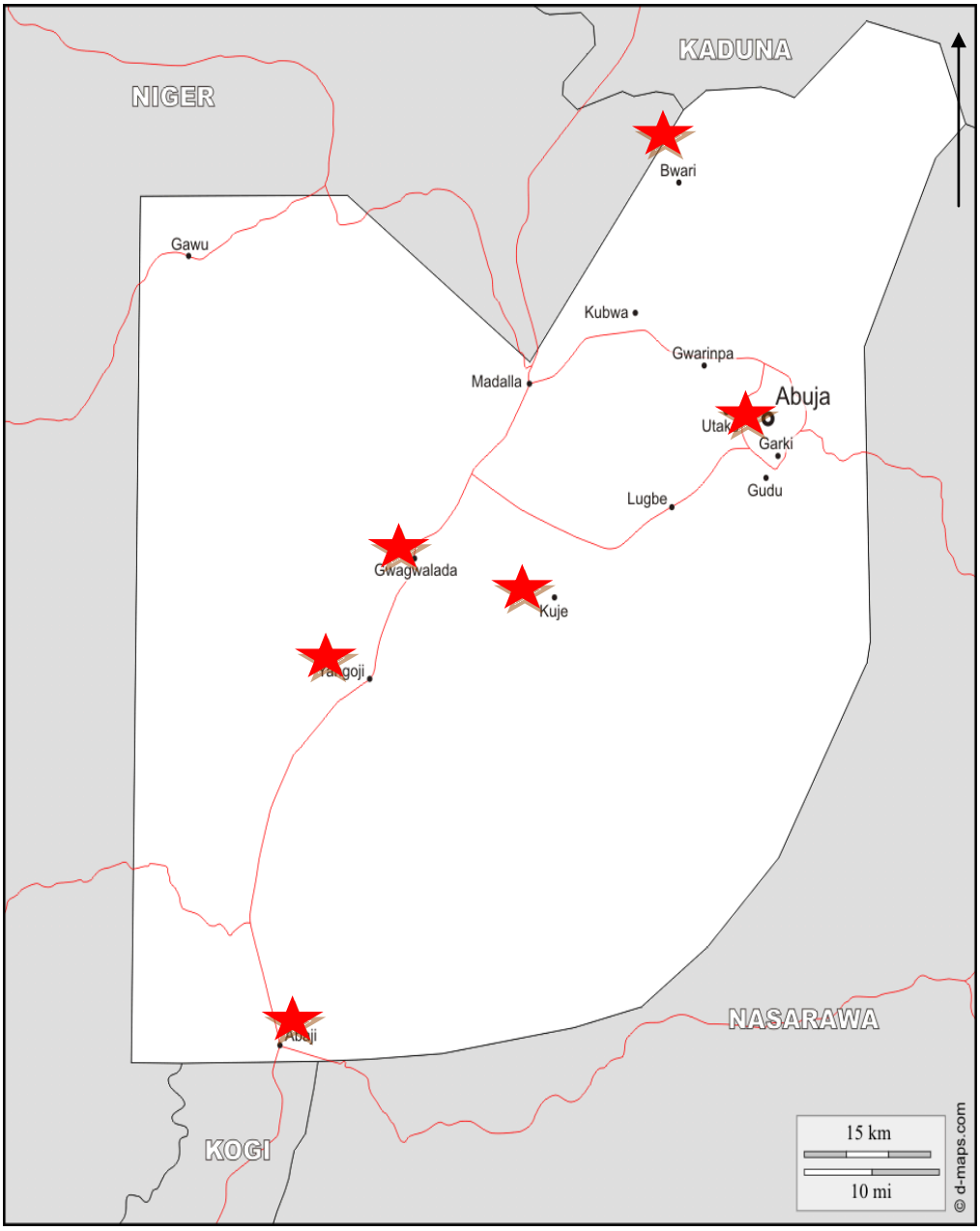
WORK PLAN

Activity	**Aug.**	**Sept.**	**Oct.**	**Nov**	**Dec**	**Jan.**	Feb	**March**	April	**May.**	**June**
Research development	xxx										
Proposal defence		xxx									

Training of Research assistants				xxx	xxx						
Pre-test of Questionnaires and validation				xxx	xxx						
Data collection and analysis						xxx	xxx				
Report writing								xxx	xxx		

Appendix 6

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Map of Abuja showing the Area councils where Health facilities were chosen for the study

Appendix 7

Ethical Clearance





ABUJA MUNICIPAL AREA COUNCIL

FCT - ABUJA. NIGERIA

HEALTH

.....DEPARTMENT



FEDERAL CAPITAL TERRITORY ADMINISTRATION

Health and Human Service Secretariat

HOSPITALS MANAGEMENT BOARD

NYANYA GENERAL HOSPITAL

Our Ref:
Your Ref:
Date:

30/03/2016

Nyanya FCT - Abuja



HEALTH AND HUMAN SERVICES SECRETARIAT (FCTA)

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Our Ref: FCTA/HHSS/HMB/GEN/0381/1

Date: 4th March, 2016

Dr. Irene Esu