

**UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENT AND  
ASSOCIATED FACTORS AMONG NURSES AT THIKA LEVEL 5 HOSPITAL**

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## DECLARATION AND APPROVAL

### Declaration by student


I confirm that this thesis is my original work and has never been presented for an award of a degree in any university.

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## **DEDICATION**

This work is dedicated to my late dad (Usman Muhammad Ajiya) and mum (Rabi'at Isah) for always being there for me.

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>FP</b>	:	Family Planning
<b>HAI</b>	:	Health-care-associated infection
<b>HCW</b>	:	Health Care Worker
<b>HFRF</b>	:	Health Facility Related Factor
<b>HH</b>	:	Hand Hygiene
<b>HIV</b>	:	Human Immuno-deficiency Virus
<b>HM</b>	:	Hospital Management
<b>HP</b>	:	Hospital Policy
<b>ICU</b>	:	Intensive Care Unit
<b>IPC</b>	:	Infection Prevention and Control
<b>MR</b>	:	Mortality Rate
<b>NHS</b>	:	National Health Service
<b>NRF</b>	:	Nurses Related Factors
<b>PPE</b>	:	Personal Protective Equipment
<b>PSS</b>	:	Proportionate Sample Size
<b>SPSS</b>	:	Statistical Package for Social Sciences
<b>TL5H</b>	:	Thika Level 5 Hospital
<b>U.K.</b>	:	United Kingdom
<b>UKNIHCE</b>	:	United Kingdom's National Institute for Health and Clinical Excellence
<b>U.S.</b>	:	United States
<b>VCT</b>	:	Voluntary Counselling and Testing
<b>VIF</b>	:	Variance Inflated Factors
<b>WHO</b>	:	World Health Organization

## **CHAPTER ONE: INTRODUCTION**

### **1.1 Background Information**

The professionals in the sector of health care are continually exposed to microorganisms, a significant number of which can cause serious or even deadly diseases. Health-care-associated infection (HAI) refers to an infection that is acquired during the process of care and not manifested at the time of admission to a hospital or other healthcare facility. According to Karen et al. (2015), nurses are at high risk of contamination and transmission of infection within the hospital setting due to the nature of their responsibilities. Therefore, it is important to protect them from being infected by microorganisms, and also prevent the spread of these infectious organisms within the hospital setting.

Personal Protective Equipment (PPE) refers to specialized clothing or equipment used for protection against infectious materials. They are a very important part of Standard Precaution (Karen et al., 2015). PPE includes aprons, gloves, gowns, eye protectors (goggles, glasses), caps, laboratory coats, boots, resuscitation bags, and face shields/masks. PPE creates a barrier between the nurse and the infectious organisms thereby preventing the nurse, the patient, and the visitors from being infected, and also prevent the spread of infection within the hospital. PPE prevents contamination of the mucous membranes, airways, skin, clothing, hair, and shoes of the Health Care Worker (HCW), thus preventing the transmission of infectious agents (Cally et al., 2015).

Great practice rules advocate risk evaluation of the potential for introduction and utilization of fitting equipment to deal with hazards (Karen et al., 2015). World Health Organization (WHO) has recommended health care professionals conduct a routine appraisal of their danger of exposure to blood and other body fluids before the

provision of any health care services and utilize the proper PPE for protection. The United Kingdom's National Institute for Health and Clinical Excellence (UKNIHCE) likewise has supported the utilization of proper PPE following correct evaluation of the HCW's risk of being contaminated and the risk of transmitting microorganisms (WHO, 2008). In Australia, guidelines for the use of PPE support careful consideration of the likelihood of health care professionals' exposure to blood and other body fluids, and the possible sort of infectious agents and their course of transmission.

Steed et al. (2011) argued that hospitals should put the elimination of health care-associated infections top on the list of the hospital quality and patient safety programs. PPE is very effective in preventing the transmission of infection. Thus, this study sought to examine the utilization of Personal Protective Equipment among nurses at Thika level 5 Hospital.

## **1.2 Statement of the Problem**

The incidence of infections among nurses is increasing tremendously in the world, with the highest percentage from the third world countries (WHO, 2008). Hospital-acquired infections have been recognized as a problem affecting the quality of health care and a principal source of adverse healthcare outcomes. Hospital-acquired infection occurs due to poor utilization of PPE among healthcare workers. In the Southeastern region of the United States (U.S.), the annual cost associated with hospital-acquired infections exceeded \$26 million (Anderson et al., 2009). These findings are indicative of the high economic burden associated with hospital-acquired infections. In 2009, about 143 cases of Human Immuno-deficiency Virus (HIV) were reported among nurses and other healthcare personnel in the US (CDC, 2010).

In Africa, the outbreak of Ebola in Nigeria took the lives of a senior medical consultant (Endocrinologists), two nurses, and a protocol officer in August 2014, all of whom had contact with the first Ebola victim Mr. Sawyer without adequate protection with PPE at the emergency treatment Centre in Lagos Nigeria (Federal Ministry of Health, 2014). In Kenya, nurses are at risk of acquiring HAI. For example, a study by Moyo (2013) found out that about 20% of nurses at Mbagathi District Hospital sustained needle pricks during service delivery while taking care of patients with differing infections, thus putting them at the risk of acquiring HAI. At Thika level 5 Hospital, several new cases of HIV, Tuberculosis, and Hepatitis are recorded frequently among the nurses. According to statistics, about 470 new cases of HIV were diagnosed between January and July 2016, out of which 86% (404) were enrolled with the facility for antiretroviral therapy. Two percent (4) of these clients died (Thika Level 5 hospital, 2016). These figures include nurses and other healthcare workers, even though all effort to receive the actual figure of nurses infected was unsuccessful. Hence, there is a great need to examine the utilization of Personal Protective Equipment among nurses at Thika level 5 Hospital.

### **1.3 Justification of the study**

Several patients suffer HAIs following their admission to the hospital. Nurses are implicated in the transmission of HAIs as they interact with the patient and environment more than other healthcare workers. This burden can be curdled with the proper utilization of PPE in the hospital. It is therefore important to create a barrier between the nurse and the infectious organisms. Studies have been conducted on other infection control measures at Thika Level 5 Hospital, but rarely a study examining utilization of PPE among nurses remain elusive - despite its importance in preventing the spread of HAIs. This study sought to identify existing gaps and thereby strengthen

the utilization of PPE at Thika Level 5 Hospital. The study aimed at establishing the actual utilization of PPE and the factors that influence compliance with WHO guidelines for use of PPE among nurses. This may give a good benchmark for developing and executing effective interventions for supporting the recognized positive behavior of nurses and fixing the identified gaps in performance among nurses working at Thika Level 5 Hospital. The findings of this study may also serve as a reference for other researchers as well as stimulating further research in the area.

#### **1.4 Research Questions**

1. What is the level of utilization of PPE among nurses at Thika Level 5 Hospital?
2. What is the influence of knowledge on the utilization of PPE among nurses at Thika Level 5 Hospital?
3. Which is the influence of attitude on the utilization of PPE among nurses at Thika Level 5 hospital?
4. What is the influence of health-facility factors on the utilization of PPE among nurses at Thika Level 5 Hospital?

#### **1.5 Hypotheses**

1. H<sub>01</sub>: There is no significant relationship between knowledge and utilization of PPE among nurses at Thika Level 5 hospital.
2. H<sub>02</sub>: There is no significant relationship between attitude and utilization of PPE among nurses at Thika Level 5 hospital.
3. H<sub>03</sub>: There is no significant relationship between health-facility-related factors and utilization of PPE among nurses at Thika Level 5 hospital.

## **1.6 Study Objectives**

### **1.6.1 Broad Objective**

To examine the antecedents that influence utilization of PPE among nurses at Thika level 5 Hospital?

### **1.6.2 Specific Objectives**

1. To establish the utilization level of PPE among nurses at Thika Level 5 Hospital.
2. To determine the influence of knowledge on utilization of PPE among nurses at Thika Level 5 hospital.
3. To establish the influence of attitude on utilization of PPE among nurses at Thika Level 5 hospital.
4. To examine the relationship between health-facility-related factors and utilization of PPE among nurses at Thika Level 5 hospital.

## **1.7 Limitations of the Study**

The study adopted a cross-sectional descriptive survey design and focused on the utilization of PPE among nurses in Thika Level 5 hospital in Kiambu County. Thus, caution should be exercised when generalizing the study findings to other hospitals in different counties in Kenya and beyond. Additionally, the study investigated the influence of three variables on the utilization of PPE among nurses working in Thika Level 5 hospital, namely: knowledge about PPE, attitudes towards PPE use, and health-facility and behavioral factors. Thus, the results of the study can only be interpreted from the influence of these variables. Also, the non-response among the study participants was an issue although it was minimized by providing them with elaborate informed consent and distributing the questionnaires by the researcher without being

assisted by the research assistant. Some participants were hesitant to provide the research with the required personal information for fear of consequences that could ensue. However, the researcher alleviated this issue by assuring the study participants of the ultimate confidentiality of the information provided.

### **1.8 Delimitations of the Study**

Delimitations in a research work refer to the features that limit the scope and establishes the boundaries within which the study will be carried out. The present study was carried out within certain delimitations. First, the researcher set to investigate the influence of knowledge about personal protective equipment among nurses, attitudes of nurses toward the utilization of personal protective equipment, and health facility-related factors on the utilization of personal protective equipment. Second, the researcher conducted the study in Thika Level 5 hospital situated in Thika Town of Kiambu County. Lastly, the study targeted all nurses working at Thika Level 5 hospital.

### **1.9 Theoretical Framework**

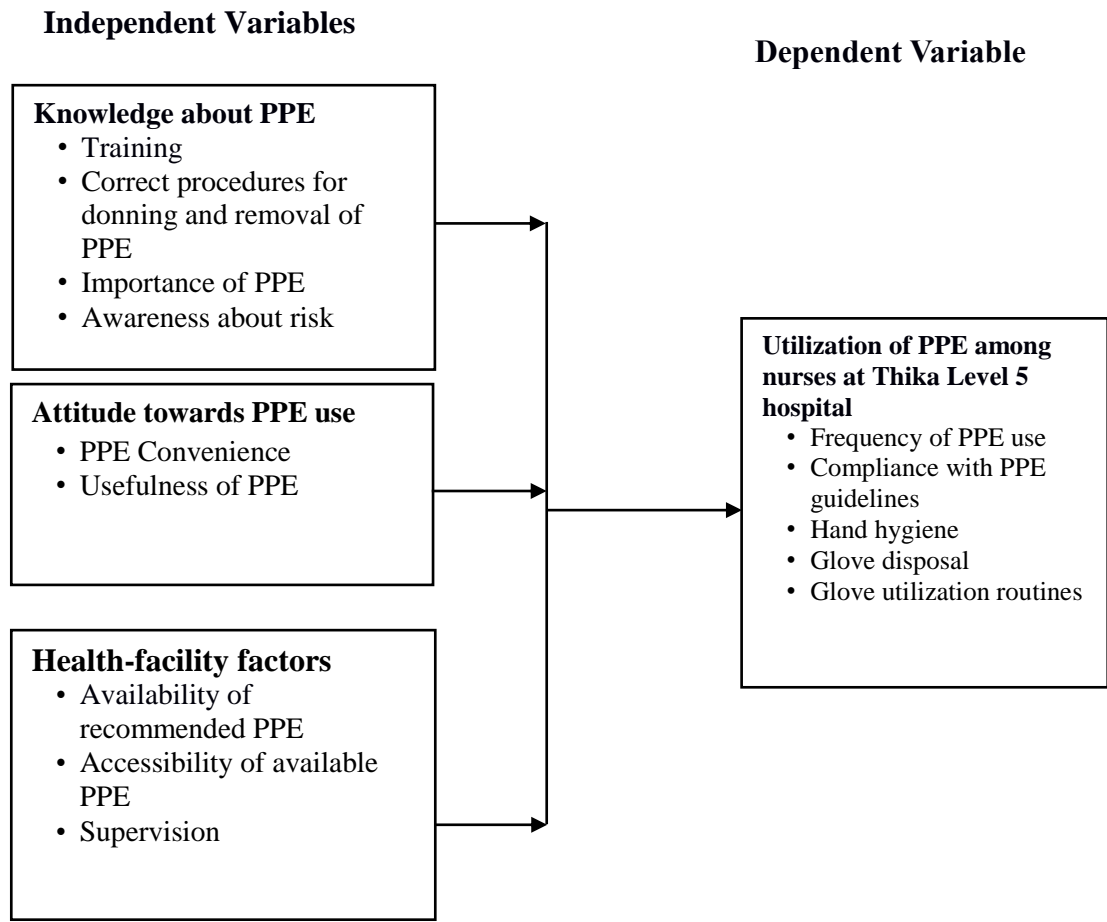
The study was premised on the Health Belief Model. The model was first developed in the 1950s by the social psychologists Hochbaum, Rosenstock, and Kegels in the United States Public Health Services (DiClemente & Peterson, 1994). According to Rosenstock, (1974), changes of behavior depend on the following five factors: perceived severity, perceived susceptibility, perceived benefits, perceived barriers, and cues to action. Rosenstock (2005) contended that each individual sees the seriousness or reality of a medical issue unexpectedly. As indicated by Rosenstock (2005), the individual sees the gravity of sickness by pondering the illness and the issues that it can cause for the person in question later on; for instance; passing or permanent disability.

As indicated by Rosenstock (2005), perceived susceptibility alludes to the person that is in danger of contracting a disease. Every individual varies in the acknowledgment of the disease. A portion of the people denies they can contract any health issue and a portion of the people feel that they are at genuine risk of getting the condition (Rosenstock, 2005). He further expressed that the course of activity that the individual will take is for the most part affected by the convictions in regards to the distinctive options. If the alternative is obtainable and can decrease the vulnerability to a disease or the harshness of a disease, then the individual will perceive this alternative as an advantage. At the point when the option is seen as an advantage, and yet it is badly designed, costly or hard to utilize, at that point, it has negative perspectives which can impact the person's wellbeing activity (Rosenstock, 2005). He further expressed that if the preparation to act is low while the potential negative angles are viewed as solid, they work as hindrances to forestall the activity (Rosenstock, 2005).

These five variables can determine what health-related action the nurse (as applied in this study) is going to take. As per Davidhazir (1983), because nurses have considerably more contact with patients than some other health care workers, they are in a position to impact health behavior.

### **1.10 Conceptual Framework on Utilization of PPE**

Figure 1.1 illustrates the study conceptual framework and demonstrates the relationship between the independent variables and the dependent variable. As indicated in figure 1.1, knowledge on PPE, attitudes towards PPE use, and healthy facility/behavior-related factors are theorized to have a direct influence on the utilization of PPE among nurses working in Thika Level 5 hospital.



**Figure 1.1. Conceptual framework for examining utilization of PPE among nurses at Thika Level 5 hospital**

### **1.11 Operational Definitions of Terms**

**Attitude:** used in the study to refer to beliefs and opinions concerning Personal Protective Equipment (PPE) use among nurses.

**Behavioral factors:** operationalized to mean ways in which nurses utilize Personal Protective Equipment and the behaviors concerning recommended PPE.

**Health facility factors:** used in the study to refer to factors associated with the hospital concerning PPE.

**Knowledge:** operationalized to refer to awareness of the nurses about the utilization of PPE.

**Personal Protective Equipment:** refers to recommended equipment that protects health care providers against infections when handling patients.

**Utilization:** used in the study to refer to how often nurses utilize PPE and comply with the laid-out procedures for using PPE.

## CHAPTER TWO: LITERATURE REVIEW

### 2.0 Introduction

This chapter presents literature on the utilization of Personal Protective Equipment. It will be discussed under the following: nurse-related factors (knowledge about PPE and attitudes towards the use of PPE) and health-facility and behavioral factors.

The necessity for controlling infections in healthcare facilities is conceived out of the need to counteract healthcare-associated infections. (HAI). HAI is one major cause of morbidity and mortality, prolonged hospitalization, as well as increased cost of treatment in the world today (reference). The prevalence in the developed world is reported to be 15% among hospitalized patients while it is as high as 37% for patients admitted into the Intensive Care Unit. The prevalence of HAI in developing countries is about 19% among hospitalized patients. In the United States (U.S), the additional use because of HAI is in overabundance of \$4.5 billion, while in the United Kingdom (U.K), a death rate of 13% and delayed hospital stay by a factor of 2.5 was accounted for. HAI remains a noteworthy reason for preventable morbidity and mortality in sub-Saharan Africa, this is due to poor utilization of PPE and overcrowding of hospitals (Iliyasu et al., 2016). Health-care workers are implicated in the spread of HAI. Karen et al. (2015) stated that nurses are at high risk of contamination and transmission of infection within the hospital setting due to the nature of their responsibilities. Proper utilization of PPE can help to curdle this burden, as it reduces the risks of exposure to infectious agents. Hence, several factors are affecting the utilization of PPE among nurses and these factors can be classified into two; (1) nurse-related factors and (2) hospital-related factors.

## **2.1 Nurse related factors influencing utilization of PPE**

Nurse-related factors are those factors from the individual (nurse) that can affect the utilization of PPE. These include socio-demographic characteristics such as age, gender, knowledge, and attitude. These factors have been shown to affect the utilization of PPE.

### **2.2.1 Demographic Characteristics**

Age and gender have been found to influence the utilization of PPE among nurses. For example, Alao, Duradola, Ibrahim, and Asinobi (2020) did a study in Southwest and Northwest Nigeria and focused on health workers' knowledge, beliefs, attitudes, and use of personal protective equipment for the prevention of COVID-19 infection in low-resource settings. Their study revealed that age (younger than 45 years) was a good predictor of knowledge about the use of personal protective equipment. Of note in their study is the fact that younger participants (less than 45 years), both nurses and medical students, were more knowledgeable about PPE among the various cadres of health care workers. Abukhelaif (2019) found similar results in a study investigating PPE knowledge and practices among medical nurses working at Al-Baha King Fahad Hospital in Saudi Arabia. The study found strong evidence of a positive relationship between awareness of the respondents with PPE with most of the nurses' demographic characteristics (age, gender, and level of education).

Atinafu Ataro et al. (2019) study on knowledge, attitude, and practice on PPE utilization among HCWs in Adare Comprehensive Hospital in Ethiopia found strong evidence of the influence of demographic characteristics (marital status and educational status) on KAP and utilization of PPE. On the same note, Wibonela et al. (2020) found out that gender and level of education statistically significantly influenced the practice

of wearing protective gear in their study on adherence to universal precautions and associated factors among nurses caring for critically ill patients in Dar es Salaam in Tanzania. Similarly, Moyo (2013) in his study on factors influencing adherence to standard precaution stated that 75% of nurses aged 30 and above had no knowledge of elements of standard precaution for the use of PPE. With regards to gender, only 73% of male nurses have no knowledge of elements of standard precaution for the use of PPE compared to 83% of female nurses with no knowledge of elements of standard precaution for the use of PPE.

### **2.2.2 Knowledge about PPE**

Knowledge is defined as what we know: it involves the mental process of comprehension, understanding, and learning that goes on in the mind of a person. However, much involves interaction with the world outside the mind and interaction with others. According to WHO (2015), the rational model of health promotion believed high knowledge will translate to a positive attitude and subsequently good behavior. Knowledge is very important as far as utilization of PPE is concerned. The knowledge of PPE among nurses and other healthcare workers would influence their level of utilization of PPE. According to Alao et al. (2020) study in Southwest and Northwest Nigeria on the examination of 290 HCWs' knowledge, beliefs, attitudes, and use of PPE for prevention of COVID-10 infection in low-resource settings, only 70 (25.7%) had adequate knowledge about PPE. Zhu, Kahsay, and Gui (2019) conducted a comparative study on KAP related to standard precautions (SPs) among nurses in China and Ethiopia and found out that nurses of both countries have a good understanding of the concept of SPs; however, the acceptance to hospital policies for the prevention of hospital-acquired infections (HAI) was lower in Ethiopia. In Nigeria, an investigation was done by Ugochukwu (2016) to determine knowledge and use of

PPE among nurses in Teaching Hospital Enugu uncovered that (91.9%) of nurses had a high level of knowledge in regards to rules for the utilization of PPE.

In Kenya, Moyo (2013) stated that only 17.8% of nurses at Mbagathi District Hospital of Nairobi have satisfactory knowledge of the basic components/elements of PPE. There are several factors influencing knowledge such as education and training, and years of experience.

Training is an important tool for hindering the spread of infections. Effective training on the utilization of PPE should start from academic institutions before individuals are allowed to practice as nurses in the clinical area. Training help equips HCWs with the necessary knowledge on the use of PPE effectively to protect against job hazards. Training equally enables HCWs to recognize the importance of PPE towards their safety and health, identify job hazards that require the use of PPE, select appropriate PPE for the tasks and inspect, and done and doff PPE properly. This is the case in both developed and developing countries. As individuals are employed, there is a need for training, both on appointment and on-the-job training, sometimes called in-hospitals training.

Training in hospitals assumes a basic job in guaranteeing that employees are made mindful of the significance of PPE. The Center for Disease Control and Prevention (CDC, 2020) recommends frequent training of HCWs on the standard and transmission-based precautions such as the correct procedure for donning and doffing PPE when caring for patients. The awareness created by training will fill in as fortification on the training provided on appointment. This awareness created through training will enable nurses to comply with requirements for the utilization of PPE as they perform their responsibilities.

Good practice guideline advocates the risk for infection, and use of appropriate equipment for protection against such infection. This is why the National Health Service (NHS) Foundation Trust in the United Kingdom (1997) published guidelines for the use of PPE in 1997 for the training of health workers. John et al. (2016) study focusing on whether health care personnel trained in the correct use of personal protective equipment concurred that effective use of PPE is essential to protect HCWs and patients in hospitals, but their survey of 222 health care workers indicated that PPE training was often suboptimal with no requirement for demonstration of proficiency. Fourteen percent of physicians reported no previous training in the use of PPE. In Kenya, Moyo (2013) stated that more than half of nurses (60%) working at Mbagathi district hospital in Nairobi, had attended formal training on infection prevention which includes the use of PPE, while the remaining 40% were not formally trained on the use of PPE. Even though 64% of the nurses were diploma holders, with less than 30% being first degree holders, there is no significant difference in their knowledge on the use of PPE. Hence, there is a need for training on the use of PPE among nurses.

### **2.2.3 Attitudes toward Utilization of PPE**

An attitude is a way of behaving towards something that indicates how you feel and consider it. Research has indicated that attitude is important towards the utilization of personal protective equipment by HCWs. Hossain et al. (2021) study investigating HCWs' KAP regarding PPE for the prevention of COVID-19 in Bangladesh found out that 88.8% had a positive attitude regarding PPE. However, the proportion of HCWs having positive attitudes differed significantly between non-physician (76.5%) and physicians (93.9%). Similarly, Badgujar et al. (2021) in a study investigating KAP regarding the use of PPE equipment during the COVID-19 pandemic among HCWs at a tertiary health care center revealed that the majority of HCWs had a positive attitude

and appropriate practice regarding the use of PPE, underlining the importance of positive attitude concerning the practice of donning and doffing PPE.

According to research conducted by Gichuhi et al. (2015) to determine health care workers' adherence to infection prevention practices and control among nurses at a Level 4 District Hospital in Kenya, only 57% of nurses washed hands properly before or after procedures. This is due to the negative attitude of nurses and other health care workers. The issue of attitude should be addressed by regular checking and continuous education.

### **2.3 Health Facility Related Factors**

Health facility-related factors are the organizational factors that may affect the utilization of PPE among nurses. These factors include availability, accessibility, and policy/supervision concerning the utilization of PPE. Availability has been a reason for poor utilization of PPE among nurses and other healthcare workers globally.

In India, a cross-sectional study by Lakshmi et al. (2015) revealed that unavailability of equipment was a reason for non-compliance with PPE among nurses and other healthcare providers.

Ojewole et al. (2015) conducted a study on nurses' and midwives' compliance with standard precautions in Olabisi Onabanjo University Teaching Hospital, Ogun state Nigeria. Their study revealed that non-compliance with the use of PPE among nurses was due to inadequacy of the equipment. In Kenya, Kaguthi (2015) stated that the unavailability of the recommended PPE was a reason for low compliance with the use of PPE among nurses.

Hospital policies and supervision are as important as availability concerning the utilization of PPE among nurses and other healthcare workers. The hospital needs to put down its policies on the utilization of PPE among the hospital staff as a means of governing the infection control practice in the hospital. Hospital policy is a set of rules by the hospital administration to guide the use of PPE as part of infection control measures in the hospital. Senior administrative nurses are usually part of the hospital policy-making team. The organizational commitment to safety is evidenced by the organization's policies, procedures, management support, and state-of-the-art safety equipment.

Good hospital policy will aid effective utilization of PPE through ensuring a consistent supply of PPE by the hospital, provision of WHO guidelines for the use of PPE, and enforcing compliance with the guidelines among hospital staff through monitoring by the infection control committee, reward for motivation or punishment for noncompliance, as well as education and training of staff on utilization of PPE. Hospital policy is a factor that affects the utilization of PPE among nurses and other health care workers globally. For example, a cross-sectional study conducted by Lakshmi et al. (2015) to evaluate the appropriate use of PPE among health care providers in two tertiary centers in Tamil Nadu, India revealed that non-compliance with PPE is due to several factors including hospital policy and non-availability. Another study conducted by Hakim et al. (2015) on factors affecting adherence to the use of PPE among nurses and physicians in Egypt revealed that hospital policy has a strong influence on adherence to the usage of PPE. Hospital policy is a driving force for compliance with guidelines and utilization of PPE among nurses in Kenya.

## **CHAPTER THREE: METHODS AND MATERIALS**

### **3.1 Research Design**

The study adopted a cross-sectional descriptive research design comprising both quantitative and qualitative methods to examine the utilization of PPE among nurses at Thika level 5. A descriptive cross-sectional research design is a type of design that allows a researcher to analyze collected data from the sample at a given point in time (Mugenda & Mugenda, 2003). This design is relatively quick and easy to conduct study and data on all variables are only collected once.

### **3.2 Study Area**

The study was conducted in Thika Level 5 hospital. The hospital is located in Thika Town of Kiambu County which is one of the 47 counties in Kenya. Thika is a major industrial town, located about 42 kilometers northeast of Nairobi, near the confluence of the Thika and Chania Rivers. The town is currently the headquarters of Thika West district and has residential areas such as Bendor estate, Maporomoko, Thika Greens, and Thika Golden Pearl, among others. Thika is best known for pineapple-growing in Kenya. The emergence of the famous Mount Kenya University and other institutions of higher learning, as well as financial institutions, has changed the history of Thika, especially in education and finance. Thika is home to Del-Monte Pineapples, and Bidco Oil Refineries, among others. Thika has a total population of 139,853 (Kenya National Census Report, 2009).

Thika Level 5 Hospital is located along General Kago Road in Thika town. The hospital was established on 10<sup>th</sup> October 1941 as a cottage hospital to care for the then native Africans and Asians. The hospital was upgraded to a Level 5 hospital on 30<sup>th</sup> November 2007. Being the largest health facility in Thika, the hospital attracts patients

from within and beyond the county boundaries, as patients from Nairobi, Machakos, Murang'a, Garissa, and Kirinyaga also receive health services at Thika level 5 Hospital. It serves as a referral hospital to many private hospitals within catchment areas such as Mount Sinai Hospital and St. Mulumba Hospital among others (Thika level 5 hospital report, 2016).

The hospital provides services such as Basic Emergency services, Preventive in-patient, and out-patient services, Curative In-patient and Outpatient Services, surgical services, Voluntary Counselling and Testing (VCT) services, HIV and Tuberculosis services, Antenatal, Obstetric Care, Family Planning services, as well as Radiology Services such as X-ray, Ultra-sound Scan, as well as MRI among others. The hospital houses the first blood transfusion center in central Kenya.

Thika Level 5 hospital has a total of 243 nurses, with a bed capacity of 265, and had attended to 200,000 outpatients, 23,000 inpatients, with an average of 1900 patients per month in the year 2015 (Thika level 5 hospital report, 2016) therefore suited the current study.

### **3.3 Target Population**

A target population is defined as a population of interest to the research in which he or she wishes to generalize the study results. For the current study, the target population was all nurses working at Thika level 5 Hospital totaling 243 nurses (Thika level 5 hospital, 2016).

### **3.4 Study Population**

The study population was all nurses with at least one year of working experience at Thika level 5 Hospital. This is because, within six months of working, a practicing

nurse is expected to have achieved familiarity with the environment as well as the practices within the hospital.

### **3.5 Selection criteria**

#### **3.5.1 Inclusion Criteria**

Inclusion criteria refer to a set of already defined features used by research in the study to select respondents who are included in the survey (Kothari, 2012). Together, inclusion criteria form the selection or eligibility criteria used to exclude a respondent from participating in the study. Proper selection of inclusion characteristics optimizes the external and internal validity of the study, enhances its practicability, minimizes the costs of conducting the study, and increases the probability of finding a true relationship between the considered variables. In line with this, to participate in the study, only nurses with at least one year of working experience at Thika level 5 Hospital were selected into the study sample. Moreover, only the nurses who were willingly and voluntarily consented to take part in this study were considered.

#### **3.5.2 Exclusion Criteria**

Exclusion criteria, just like inclusion criteria, refers to a set of prior defined conditions that are used by researchers to identify respondents that are not included or will have to withdraw from a research study after being included (Kothari, 2012). Like the inclusion criteria, exclusion criteria are guided by the objectives of the study. In line with this, the researcher did not consider nurses with less than one year of working experience at Thika level 5 Hospital as participants. In addition, student nurses under training and nurses on an internship at Thika level 5 Hospital were also not selected. In addition, other healthcare workers at Thika level 5 Hospital were excluded from the study.

Participants who failed to provide consent were also excluded from participating in the study.

### **3.6 Study Variables**

The study comprised both the independent and dependent variables.

#### **3.6.1 Independent variables**

In survey research, an independent variable is thought to have an influence or at least correlated with the dependent variable. In this study, the independent variables were divided into two - nurse-related factors and health facility-related factors. The former encompassed demographic characteristics, knowledge about PPE, and attitudes toward the use of PPE. While this was the case, the latter comprised availability of PPE, accessibility of the available PPE, hospital policy, supervision, and practices of the nurses about the use of PPE.

#### **3.6.2 Dependent variables**

A dependent variable in a study is a variable that is explained by one or more variables. The study dependent variable was the utilization of PPE among nurses at Thika level 5 Hospital which was measured in terms of frequency of use of PPE as well as compliance with the set guidelines for the use of PPE.

### **3.7 Sampling Procedures**

In research, sampling occurs when a researcher examines a sample from the larger population the sample is collected. Sampling allows the researcher to make statements about the population of interest to a study. The goal of sampling is to ensure that selected participants are a true representation of the population from which they are selected. In line with this, the researcher used different sampling techniques to select the study participants. First, stratified random sampling was used to select the sample

for this study to ensure a good representation of the nurses working in the different units at Thika level 5 Hospital. In this sampling technique, the researcher segments the entire population of interest into distinguishable strata or sub-groups, then randomly selects the final respondents from the different strata. To implement this sampling technique in the study, all units or wards from the different departments were clustered together in strata and included medical wards, surgical wards, emergency wards, out-patient units, theatres, and intensive care units.

To select the study participants, a proportionate convenience sampling technique was used to ensure the representation of each unit in the hospital. This technique allows the researcher to select participants from a population-based on how convenient and readily accessible and available they are. The focus is on a sample that is easy to access. Using this technique allows a researcher to obtain a sample in an easy way as well as reducing the cost of obtaining them, which was the case in the present study. Self-administered questionnaires were issued to the selected nurses available on duty during data collection.

Moreover, the purposive sampling technique was used to select key informants for interviewing. A purposive sample allows a researcher to select a sample that can be logically assumed to be representative of the population. In this study, senior nurses were purposively selected for interviewing as key study informants.

### **3.8 Sample Size Determination**

The sample size for the study was computed using the Fishers *et al.*, 1998 formula (as cited in Mugenda & Mugenda, 2008).

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

Where Z is the value for the corresponding confidence level (i.e., 1.96 for 95% confidence); e is the margin of error (i.e., 0.05 = ± 5%) and p is the estimated value for the proportion of a sample that has the condition of interest. P= 0.5

$$n = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2} = 384.16 \text{ Participants}$$

Since the target population for this study was 243 which was less than 10,000, the sample size was adjusted using the equation developed by Yamane *et al.* (1967) which is recommended for the population less than 10,000.

$$nf = \frac{n}{1 + \frac{n-1}{N}}$$

Where;

*nf* = desired sample size

calculated sample size 384

estimate of population in the study area (i.e. number of nurses working at Thika level 5 hospital which is 243).

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

$$nf = \frac{384}{1 + \frac{(384-1)}{243}}$$

$$nf = \frac{384}{1 + \frac{(383)}{243}}$$

$$nf = \frac{384}{1 + 1.58}$$

$$nf = 149 + 10\% \text{ (for non-response = 15) = 164}$$

Therefore, the sample size for the study was 164 participants.

**Table 3.1. Sample size computation**

<b>Units</b>	<b>No. of Nurses</b>	<b>Proportionate sample size</b>	<b>Proportionate %</b>
Casualty	14	9	5.8
OPD	20	12	8.2
MMW	12	7	4.9
FMW	12	7	4.9
MSW	12	7	4.9
FSW	12	7	4.9
PAED	16	10	6.6
NBU	14	9	5.8
MCH	14	9	5.8
Maternity	26	16	10.7
Maternity-Theatre	11	7	4.5
Main Theatre	14	9	5.8
Gynae	11	7	4.5
ICU	13	8	5.3
ENT/EYE	9	6	3.7
CCC	8	5	3.3
RENAL	5	3	2.1
CSSD	8	5	3.3
Nurse Managers	12	7	4.9
<b>Total</b>	<b>243</b>	<b>149</b>	<b>100.0</b>

**Note: The proportionate sample size is exclusive of non-respondents**

### 3.9 Data Collection Tools and Methods

A structured self-administered questionnaire was used to collect data for this study as well as an interview guide. A self-administered questionnaire refers to a questionnaire that has been developed specifically to be filled by a respondent without the help of a researcher. The questionnaire was used to collect data on the study variables that were necessary for the testing of the study hypotheses. The questionnaire had four parts. The first part was used to collect data on the participants' demographic variables. The second part was designed to collect data on the participants' knowledge about personal protective equipment as well as their level of knowledge about personal protective equipment. The third part was designed to collect data on attitudes towards the utilization of personal protective equipment among nurses. The last part was used to

gather data on the level of utilization of personal protective equipment and the general utilization of this equipment.

### **3.10 Pre-Testing of Instrument**

Survey pretesting is a process of testing the usability of the questionnaire before actual data collection (Mugenda & Mugenda, 2003). This process is executed to detect and remediate issues with the questionnaire before actual data collection. According to Mugenda and Mugenda (2003) procedures used in pretesting the questionnaire should be identical to those which should be used during the actual data collection. However, the pretesting sample should not be included in the final data collection.

In this study, pretesting of the questionnaire was done at Murang'a Level 5 Hospital to a selected sample (10% of 164) = 16 participants). The procedures used to collect data were identical to those the researcher used during the actual data collection exercise. Analysis of pre-testing information enabled the researcher to make meaningful observations for any correction. Additionally, the researcher encouraged the selected participants to make suggestions concerning the instructions, clarity of questions, and relevance. Pre-testing helped the researcher to refine the questionnaire for the actual data collection. For example, pre-testing allowed the researcher to approximate the time it would take to fill the questionnaire which was between 15 to 20 minutes. Also, the researcher was able to adjust the questions in line with the suggestions made by the selected participants.

### **3.11 Validity and Reliability of the Questionnaire**

#### **3.11.1 Validity of the Questionnaire**

Validity refers to the extent to which a test (i.e., questionnaire in this study) measures the variables under study. It ensures accurate application and interpretation of study

results. To ensure validity, a pretest was conducted at Muranga level 5 hospital. In addition, the content validity of the questionnaire was ensured through supervisors' comments and suggestions.

### 3.11.2 Reliability of the Questionnaire

Reliability is the consistency of a measure that ensures the consistency of a test. A reliability measure fundamentally tells the researcher whether a study participant would provide the same score on a particular variable if that variable were to be administered again (Kothari, 2012). To ensure reliability, Chronbach's Alpha coefficient for internal consistency was used. Chronbach's alpha is a statistic that measures the internal consistency among a set of survey items that the researcher believes all measure the same construct or scale, are correlated with each other and could be developed into some type of scale. Four separate Chronbach's alphas were computed for the following constructs: 1) knowledge about PPE, 2) attitude towards the use of PPE, 3) health facility-related factors, and 4) utilization of PPE among nurses. The results are presented in Table 3.1.

**Table 3.2. Reliability Results**

<b>Construct</b>	<b>Number of Items</b>	<b>Chronbach's alpha</b>
Knowledge about PPE	7	0.785
Attitude towards PPE use	6	0.843
Health facility-related factors	8	0.771
Utilization of PPE among nurses	2	0.815

As can be seen from Table 3.1, alpha coefficients for all the constructs were above the threshold of 0.70 (Nunnaly & Bernstein, 1994). The values indicated sufficient reliability of the measures.

### **3.12 Data Management**

The questionnaires were first sorted for data completeness. Following this process, they were coded and variables entered into Statistical Package for Social Sciences (SPSS) version 20. Descriptive and inferential statistics were used to analyze data in line with the study objectives. Descriptive statistics comprised means, standard deviations, percentages, and frequencies. Inferential statistics comprised of Chi-square and simple linear regression analysis. The chi-square ( $X^2$ ) is a test of significance for categorical variables. This test lets the researcher test the relationship between two categorical variables. In this study, the chi-square test of independence was used to test the significance of the relationships among the study demographic variables (gender, age, marital status, work experience, and education qualifications) and utilization of PPE at a 95% confidence level.

Simple linear regression analysis was applied to examine the models in line with the study objectives and related hypotheses. Simple linear regression is an inferential statistical test that focuses on predicting variation in the outcome variable based on data in the predictor variable. Therefore, this statistical test yields a regression model that helps the researcher to examine changes in one variable as a function of changes or differences in values of the other variable. This analysis aims to determine how, and to what extent, the outcome variable varies as a function of changes in the predictor variable. In this study, three separate simple linear regressions were computed.

The first simple linear regression was computed between knowledge about PPE and utilization of PPE among nurses. The second regression model was computed between attitude toward the use of PPE and utilization of PPE among nurses. The third regression model was computed between health facility-related factors and utilization of PPE among nurses. Coefficient of determination was used to establish the percentage

of variance that could be explained by the study's significant variables. The significance of the simple linear regression model was examined using the Analysis of Variance f-test at a 95% confidence level. To analyze the qualitative data, a content analysis technique was used where themes were extracted in line with the study objectives. Table 3.3 presents the analysis plan based on the study objectives.

**Table 3.3. Data analysis plan**

<b>Objective(s)</b>	<b>Statistical analysis</b>
To establish the utilization level of PPE among nurses at Thika Level 5 Hospital	Descriptive statistics (means, standard deviations, percentages, and frequencies)
To determine the influence of knowledge on utilization of PPE among nurses at Thika Level 5 hospital	Descriptive statistics (means, standard deviations, percentages, and frequencies) Inferential statistics (chi-square test of independence, simple linear regression analysis), significance tested at 5% level.
To establish the influence of attitude on utilization of PPE among nurses at Thika Level 5 hospital	Descriptive statistics (means, standard deviations, percentages, and frequencies) Inferential statistics (chi-square test of independence, simple linear regression analysis), significance tested at 5% level.
To examine the relationship between health-facility factors and utilization of PPE among nurses at Thika Level 5 hospital	Descriptive statistics (means, standard deviations, percentages, and frequencies) Inferential statistics (chi-square test of independence, simple linear regression analysis), significance tested at 5% level.

### **3.13 Ethical Considerations**

The study's ethical considerations comprised several procedures and steps to ensure the smooth running of the actual data collection exercise. First, the researcher obtained approval from the School of Nursing of Mount Kenya University. Second, the researcher sought and obtained ethical clearance from the Ethical Review Committee of Mount Kenya University. Third, a permit to carry out the research was sought and obtained from the National Commission for Science Technology and Innovation of

Kenya. Fourth, permission was obtained from the Kiambu County Director for Health, County Commissioner, Chief Officer of Kiambu County, as well as the sub-chief of Thika sub-county. A clearly stated informed consent was obtained from the respondents who were willing to participate in the study. Before signing the informed consent forms, the researcher explained to all study participants the purpose of the study. Also, the researcher assured them of confidentiality of the information provided and that collected data would be used for this study only. The researcher further notified the participants that participation in the study was voluntary and one could refuse to participate or terminate his or her participation without incurring any harm whatsoever.

#### **3.14 Assumptions of the Study**

The researcher assumed that the respondents were honest and provided genuine responses. In addition, it was assumed that the nurses would give 100% support after the researcher had explained to them the purpose and significance of the study, and they had good knowledge of the use of PPE. Another assumption was that knowledge about PPE, attitude towards the use of PPE, and health facility/behavioral factors influenced utilization of PPE among nurses at Thika level 5 hospital.

## CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSIONS

### 4.1 Introduction

This chapter presents the results of the analysis of the study data in line with the set objectives. In addition, it also presents a discussion of the study findings based on the analyses of the data collected. The main objective of the study was to examine the antecedents influencing the utilization of PPE among nurses at Thika Level 5 hospital. Specifically, the study sought to establish the influence of knowledge about PPE, attitude toward the use of PPE, and health facility-related factors on the utilization of PPE among nurses at Thika level 5 hospital. The survey was distributed to 164 nurses at Thika level 5 hospital all (100%) completing the survey. Out of these questionnaires, 14.6% (24) were found to have missing data and were discarded resulting in 85.4% (140) useable ones for further data analysis.

### 4.2 Utilization of Personal Protective Equipment

About utilization of PPE, respondents were requested to identify the frequency at which they used PPE when dealing with clients as well as compliance with the set guidelines for the use of PPE. Analysis of their responses comprised means and standard deviations as presented in Table 4.1.

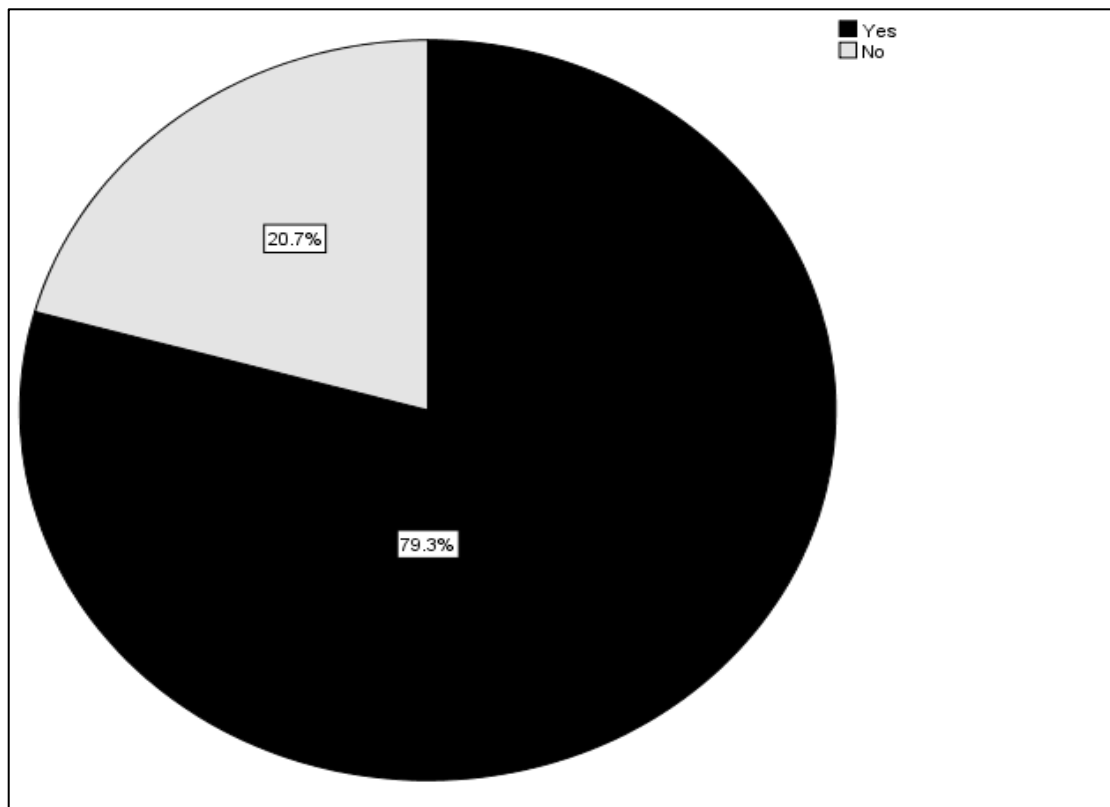
**Table 4.1. Utilization of PPE**

Utilization of PPE	Mean	SD
I frequently use PPE when dealing with patients	2.12	0.96
I often comply with the set guidelines on the use of PPE	2.02	1.01
I perform hand hygiene before donning gloves	2.98	0.95
I perform hand hygiene immediately after removing gloves	4.12	0.88
I touch my face and other parts of my body, another person, adjust another PPE, or touch the surrounding after donning gloves	4.10	1.03
I wash or reuse gloves if clean after use	2.88	0.97
I change gloves if highly soiled or torn during use, even if used on the same patient	4.23	0.99

As indicated, participants agreed with touching their face and other parts of their body, another person, adjust another PPE or touch the surrounding after donning gloves ( $M = 4.10$ ,  $SD = 1.03$ ). additionally, they indicated that they were changing gloves if highly soiled or torn during use, even if used on the same patient ( $M = 4.23$ ,  $SD = 0.99$ ). However, they indicated that they hardly complied with the set guidelines on the use of PPE ( $M = 2.02$ ,  $SD = 1.01$ ) and were not frequently using PPE when dealing with patients ( $M = 2.12$ ,  $SD = 0.96$ ).

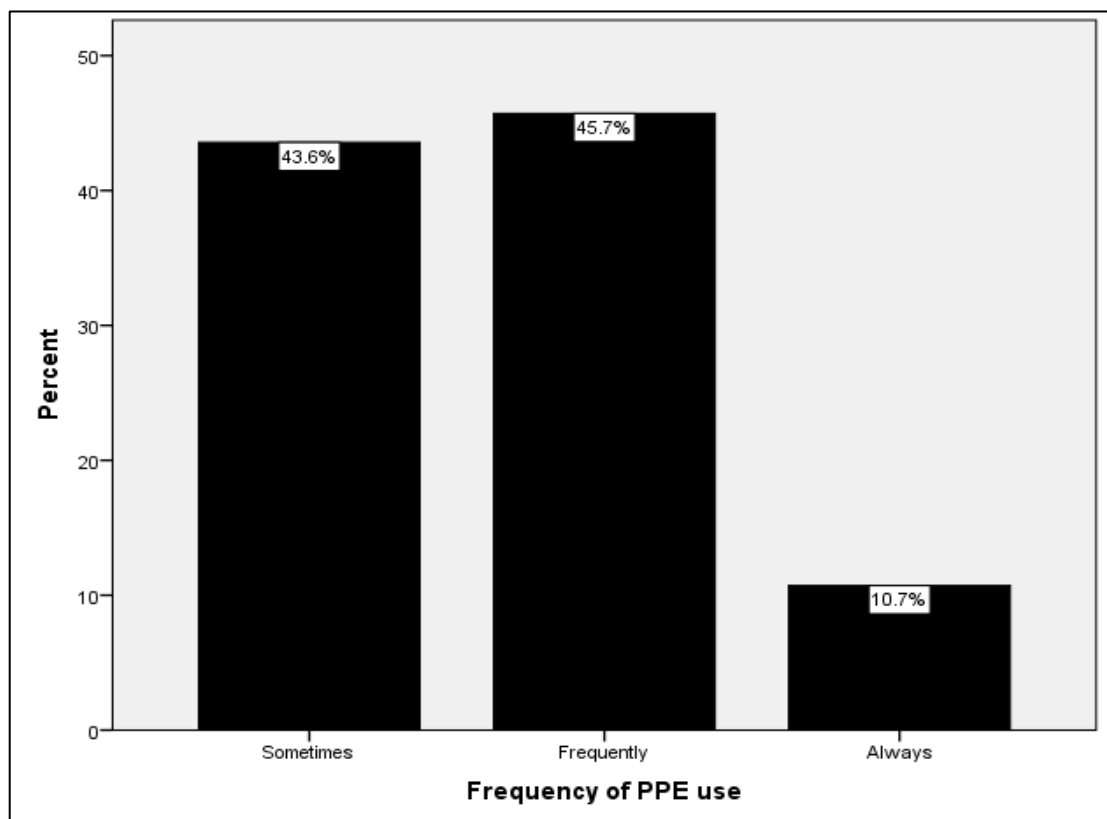
#### 4.2.1 Level of Utilization of Personal Protective Equipment

The study sought to determine the utilization level of PPE among nurses at all times while they were working. Results illustrated in figure 4.1 showed that the majority 79.3% (111) used appropriate PPE in line with WHO guidelines while 20.7% (29) indicated that they did not use all the appropriate PPE.



**Figure 4.1. Use of appropriate PPE while working**

In addition to the determination of the number of nurses who complied with the use of appropriate PPE, participants were requested to indicate how often they utilized PPE while working. As illustrated in figure 4.2, the majority of all nurses who participated in this study 45.7% (64) indicated that they frequently utilized PPE while working. However, 43.6% (61) indicated that they sometimes utilized PPE while working. Only 10.7% (15) of nurses indicated they always utilized PPE while working.

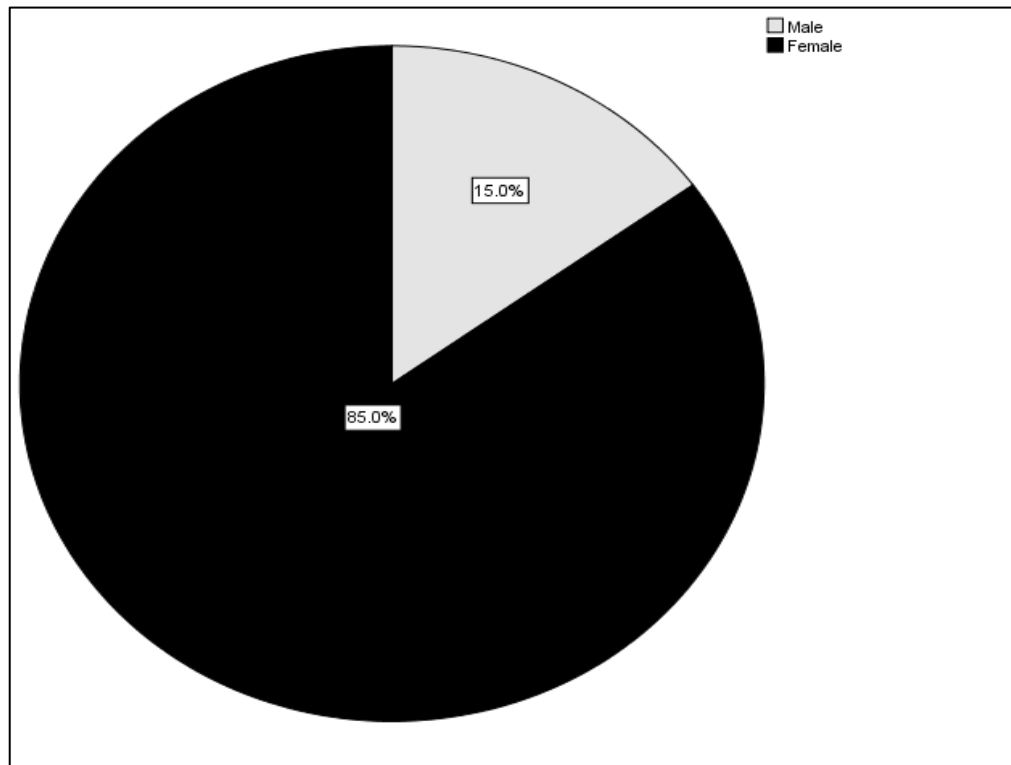


**Figure 4.2. Frequency of PPE Utilization**

In addition to the determination of the frequency of utilization of PPE, total numbers of PPE used by each participant were computed to determine the utilization rate. The scores were then classified into low (those who only used one type of PPE), moderate (used between 2 and 3 types of PPEs), and high (used four or more PPEs). Results indicated that 50.0% (70) of all the sampled nurses had a low PPE utilization rate, 41.4% (58) had a moderate PPE utilization rate and only 8.6% (12) of the sample had a high PPE utilization rate.

### 4.3 Participants Gender and Utilization of Personal Protective Equipment

The results of the analysis of participants' gender characteristics are illustrated in figure 4.3 and indicated that the majority 85.0% (119) of the study participants were females and 15.0% (21) were male participants. These results demonstrated that nursing is a female-dominated profession where the minority are males.



**Figure 4.3. Analysis of Participants' Gender**

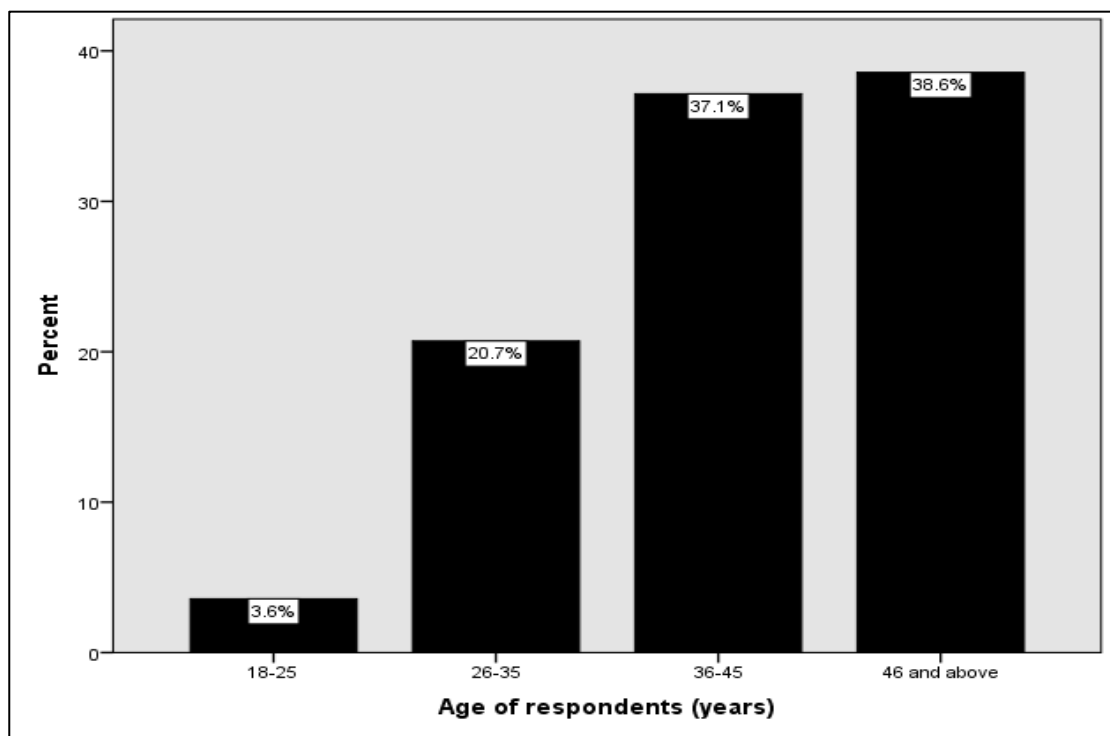
The majority of the male 76.2% (16) and female 79.8% (95) respondents indicated that they were utilizing PPE while working (Table 4.2). A cross-tabulation results presented in Table 4.2 indicated that gender was not significantly associated with the utilization of PPE among nurses ( $X^2 = 0.144$ ,  $df = 1$ ,  $p = .704$ ).

**Table 4.2. Relationship between Gender and Utilization of PPE**

Gender	Utilization of PPE		Significance
	Yes	No	
Male	76.2% (16)	23.8% (5)	$X^2 = 0.144, df = 1, p = .704$
Female	79.8% (95)	20.2% (24)	
<b>Total</b>	<b>79.3% (111)</b>	<b>20.7% (29)</b>	

#### 4.4 Age of Participants and Utilization of Personal Protective Equipment

Concerning age, results illustrated in figure 4.3 showed that the majority 38.6% (54) were aged 46 years and above followed by those between 36 and 45 years 37.1% (52).



**Figure 4.4. Analysis of respondents' age profile**

The results in figure 4.4 indicated that very few young nurses aged 18 to 35 years are working at Thika Level 5 Hospital. The age of respondents was cross-tabulated with the utilization of personal protective equipment and the results are presented in Table 4.3. As shown in Table 4.3, the majority 79.3% (111) of respondents across all age groupings in this study utilized PPE while working. Only 20.7% (29) were not utilizing

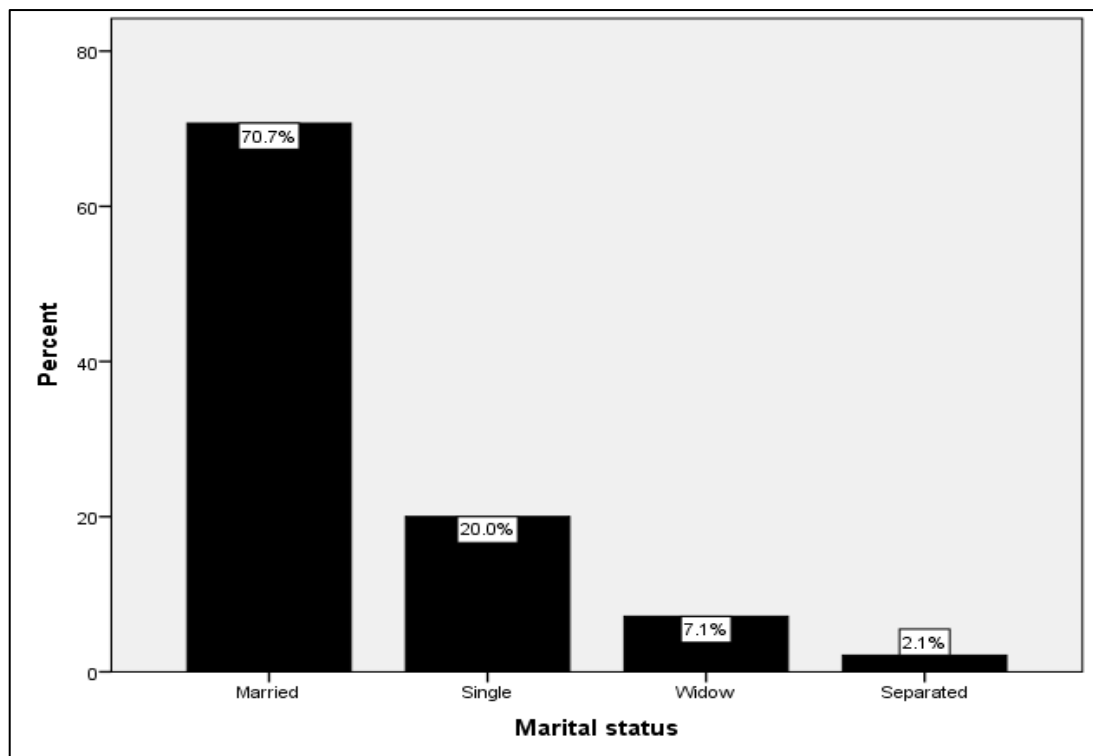
PPE while working. Additionally, age was found to be significantly associated with utilization of PPE among the respondents ( $X^2 = 1.487$ ,  $df = 3$ ,  $p = .008$ ).

**Table 4.3. Relationship between Age and Utilization of PPE**

	Utilization of PPE		Significance
	Yes	No	
18-25	100.0% (5)	0	$X^2 = 6.487$ , $df = 3$ , $p = .008$
26-35	79.3% (23)	20.7% (6)	
36-45	76.9% (40)	23.1% (12)	
46 and above	79.6% (43)	20.4% (11)	
<b>Total</b>	<b>79.3% (111)</b>	<b>20.7% (29)</b>	

#### 4.5 Marital Status and Utilization of Personal Protective Equipment

Results of the analysis of respondents' marital status are illustrated in figure 4.5.



**Figure 4.5. Analysis of respondents' marital status**

Results illustrated in figure 4.5 show that the majority 70.7% (99) were married, 20.0% (28) single, 7.1% (10) widowed, and 2.1% (3) had separated with their partners. These

results collated well with those of age distribution as the majority of nurses were aged 36 years and above. It is probable then that majority were married.

In addition, marital status was cross-tabulated with the utilization of personal protective equipment, and results are presented in Table 4.4. As shown in the table, the majority 74.7% (74) of the married respondents reported that they were using PPE while working. The same trend was observed with those who were single (92.9%, 26), widowed (90.0%, 9), and separated from their spouses (66.7%, 2). However, the relationship between marital status and utilization of PPE was not significant ( $X^2 = 5.371$ ,  $df = 3$ ,  $p = .147$ )

**Table 4.4. Relationship between Marital Status and Utilization of PPE**

		Utilization of PPE		Significance
		Yes	No	
	Married	74.7% (74)	25.3% (25)	$X^2 = 5.371$ , $df = 3$ , $p = .147$
<b>Marital</b>	Single	92.9% (26)	7.1% (2)	
<b>Status</b>	Widow	90.0% (9)	10.0% (1)	
	Separated	66.7% (2)	33.3% (1)	
<b>Total</b>		<b>79.3% (111)</b>	<b>20.7% (29)</b>	

#### 4.6 Work Experience and Utilization of Personal Protective Equipment

Results of the analysis of participants' work experience are presented in Table 4.5. As indicated, the majority 49.3% (69) of participants had worked for 15 years and above followed by those who had worked for a period of 10 to 15 years 21.4% (30). Those with work experience between 5 to 10 years were 28 and accounted for 20.0%. Only a few had work experience between 1 to 5 years 9.3% (13).

**Table 4.5. Work Experience**

	n (%)
1 to 5 years	9.3% (13)
5 to 10 years	20.0% (28)
10 to 15 years	21.4% (30)
Above 15 years	49.3% (69)

**Note:** 140 participants

Work experience was cross-tabulated with the utilization of personal protective equipment. Results demonstrated in Table 4.6 reveal that majority of respondents across all groupings of work experience utilized PPE while working.

Specifically, for those who had work experience between 0 to 5 years, the majority 84.6% (11) reported that they were using PPE while working. Similarly, 67.9% (19) and 90.3% (28) of respondents with working experience ranging from 6 to 10 years and 11 to 15 years respectively reported that they were using PPE while working.

For those with work experience of above 5 years, the majority 77.9% (53) indicated that they were utilizing PPE while working. However, a higher proportion 90.3% (28) of respondents with working experience between 11 to 15 years were utilizing PPE more than the rest. A higher percentage of those with working experience ranging between 0 to 5 years were using PPE (11, 84.6%) as compared to those with 6 to 10 years of working experience (67.9%). In addition, the relationship between work experience and utilization of PPE was found to be significant ( $X^2 = 7.826$ ,  $df = 3$ ,  $p = .004$ ).

**Table 4.6. Relationship between Work Experience and Utilization of PPE**

		Utilization of PPE		Significance
		Yes	No	
<b>Work Experience</b>	0-5 years	84.6% (11)	15.4% (2)	$X^2 = 7.826, df = 3, p = .004$
	6-10 years	67.9% (19)	32.1% (9)	
	11-15 years	90.3% (28)	9.7% (3)	
	Above 5 years	77.9% (53)	22.1% (15)	
<b>Total</b>		<b>79.3% (111)</b>	<b>20.7% (29)</b>	

**4.7 Education Qualification and Utilization of Personal Protective Equipment**

Concerning participants' education qualifications, the majority 77.9% (109) were diploma holders, 16.4% (23) undergraduate degree holders, 5.0% (7) certificate holders, and just 0.7% (1) with a Master's degree (Table 4.7). These results indicated that nursing as a profession attracted individuals with different educational qualifications. Thus, the results indicated that most nurses were literate and could easily be trained on safety, work-related risk management associated with PPE's while discharging their duties.

**Table 4.7. Education Qualifications**

	n (%)
Certificate	5.0% (7)
Diploma	77.9% (109)
Degree	16.4% (23)
Masters	0.7% (1)

**Note:** 140 participants

Cross-tabulation results presented in Table 4.8 revealed higher percentages of PPE utilization among all the categories of respondents (i.e. certificate, diploma, degree, and masters). However, respondents with diploma qualifications 80.7% (88) reported using PPE more than those with certificates 57.1% (4) and degree qualifications 78.3% (18). In addition, the relationship between education qualifications and utilization of PPE was significant at 5% significance level ( $X^2 = 5.505, df = 3, p = .005$ )

**Table 4.8. Relationship between Education Qualifications and Utilization of PPE**

		Utilization of PPE		Significance
		Yes	No	
<b>Education Qualifications</b>	Certificate	57.1% (4)	42.9% (3)	$X^2 = 5.505, df = 3, p = .005$
	Diploma	80.7% (88)	19.3% (21)	
	Degree	78.3% (18)	21.7% (5)	
	Masters	100.0% (1)	0.0% (0)	
<b>Total</b>		<b>79.3% (111)</b>	<b>20.7% (29)</b>	

#### 4.8 Knowledge about Personal Protective Equipment

##### 4.8.1 Training on Infection Control

The results presented in Table 4.9 showed that among respondents, 97.1% (136) reported having been trained on infection control.

**Table 4.9. Respondents training on infection control**

	Frequency	Percent
<b>Whether trained or not</b>		
Yes	136	97.1
No	4	2.9
<b>Total</b>	<b>140</b>	<b>100.0</b>
<b>When training was done</b>		
1 to 6 months ago	19	13.9
6 to 12 months ago	11	8.2
1 to 3 years	37	27.2
More than 3 years	69	50.7
<b>Total</b>	<b>136</b>	<b>100.0</b>
<b>Mode of training</b>		
During orientation and induction	10	7.4
On the job training	90	66.2
Short-course	32	23.5
In-service training	4	2.9
<b>Total</b>	<b>136</b>	<b>100.0</b>

As shown in Table 4.9, the majority 50.7% (69) reported that they were trained on infection control for a period of more than 3 years passed with about 13.9% (19) who had received training for a period between 1 to 6 months earlier given the time survey was carried out. Concerning the mode of training on infection control, the majority

66.2% (90) reported having trained on the job followed by those who had attended a short course 23.5% (32).

#### **4.8.2 Sequence of Donning PPE**

Respondents were requested to identify the correct order of donning overall PPE. Moreover, they were requested to identify the correct order of donning a gown, mask, goggles/face shields, and gloves. Results of the number of participants who were able to identify the right procedures are presented in Table 4.10.

The correct procedure for donning PPE requires a nurse to start with the gown followed by a mask, goggles, and gloves in that order. As indicated in Table 4.10 majority of 65.0% (91) participants were able to correctly identify the sequence of donning the overall PPE.

About donning a gown, the majority of participants 72.1% (101) were able to correctly identify the right procedure for donning an apron or gown. Results in Table 4.10 also demonstrated that the majority 45.0% (63) of participants were able to properly identify the procedure for donning a mask. In assessing whether participants were able to identify the right procedure for donning particulate respirator the majority 65.7% (92) were able to identify this procedure.

In addition, the majority 54.3% (76) were able to identify the correct order of donning goggles or the face shields. Concerning donning gloves, the majority 37.9% (53) were aware of the right sequence.

**Table 4.10. Sequence of Donning PPE**

	<b>Correct sequence</b>	<b>Incorrect sequence</b>
Overall PPE	65.0% (91)	35.0% (49)
Gown/Apron	72.1% (101)	27.9% (39)
Mask	45.0% (63)	55.0% (77)
Googles/Face Shield	54.3% (76)	45.7% (64)
Gloves	37.9% (53)	62.1% (87)
Particulate Respirator	65.7% (92)	34.3% (48)
<b>Note:</b> 140		

**4.8.3 Sequence of Removing PPE**

Respondents were requested to identify the correct order of removing the overall PPE. Moreover, they were requested to identify the correct order of removing gown, mask, goggles/face shields, and gloves, and the results are presented in Table 4.11. As shown in Table 4.11, the majority 55.7% (78) were not able to properly identify the correct order of removing overall PPE (i.e., gloves, googles, gown, mask). In addition, the majority 65.7% (92) were able to identify and right sequence of removing gloves.

About removing googles, the majority 57.1% (80) of the respondents knew the right procedure. Likewise, the majority 60.7% (85) identified the correct sequence for removing the particulate respirator. In assessing whether the respondents knew the right procedure of removing gown, the majority 72.1% (101) of participants were able to identify the right procedure. However, the majority 52.1 % (73) were not able to identify the right procedure for removing the mask.

**Table 4.11. The sequence of Removing PPE**

	<b>Correct sequence</b>	<b>Incorrect sequence</b>
Overall PPE	44.3% (62)	55.7% (78)
Gloves	65.7% (92)	34.3% (48)
Googles/Face Shield	57.1% (80)	42.9% (60)
Gown/Apron	72.1% (101)	27.9% (39)
Mask	47.9% (67)	52.1% (73)
Particulate Respirator	60.7% (85)	39.3% (55)
<b>Note:</b> 140		

#### 4.8.4 Knowledge on Use of PPE

The respondents were requested to indicate their level of agreement with items measuring knowledge on the use of PPE on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). Analysis of the collected data included the means and standard deviations and results are demonstrated in Table 4.12. As indicated, all the means of items measuring knowledge of nurses about PPE were above a mean of 4.00 demonstrating respondents' agreement.

**Table 4.12. Knowledge about PPE**

Statements	Mean	SD
1. Use of Personal Protective Equipment (PPE) is part of infection control	4.12	0.96
2. Personal Protective Equipment (PPE) is an effective barrier to infection	4.13	1.01
3. PPE should be used when there is a risk of exposure to fluids and secretions from the patient	4.03	1.04
4. I am confident that I understand the risks associated with infections when dealing with patients	4.36	0.85
5. I am confident that I understand how to protect myself and my patients from infections	4.22	0.99
6. Use of correct PPE would not eliminate the need for hand hygiene	4.03	1.03
7. Clients with signs and symptoms of respiratory illness should wear a surgical mask while waiting in common areas or should be placed immediately in examination rooms or away from others.	4.23	0.97

Qualitative analysis of data collected from key informants revealed similar results. For example, when asked about the benefits of using PPE, one respondent retorted:

*“PPE offers protection for both the nurse and the patient”.*

Another one confirmed this by saying:

*“PPE provides them protection against cross-infection”.*

These results indicated that participants in this study were aware of the use of PPE and more so, the benefits associated with their use.

#### **4.8.5 Level of Knowledge about Personal Protective Equipment**

In addition to the determination of the knowledge about PPE, respondents were requested to identify the correct procedures for donning and removing PPE. This comprised of procedures for donning and removing overall PPE, gown, mask, goggles, gloves, and particulate respirator. This amounted to twelve (12) procedures – 6 for donning and 6 for removing PPE. The total numbers of correctly identified procedures for donning and removing PPE by each participant were computed to determine the level of knowledge. The computed scores were then classified into inadequate, marginal, and adequate levels of knowledge.

Inadequate knowledge level was used to represent participants who were able to identify between 0 to 4 correct procedures. Marginal knowledge level was used to represent participants who were able to identify between 5 to 8 right procedures whereas the adequate level of knowledge represented those who were able to identify right procedures ranging between 9 to 12. These results are presented in Table 4.13 and show that the majority 47.9% (67) had a marginal level of knowledge followed by those who had an inadequate level of knowledge accounting for 30.7% (43). Participants with an adequate level of knowledge accounted for the lower percentage of 21.4% (30) of the total number of participants in this study.

**Table 4.13. Level of Knowledge about PPE**

<b>Level</b>	<b>f (%)</b>
Inadequate (0 – 4 correct procedures of donning and removing PPE)	30.7% (43)
Marginal (5 – 8 correct procedures of donning and removing PPE)	47.9% (67)
Adequate (9 – 12 correct procedures of donning and removing PPE)	21.4% (30)
<b>Total</b>	<b>100.0% (140)</b>

**Notes:** PPE procedures were for:

- i) Donning overall PPE, gown, mask, goggles, gloves, and a particulate respirator (6 procedures)
- ii) Removing overall PPE, gown, mask, goggles, gloves, and a particulate respirator (6 procedures)

#### **4.8.6 Knowledge about Personal Protective Equipment and Utilization**

The study sought to establish the relationship between knowledge about personal protective equipment and utilization among nurses. A null hypothesis ( $H_{01}$ ) was used and suggested the non-existence of a significant relationship between knowledge about PPE and utilization among nurses. Simple linear regression was carried out to investigate the relationship between knowledge about personal protective equipment and its utilization.

Results presented in Table 4.14 showed a significant relationship between knowledge and utilization of personal protective equipment ( $p < 0.001$ ). The coefficient of determination value ( $R^2$ ) was 0.151 meaning that 15.1% of the variation in utilization of personal protective equipment among nurses can be explained by the regression model containing knowledge.

**Table 4.14. Relationship between Knowledge and Utilization of PPE**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			Sig. F Change
					F Change	df1	df2	
1	.389	.151	.147	.882	2.131	1	138	.000

a. Predictors: (Constant), Knowledge about PPE  
b. Dependent Variable: Utilization of PPE

Table 4.15 presents the coefficients of the regression model equation and tests of significance.

**Table 4.15. Regression Coefficients concerning Knowledge about PPE**

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.	
	B	Std. Error	Beta	t		
1	(Constant)	<b>2.672</b>	.317		8.433	<b>.000</b>
	Knowledge about PPE	<b>.135</b>	.092	.123	1.460	<b>.000</b>

a. Dependent Variable: Utilization of PPE among nurses

As shown in Table 4.13, the constant was statistically significant ( $B = 2.672$ ,  $t = 8.433$ ,  $p < 0.001$ ). The regression model is:

$$\text{Utilization of PPE (y)} = 2.67 + 0.135 * \text{Knowledge about PPE}$$

#### 4.9 Attitudes and Utilization of Personal Protective Equipment

Descriptive results of the analysis of attitudes influencing utilization of PPE comprised means and standard deviations. Results are presented in Table 4.16. As shown, all the means were above 4.00 indicating that respondents agreed with all the items measuring attitudes toward the use of PPE. All the surveyed nurses agreed that the use of appropriate PPE would prevent them from the acquisition of infections ( $M = 4.32$ ,  $SD = 0.99$ ) and keep patients from getting infections ( $M = 4.13$ ,  $SD = 0.97$ ). This notwithstanding, when asked whether it was inconvenient to use recommended PPE when taking care of patients, participants indicated that it was the case ( $M = 4.23$ ,  $SD = 0.94$ ).

Moreover, the level of agreement with ‘use of recommended PPE to interfere with patient treatment was above the mean of 4.00 indicating that participants' attitude towards the use of recommended PPE was somewhat negative. However, participants in this study thought it was essential to adhere to guidelines for use of PPE (M = 4.21, SD = 0.99) and were confident that they could improve PPE compliance (M = 4.25, 0.91).

**Table 4.16. Attitude towards the use of PPE**

<b>Statements</b>	<b>Mean</b>	<b>SD</b>
1. Use of PPE keeps me from getting infections	4.32	0.99
2. Use of PPE will keep patients from getting infections	4.13	0.97
3. It is inconvenient to use recommended PPE when taking care of patients	4.23	0.94
4. Use of recommended PPE interfere with patient treatment/care	4.06	0.85
5. Adherence to guidelines for the use of PPE is very essential	4.21	0.99
6. I am confident that I can improve PPE compliance	4.25	0.91

About attitude towards the use of PPE, qualitative analysis of data revealed a somewhat negative attitude. When asked about the challenges they faced when implementing the guidelines for the use of PPE, one respondent had this to say:

*“I feel uncomfortable – for example, like am suffocating when on a mask”.*

Another respondent had this to say concerning complying with WHO guidelines for the use of PPE:

*“Insufficient PPE and negative attitude”.*

#### **4.9.1 Relationship between Attitude and Utilization of PPE**

The study sought to establish the relationship between attitude towards personal protective equipment and utilization among nurses. A null hypothesis (H<sub>02</sub>) was used and suggested the non-existence of a significant relationship between attitude and

utilization of PPE among nurses. Simple linear regression was used to investigate the relationship between the two variables. Results are presented in Table 4.17 and showed a significant relationship between attitude and utilization of personal protective equipment ( $p < 0.001$ ). The coefficient of determination value ( $R^2$ ) was 0.251 meaning that 25.1% of the variation in utilization of personal protective equipment among nurses can be explained by the regression model containing attitude.

**Table 4.17. Relationship between Attitude and Utilization of PPE**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			
					F Change	df1	df2	Sig. F Change
1	.501	.251	.217	.782	3.221	1	138	.000

a. Predictors: (Constant), Attitude towards PPE  
b. Dependent Variable: Utilization of PPE

Table 4.18 presents the coefficients of the regression model equation and tests of significance.

**Table 4.18. Regression Coefficients concerning Attitude**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	<b>3.152</b>	.217		7.233	<b>.000</b>
	Attitude towards PPE	<b>.246</b>	.081	.212	2.560	<b>.000</b>

a. Dependent Variable: Utilization of PPE among nurses

As shown in Table 4.18, the constant was statistically significant ( $B = 3.152$ ,  $t = 7.233$ ,  $p < 0.001$ ). The regression model is:

$$\text{Utilization of PPE (y)} = 3.15 + 0.246 * \text{Attitude towards PPE}$$

#### 4.10 Health Facility Related Factors

Descriptive results of the analysis of health facility-related factors influencing PPE use comprised means and standard deviations. Results are presented in Table 4.17. As can be seen from Table 4.19, participants reported that they change gloves if highly soiled

or torn during use, even if used on the same patient (M = 4.23, SD = 0.99). In addition, participants reported that they perform hand hygiene immediately after removing gloves (M = 4.12, SD = 0.88) and indicated that their head nurse or attending physician would warn them if they did not use recommended PPE when caring for patients (M = 4.13, SD = 0.96).

**Table 4.19. Health facility-related factors**

	<b>Mean</b>	<b>SD</b>
1. All recommended PPE is readily available in the hospital	4.02	0.96
2. All recommended PPE that are available are accessible	2.73	1.01
3. My head nurse or attending physician would warn me if I did not use PPE when caring for patients	4.13	0.96

When asked to indicate their opinion concerning what hinders them from complying with WHO guidelines for the use of PPE, participants revealed that such equipment is not always available in the hospital. One key informant had this to say:

*“Lack of PPE’s (inadequate) such as goggles, plastic aprons, and masks”.*

Another reported:

*“Shortage in some cases especially for the masks to be used for tuberculosis patients”.*

#### **4.10.1 Health Facility related factors and Utilization of PPE**

The study sought to establish the relationship between health facility-related factors and the utilization of PPE among nurses. A null hypothesis ( $H_{03}$ ) was used and suggested the non-existence of a significant relationship between health-related factors and utilization of PPE among nurses. Simple linear regression was used to investigate the relationship between the two variables. Results are presented in Table 4.20 and showed a significant relationship between health facility-related factors and utilization of

personal protective equipment ( $p < 0.001$ ). The coefficient of determination value ( $R^2$ ) was 0.102 meaning that 10.2% of the variation in utilization of personal protective equipment among nurses can be explained by the regression model containing health-related factors.

**Table 4.20. Relationship between Health facility-related factors and Utilization of PPE**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			Sig. F Change
					F Change	df1	df2	
1	.319	.102	.092	.812	1.201	1	138	.000

a. Predictors: (Constant), Attitude towards PPE  
b. Dependent Variable: Utilization of PPE

Table 4.21 presents the coefficients of the regression model equation and tests of significance.

**Table 4.21. Regression Coefficients concerning Health facility-related factors**

Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta			
1	(Constant)	<b>1.623</b>	.417		5.142	<b>.000</b>
	Health facility related factors	<b>.172</b>	.092	.152	1.760	<b>.000</b>

a. Dependent Variable: Utilization of PPE among nurses

As shown in Table 4.21, the constant was statistically significant ( $B = 1.623$ ,  $t = 5.142$ ,  $p < 0.001$ ). The regression model is:

$$\text{Utilization of PPE (y)} = 1.62 + 0.172 * \text{Health facility related factors}$$

#### 4.11 Discussions

This section presents the discussions of the study findings as found in the preceding chapter. The results are discussed according to the study objectives and hypotheses.

#### **4.11.1 Utilization of Personal Protective Equipment**

Analysis of data concerning the utilization of personal protective equipment indicated that respondents agreed that they were not using this equipment when handling clients ( $M= 2.12$ ,  $SD = 0.96$ ). This demonstrated that nurses in Thika level 5 hospital were not utilizing personal protective equipment when taking care of patients. In addition, respondents indicated that they were not complying with the set guidelines on the use of personal protective equipment ( $M = 2.02$ ,  $SD = 1.01$ ) demonstrating that even when using the equipment, nurses were not cautious to adhere to the set guidelines. In addition, analysis of data concerned with the level of utilization of PPE indicated that the majority of nurses 45.7% were frequently using PPE when dealing with patients. However, 43.6% indicated they sometimes used PPE. Nearly 11% of nurses always used PPE when dealing with patients. These results were supported those concerned with the utilization rate. These results revealed that the level of utilization of PPE among nurses was not adequate which could expose them to dangers of infectious diseases. In addition, the result on the utilization rate corroborated those of utilization level. The study results found out that the majority 45.7% (61) of nurses who participated in this study had a moderate rate of utilizing personal protective equipment. A considerable percentage of 43.6% or nearly half (50.0%) of all nurses who participated in the study had a low utilization rate of PPE. This indicated that nurses at Thika Level 5 were not utilizing personal protective equipment as recommended by the World Health Organization (WHO) and as required by the hospital management.

#### **4.11.2 Participants Demographic Characteristics**

The demographic data of this research showed that most (85%) participants were females. This indicated that the majority of nurses at Thika level 5 hospital are women.

This could be used to indicate that nursing as a profession is still perceived as female-dominated. A cross-tabulation between gender and utilization of PPE was not significant ( $X^2 = 0.144$ ,  $df = 1$ ,  $p = .704$ ). This demonstrated that utilization of PPE does not rely on whether a nurse is a female or male.

The data also confirmed that the majority (38.6%) of the study participants were aged 45 years and above, which implied that nursing is not only a profession of youth. A cross-tabulation between age and utilization of PPE revealed significant relationship between the two variables ( $X^2 = 1.487$ ,  $df = 3$ ,  $p = .008$ ). Thus, the age of a nurse could influence the utilization of PPE.

In addition, the majority (70.7%) of nurses were married. The relationship between marital status and utilization of PPE was not significant ( $X^2 = 5.371$ ,  $df = 3$ ,  $p = .147$ ). This demonstrated that utilization of PPE is not pegged on whether a nurse is married, single, or divorced.

On work experience, the majority (49.3%) had worked for over 15 years. This demonstrated that participants in this study were well experienced and therefore were versed with nursing practice. Also, the relationship between work experience and utilization of PPE was significant ( $X^2 = 7.826$ ,  $df = 3$ ,  $p = .004$ ). Thus, work experience could influence the utilization of PPE among nurses. This could be the case because as a nurse gains experience, he or she comes across different patients or rather experiences infections as a result of not using PPE when dealing with patients. This experience could propel the nurse to utilize PPE when dealing with patients to avoid an occurrence of an earlier negative experience.

On education qualification, the overwhelming majority (77.9%) of all participants had diploma holders. Therefore, this indicated the need for more nurses to acquire advanced

training. It could also mean – when work experience is considered – that once a nurse earns his or her diploma qualification, one is engaged in practicing without serious considerations of earning any further education qualification. Additionally, the relationship between education qualification of nurses and utilization of PPE was significant ( $X^2 = 5.505$ ,  $df = 3$ ,  $p = .005$ ). This demonstrated that the level of education of nurses could act as an agent of utilizing PPE.

#### **4.11.3 Knowledge about PPE**

Results on this perspective indicated that the majority (97.1%) of all participants investigated in this study had been trained on infections control. This implied that nurses were well versed with ways of controlling infections when dealing with patients. However, the obtained results show that training on infection control is not conducted within short periods which could have implications on the nurses' practice. Equally important was the fact that the majority of participants were trained on infection control on the job. Although this mode of training is systematic, economical, and yields immediate productivity, it is a rushed process and could cost the hospital and individual nurses. For example, individual learning nurses when faced with a challenging situation in the absence of a trained nurse could mean that they are exposed to serious consequences given the way they are going to deal with such a situation.

Descriptive results using means and standard deviations revealed that participants agreed with all items of knowledge about personal protective equipment. In particular, respondents were high in agreement on their confidence that they understand the risks associated with infections when dealing with patients ( $M = 4.36$ ,  $SD = 0.85$ ). Also, participants indicated that they were confident that they could understand how to protect themselves and patients from infections ( $M = 4.22$ ,  $SD = 0.99$ ). In addition,

participants in this study were aware that patients with signs and symptoms of respiratory illness should wear a surgical mask of the face in common areas, or should be placed immediately in examination rooms or away from other patients ( $M = 4.23$ ,  $SD = 0.97$ ). These results demonstrated that participants had knowledge about PPE and how to handle the patients to prevent fresh illnesses. Concerning the level of knowledge, the majority (47.9%) of the participants were found to have a marginal level of knowledge because they were able to identify 5 to 8 procedures of donning and removing PPE out of the 12 possible ones.

The study findings revealed that a significant portion of nurses was not able to identify the correct procedure of donning and removing the recommended PPE. This begged a question of how then nurses were expected to deal with recommended PPE when dealing with patients. This implied that participants in this study were exposed to the serious hazardous situation when dealing with patients because even incorrect procedures of donning recommended PPE meant that nurses were still exposed to infections when handling patients in the hospital. Other studies found similar results as are for the current study. For example, Formozo et al., (2009) found insufficient knowledge and stated that was a reason for non-compliance with recommended PPE among nurses. Jain et al. (2012) also found similar results. In their study which was conducted in Nigeria, 55.3% of nurses had sub-optimal knowledge regarding guidelines for the use of PPE, and 31.8% lacked appropriate knowledge on the risks associated with HAIs. Similar results were also found in Kenya (Moyo, 2013) who found an extremely low percentage (17.8%) of nurses with satisfactory knowledge on the fundamentals concerning PPE in a study conducted in Mbagathi District Hospital.

Simple linear regression results also confirmed a positive and significant influence of knowledge on utilization of recommended PPE ( $B = 2.672$ ,  $t = 8.433$ ,  $p < 0.001$ ).

Hence,  $H_{01}$  was rejected indicating that knowledge about PPE and utilization of PPE were significantly related. The result demonstrated how knowledge about PPE was critical towards utilization of PPE and hence the overall prevention of HAI. This result compares well with the past study in 2009 by the Israel Ministry of Health which showed that, among healthcare workers in 21 hospitals and 40 primary care clinics, only 58% were confident in the use of PPE, and knowledge was positively related to confidence in PPE.

#### **4.11.4 Attitudes influencing PPE use**

Results on this dimension of the study indicated positive and negative attitudes towards PPE use among nurses in Thika level 5 hospital. It was found out that even though nurses valued the use of appropriate PPE towards preventing the acquisition of infections, they equally indicated that it was inconvenient to use them when taking care of patients and interfered with the treatment rendered to the patients. This implied that they knew the importance of using recommended PPE but their attitudes were not positive. Daugherty et al. (2009) found similar results in a survey of 292 internal medicine house staff, pulmonary/critical care fellows and faculty, nurses, and respiratory care professionals working in four ICUs in two hospitals in Baltimore. In addition, Ward (2012) argued that the purpose behind the negative attitudes is credited to the recognition that it is an extra obligation not part of patient consideration and that infection prevention and control is viewed as tedious and inconvenient without thinking about its significance in enhancing patient safety.

The simple linear regression results on attitudes towards the use of PPE dimension revealed similar results as the coefficient for attitudes towards PPE use and utilization of PPE was found to be positive and significant ( $B = 3.152$ ,  $t = 7.233$ ,  $p < 0.001$ ). These

results underlined the crucial role of attitude towards the overall utilization of recommended PPE among the nurses. The results could be used to mean that, utilization of PPE by nurses when dealing with patients is all about having positive attitudes. Consequently, a negative attitude would yield a 'do not care' perspective on the utilization of recommended PPE among nurses when dealing with patients in the hospital. If hospital management and supervisors cannot be able to deal with the negative attitudes of nurses towards the utilization of recommended PPE, this could bring serious ramifications to the health of nurses and could cost the hospitals dearly.

#### **4.11.5 Health Facility Related Factors**

Descriptive results on health facility-related factors revealed that the use of recommended PPE was due to availability in hospitals. However, results indicated that even when the recommended PPE is available in the hospital, they could not be easily accessible to nurses or lengthy procedures of accessing them. Formozo and Oliveira (2009) found similar results in Australia and noted that unavailability of equipment was a reason for non-compliance with PPE among nurses.

Equally worthwhile to note is that the behavior of nurses may have a serious influence on the way recommended PPE were used. As of knowledge about PPE and attitudes towards the use of PPE, simple linear regression results revealed a positive and significant influence of health facility-related factors on utilization of recommended PPE ( $B = 1.623$ ,  $t = 5.142$ ,  $p < 0.001$ ). This underlined the importance of these factors towards the overall utilization of recommended PPE. These findings are consistent with those of a study by Ojewole et al. (2015) in Olabisi Onabanjo University Teaching Hospital in Nigeria and Kenya by Gertrude (2013).

## **CHAPTER FIVE: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS**

### **5.0 Introduction**

This chapter presents a summary of key findings. The chapter also presents the conclusions ensuing from the study key findings and recommendations are provided for practice, policy, and further research.

### **5.1 Summary of the Major Findings**

Analysis of the data collected revealed three important findings. Foremost, the study results indicated that knowledge about PPE is critical towards the overall utilization of recommended PPE. However, the level of knowledge among nurses was found to be marginal and inadequate. Results also revealed that nurses are trained on infection control, but the majority are trained on the job. Knowledge about PPE was found to have a positive and significant influence on the utilization of recommended PPE. Second, attitude towards the use of PPE was found to have a positive significant influence on the utilization of PPE among nurses. When compared with knowledge about PPE and health facility-related factors, attitude towards PPE use was found to be the most significant predictor of utilization of PPE. Lastly, health facility-related factors were found to positively and significantly influence the utilization of PPE among nurses.

### **5.2 Conclusions**

The analysis of individual and work environment factors that influence the use of Personal Protective Equipment by nurses was meant to understand the factors that can be used to explain the decision of nurses regarding utilization of PPE to protect them from hazards and risks of acquiring infections while dealing with patients in the hospital. This information is important to the management of hospitals and other

interested stakeholders in the development of strategies for addressing sub-optimal utilization of PPE among nurses in hospitals.

The study concludes that utilization of PPE among nurses is suboptimal hence leaving them exposed to a variety of hazards and risks, some of which could easily have been controlled or greatly reduced if all the recommended PPE were utilized.

The study further concludes that knowledge about PPE is a vital component in the entire process of utilizing recommended PPE among nurses. Having the requisite knowledge will raise the level of risk awareness among nurses. Improved awareness among the nurses is further expected to increase the perception of risks posed by their practice that influence positive attitudes towards the use of PPE. This is specifically true because as earlier observed most nurses are trained on the job, meaning that trainers of trainees should have adequate knowledge in the use of PPE as well as risks and hazards associated with non-compliance. This will in turn boost the well-being of nurses in hospitals.

The study further concludes that attitude towards the use of recommended PPE is very important on the overall utilization of PPE among nurses. In line with this, a positive attitude among nurses concerning PPE would enhance the utilization of the same. A negative attitude would completely do the contrary. Further and on this dimension, the study concludes that attitude is the main driver of utilizing PPE among nurses, as an individual nurse could have all the required knowledge but still fail to use them due to negative attitudes and perceptions.

Lastly, the study concludes that health facility-related factors are important to the overall utilization of PPE. This is true because nurses could have the knowledge and positive attitude but still fail to use them due to hospital-related and behavioral factors.

### **5.3 Recommendations**

Healthcare-acquired infections can be significantly reduced or avoided through good and consistent utilization of recommended PPE when dealing with patients in hospitals.

The following are the recommendations of this study:

#### **5.3.1 Recommendations for Hospital Management**

The findings of the study provide real-world implications for the management of hospitals. For managers of hospitals, this study has demonstrated that knowledge about PPE is important to the overall use of PPE. Thus, the management should ensure that nurses are well trained by planning for periodical training, and when doing so, to utilize experts. For hospitals, aiming to reduce or avoid healthcare-acquired infections or nurses-acquired infections, the management should invest more to develop ways of enhancing positive attitudes among nurses. More attention should be paid to the importance of utilizing PPE and the consequences for doing the contrary. Besides, the management of hospitals should ensure that, at all times, recommended PPE is available and accessible.

#### **5.3.2 Recommendations for Government Agencies**

The County governments should ensure that quality PPE is available to hospitals. This would ensure that recommended PPE is available for use by nurses while attending to patients.

The ministry of health should develop strategies for training and delivering safety and health education information to hospitals to raise awareness on the use of PPE and other protective measures. Training of nurses would increase their perception of risks and enhance their perceptions of the benefits of PPE in offering protection from work-related hazards.

### **5.3.3 Recommendations for Further Research**

Besides its contributions, our study is also subject to several limitations which provide potential avenues for future research.

First, the study focused on the influence of three dimensions (knowledge about PPE, attitude towards the use of PPE, and health facility-related factors) on the utilization of PPE among nurses. Future research could investigate whether these findings also hold in other health care workers.

Second, the study focused on Thika level 5 hospital – a county government management hospital that falls under the public sector. Future research should address this issue in other county hospitals and also in privately-owned hospitals.

Third, future research should focus on other dimensions influencing the utilization of PPE among nurses other than the three investigated in this study.

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## APPENDICES

### **Appendix 1: Letter of Consent**

I am **Yusuf Usman**, a post-graduate student pursuing a Master's of Science in Medical-Surgical Nursing at Mount Kenya University. I am researching the **Utilization of Personal Protective Equipment (PPE) Among Nurses at Thika Level 5 Hospital**. I humbly request your participation in this research to help identify areas that could help to make Thika level 5 hospital the best hospital where infection control is at its peak, in Kenya and Africa at large.

### **Informed Consent to Participate**

I am inviting you to take part in a research study. This form will tell you about the study, but I will explain it to you first. You can ask any questions regarding the study. You have the right either to or not to participate. If you wish to participate, then you will have to read this information carefully and sign. You will also receive a copy of this form.

### **Why am I being asked to take part in this research study?**

As a nurse, infection control in the hospital cannot be achieved without you. Your participation will help me identify gaps that need to be filled to ensure safety in our hospitals.

### **Why are am I conducting the research study?**

The purpose of this study is to investigate infection control practice among nurses at Thika level 5 Hospital.

### **What will I be asked to do?**

You will be asked to complete a questionnaire which will take approximately 15 minutes. If you have any difficulty reading or understanding the questions, the researcher will be available to help you.

**Where will this take place?**

The questionnaires would be administered to you at the hospital, and you can fill them at your own pace and place of your convenience.

**Will there be any risk or discomfort to me?**

There will be no risks to you as you would be given enough time to complete and return the questionnaires. All information would be treated with the utmost confidentiality.

**Will I benefit directly from this research?**

There will be no direct benefit from participating in this research. Nevertheless, information from this study will serve as a guide for improved infection control practice.

**Who will see the information about me?**

All information provided by you will be treated with confidentiality. No reports or publications about the research will use information that can identify you in any way.

**Can I discontinue my participation in this study?**

Yes, your participation is voluntary. You can stop at any point if you do not want to continue.

**Who can I contact if I have questions or problems?**

You can contact me (Yusuf Usman), on mobile number 0726653542. Address: Mount Kenya University, School of Nursing.

**Will I be paid for my participation?**

You will not receive any monetary or another form of reimbursement for participating in this study.

Thank you for sparing your time to read this information. If you wish to participate, please sign below.

---

Respondent's signature/Date

Researchers signature/ Date

## **Appendix 2: Questionnaire for Nurses at Thika Level 5 Hospital**

**Study Topic:** Utilization of Personal Protective Equipment (PPE) Among Nurses at Thika Level 5 Hospital

### **Instructions**

- a) *Please do not write your name on this questionnaire.*
- b) *Tick your answers in the boxes provided*
- c) *Write your response in the space provided where there are no options to choose from.*

### **PART A: Demographic Information**

1. **Gender** Male  Female
2. **Age**  
18-25  26 – 35  36-45  46 and above
3. **Marital Status**  
Married  Single  Widow  Separated
4. **How long have you worked as a nurse?**  
0- 5yrs  6 - 10yrs  11 - 15yrs  Above15yrs
5. **Level of education**  
Certificate  Diploma  Degree  Masters  Ph.D.

### **Part B. Knowledge on Personal Protective Equipment**

6. **Have you been trained in infection control?**  
Yes  No
7. **When did you receive your last training on infection control?**  
1 – 6 months ago  7 – 12 months  1 - 3 years   
more than 3years
8. **How were you trained on infection control?**  
During orientation and induction   
On the job training   
Short course

In-service training

Others (please specify): \_\_\_\_\_

**9. Choose the correct series of donning PPE**

- Apron/Gown ▶ Particulate Respirator/Mask ▶ face shields/Goggles  
▶ Gloves
- Gown ▶ Gloves ▶ Mask/Respirator ▶ Goggles/face shields
- Mask/Respirator ▶ Gloves ▶ Goggles/face shields ▶ Gown
- Gloves ▶ Mask/Respirator ▶ Goggles/face shields ▶ Gown

**10. Choose the correct series of removing PPE**

- Mask/Respirator ▶ Gown ▶ Goggles/face shields ▶ Gloves
- Goggles/face shields ▶ Gloves ▶ Mask/Respirator ▶ Gown
- Gloves ▶ Goggles/face shields ▶ Gown ▶ Mask/Respirator
- Gown ▶ Goggles/face shields ▶ Gloves ▶ Mask/Respirator

**11. Choose the correct order of donning gloves**

- if in use) ▶ Keep the gloved hand away from the face ▶ Avoid touching any other PPE ▶ Remove glove if it is torn ▶ Ensure hand hygiene before donning a new set of gloves
- Select correct type and size ▶ Extend over isolation gown cuff (i.e. if in use) ▶ Insert hand into glove ▶ Avoid touching other PPE ▶ Perform hand hygiene before donning new gloves ▶ Keep gloved hand away from face ▶ Remove glove if it is torn
- Ensure hand hygiene before donning new gloves ▶ Select the correct type and size ▶ Insert hand into glove ▶ Extend over isolation gown cuff ▶ Keep gloved hand away from face ▶ Avoid touching another PPE ▶ Remove glove if torn
- Select correct type and size ▶ Insert hand into glove ▶ Extend over isolation gown cuff ▶ Remove glove if torn ▶ Perform hand hygiene before donning new gloves ▶ Avoid touching other PPE ▶ Keep gloved hand away from the face

**12. Choose the correct order of removing gloves**

- Grasp outside edge near wrist ▶ Peel away from hand turning the glove inside out ▶ Hold in opposite gloved hand ▶ Slide ungloved finger under the wrist of the remaining glove ▶ Peel off from inside creating a bag for both gloves ▶ Discard the gloves ▶ Wash hand

- Peel away from hand turning the glove inside out ► Slide ungloved finger under the wrist of the remaining glove ► Hold in opposite gloved hand ► Grasp outside edge near wrist ► Peel off from inside creating a bag for both gloves ► Wash hand ► Discard the gloves
- Slide ungloved finger under the wrist of the remaining glove ► Peel away from hand turning the glove inside out ► Grasp outside edge near wrist ► Hold in opposite gloved hand ► Peel off from inside creating a bag for both gloves ► Discard the gloves ► Wash hand
- Peel away from hand turning the glove inside out ► Grasp outside edge near wrist ► Hold in opposite gloved hand ► Slide ungloved finger under the wrist of the remaining glove ► Peel off from inside creating a bag for both gloves ► Discard the gloves ► Wash hand

### **13. Choose the correct order of donning Gown/Apron**

- Select appropriate type and size ► Opening is in the back ► Secure at the neck, then waist ► If a gown is too small, use two ► Tie the first one in front, and the second one in back
- Select appropriate type and size ► Secure at the neck, then waist ► If a gown is too small, use two ► Tie the first one in back, and the second one in front ► Opening is in the front
- Select appropriate type and size ► If a gown is too small, use two ► Tie the first one in back, and the second one in front ► Opening is in the front ► Secure at the neck, then waist
- If a gown is too small, use two ► Tie the first one in back, and the second one in front ► Select appropriate type and size ► Opening is in the front ► Secure at the neck, then waist

### **14. Choose the correct order of removing Gown/Apron**

- Unfasten ties ► Peel away from neck and shoulder ► Turn contaminated area outside towards the inside ► Fold or roll gown ► Discard
- Peel away from neck and shoulder ► Unfasten ties ► Turn contaminated area outside towards the inside ► Fold or roll gown ► Discard
- Turn contaminated area outside towards the inside ► Peel away from neck and shoulder ► Unfasten ties ► Discard ► Fold or roll gown

- Peel away from neck and shoulder ► Turn contaminated area outside towards the inside ► Unfasten ties ► Discard ► Fold or roll gown

**15. Choose the correct order of donning Mask**

- Place mask over nose, mouth, and chin ► Fit flexible nose-piece over nose-bridge ► Secure the head with ties or elastic ► Adjust to fit
- Place mask over nose, mouth and chin ► Secure the head with ties or elastic ► Adjust to fit
- Fit flexible nose-piece over nose-bridge
- Fit flexible nose-piece over nose-bridge ► Place mask over nose, mouth, and chin ► Adjust to fit ► Secure on the head with ties or elastic
- Secure on the head with ties or elastic ► Fit flexible nose-piece over nose-bridge ► Place mask over nose, mouth, and chin ► Adjust to fit

**16. Choose the correct order of removing Mask**

- Untie the bottom, then the top tie ► Remove from face ► Discard
- Remove from face ► Discard ► Untie the top, then the top bottom
- Untie the top ► then the bottom ► Remove from face ► Discard
- Remove from face ► Untie the top Discard ► Untie the bottom

**17. Choose the correct order of donning Particulate Respirator**

- Select a fit-tested respirator ► Place on nose, mouth, and chin ► Fit flexible nose-piece over nose-bridge ► Adjust to fit and perform a fit check
- Place on nose, mouth, and chin Fit flexible nose-piece over nose-bridge ► Select a fit-tested respirator ► Adjust to fit and perform a fit check
- Adjust to fit and perform a fit check ► Place on nose, mouth, and chin ► Select a fit-tested respirator ► Fit flexible nose-piece over nose-bridge
- Fit flexible nose-piece over nose-bridge ► Adjust to fit and perform a fit check ► Place on nose, mouth, and chin ► Select a fit-tested respirator

**18. Choose the correct order of removing Particulate Respirator**

- First, lift the bottom elastic overhead ►Lift the top elastic and remove respirator ►Discard
- First, lift the top elastic overhead ►Lift the bottom elastic and remove respirator ►Discard
- Remove respirator ►Lift the bottom elastic then lift the top elastic overhead ►Discard
- Lift the bottom elastic then lift the top elastic overhead ►Discard ►Remove respirator

**19. Choose the correct order of donning Goggle/Face shield**

- Select the appropriate type and size ►Position the goggle over the eyes and secure to the head ►using earpiece or headband ►Position face-shield over face and secure to the head using earpiece or headband ►Adjust to fit comfortably
- Position the goggle over the eyes and secure to the head using earpiece or headband ►Position face-shield over face and secure to the head using earpiece or headband ►Adjust to fit comfortably ►Select the appropriate type and size
- Select the appropriate type and size ►Adjust to fit comfortably ►Position the goggle over the eyes and secure to the head ►using an earpiece or headband
- Position face-shield over face and secure to the head using earpiece or headband ►Select the appropriate type and size ►Adjust to fit comfortably
- Position the goggle over the eyes and secure to the head ►using an earpiece or headband ►Adjust to fit comfortably

**20. Choose the correct order of removing Goggle/Face shield**

- Grasp ear or head-piece with ungloved hands ►Lift away from face ►Place in the designated receptacle for reprocessing or disposal
- Lift away from face ►Place in the designated receptacle for reprocessing or disposal ►Grasp ear or head-piece with ungloved hands
- Grasp ear or head-piece with ungloved hands ►Place in the designated receptacle for reprocessing or disposal ►Lift away from the face

- Lift away from face ► Place in the designated receptacle for reprocessing or disposal ► Grasp ear or head-piece with ungloved hands

**21. After donning gloves, work should start from?**

Dirty to clean area  Clean to dirty area  Anywhere

None of above

**22. Please indicate your level of agreement with regard TO KNOWLEDGE ON THE USE OF PPE on a scale of 1 to 5 (1 = Complete Disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Complete Agree)**

Statements	1	2	3	4	5
1. Use of Personal Protective Equipment (PPE) is part of infection control					
2. Personal Protective Equipment (PPE) is an effective barrier to infection					
3. PPE should be used when there is a risk of exposure to fluids and secretions from the patient					
4. I am confident that I understand the risks associated with infections when dealing with patients					
5. I am confident that I understand how to protect myself and my patients from infections					
6. The use of correct PPE eliminates the need for hand hygiene					
7. Clients with signs and symptoms of respiratory illness should wear a surgical mask while waiting in common areas or should be placed immediately in examination rooms or away from others.					

**Part C. Attitude**

**23. Please indicate your level of agreement with regard to following statements on a scale of 1 to 5 (1 = Complete Disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Complete Agree)**

Attitude	1	2	3	4	5
1. Use of PPE keeps me from getting infections					
2. Use of PPE will keep patients from getting infections					
3. It is inconvenient to use recommended PPE when taking care of patients					
4. Use of recommended PPE interfere with patient treatment/care					
5. Adherence to guidelines for the use of PPE is					

very essential					
6. I am confident that I can improve PPE compliance					

**Part D. Health facility related factors**

24. Please indicate your level of agreement with regard to following statements on a scale of 1 to 5 (*1 = Complete Disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Complete Agree*)

Statements	1	2	3	4	5
1. All recommended PPE is readily available in the hospital					
2. All recommended PPE that are available are accessible					
3. My head nurse or attending physician would warn me if I did not use PPE when caring for patients					

**Part E. Utilization of PPE**

25. How often do you use PPE when dealing with patients?

Never  Sometimes  Frequently  Always

26. How often do you comply with the guidelines on the use of PPE?

Never  Sometimes  Frequently  Always

27. Please indicate your level of agreement with regard to following statements on a scale of 1 to 5 (*1 = Complete Disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Complete Agree*)

Statements	1	2	3	4	5
I perform hand hygiene before donning gloves					
I perform hand hygiene immediately after removing gloves					
I touch my face and other parts of my body, another person, adjust another PPE, or touch the surrounding after donning gloves					
I wash or reuse gloves if clean after use					
I change gloves if highly soiled or torn during use, even if used on the same patient					

**Thank You for your Participation**

### **Appendix 3: Key Informant Interview Guide**

#### **Factors Influencing Compliance with WHO guidelines for use of PPE among nurses working at Thika Level 5 Hospital**

##### **Benefits**

- In your own opinion, what do you think are the benefits of using PPE?

##### **Motivation**

- What drives you to comply with guidelines for the use of PPE?

##### **Barriers**

- In your own opinion, what do you think would hinder a nurse from complying with WHO guidelines for the use of PPE?

##### **Practice**

- In the past six months can you recall having any healthcare-associated infection?
- What do you think contributed to that?
- After contacting the infection, explain the care you received and how soon was the care implemented?

##### **Challenges**

- In the past six months, is there any time when the supply of PPE was inadequate?
- Think of any reason for inadequate supply of PPE
- Think of an incident in the past three months when you did not comply with WHO guidelines for the use of PPE?
- Describe the situation?
- Explain the reasons for not complying?

- Are there any challenges you face when implementing the guidelines for the use of PPE? Explain.

### **Recommendations**

Finally, what do you think should be in place to promote and sustain compliance with the WHO guidelines for the use of PPE?


Thank you for your time and contributions.

**Appendix 4: Request for Permission to obtain Baseline Survey**

Yusuf Usman  
MSCN/2014/79195  
Mount Kenya University  
[yusman2222@gmail.com](mailto:yusman2222@gmail.com)

The Medical Superintendent  
Thika Level 5 Hospital,  
Thika Sub-County,  
Kiambu County

19/1/17  
TRFC  
A. Waye



Dear Sir/Mr,

**Request for permission to obtain baseline information**

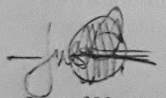
I am a student pursuing Masters of Science in Nursing at Mount Kenya University with admission number as above.


I hereby request for some baseline information such as the number of nurses working at Thika level 5 hospital, to enable me prepare a proposal for my research titled: ASSESSMENT OF ADEQUATE UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENT (PPE) AMONG NURSES AT THIKA LEVEL 5 HOSPITAL.

With regards, I look forward to consideration.

Thank you

Yours faithfully

  
Yusuf Usman  
0726653542

TRFC Approved  
HOD to advise  
 23/01/17

**Appendix 5: Certificate of Ethical Clearance**

**Mount Kenya University**



JUNE 9, 2017

Ref. No. MKU/ERC/0417

CERTIFICATE OF ETHICAL CLEARANCE

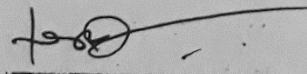
This is to certify that the proposal titled "UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENT (PPE) AMONG NURSES AT THIKA LEVEL 5 HOSPITAL", whose Principal Investigator is Mr Usman Yusuf (MSCN/2014/79195) has been reviewed by Mount Kenya University Ethics Review Committee (ERC), and found to adequately address all ethical concerns.

Mr Francis W. Makokha  
Secretary, Mount Kenya University ERC

Sign: 

Date: 9/06/2017

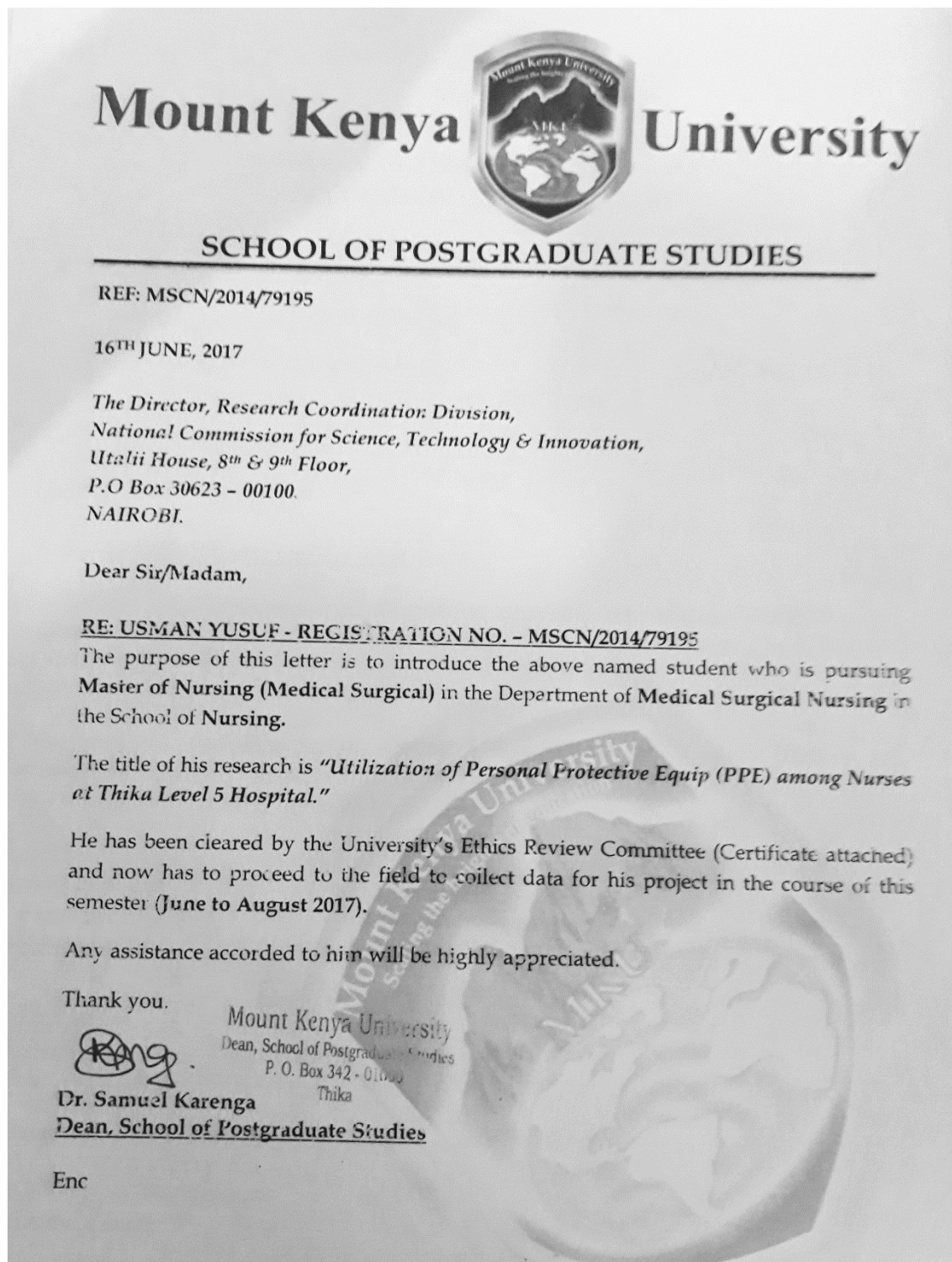
Prof. Francis W. Muregi  
Chairman, Mount Kenya University ERC

Sign: 


Date: 12/06/2017

The Chairman  
Mount Kenya University  
Ethics Review Committee  
P. O. Box 342 - 0100, Thika

## Appendix 6: Introduction Letter to NACOSTI



## Appendix 7: Research Authorization (NACOSTI)

  
**NATIONAL COMMISSION FOR SCIENCE,  
TECHNOLOGY AND INNOVATION**

Telephone: +254 20 2213471  
2241349, 3310521, 2219420  
Fax: +254 20 318245, 318249  
Email: dg@nacosti.go.ke  
Website: www.nacosti.go.ke  
When replying please quote

9<sup>th</sup> Floor, Utafu House  
Uhuru Highway  
P.O. Box 30673-00100  
NAIROBI-KENYA

Ref No: **NACOSTI/P/17/24220/17856** Date: **3<sup>rd</sup> August, 2017**

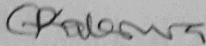
Yusuf Usman  
Mount Kenya University  
P.O. Box 342-01000  
**THIKA.**

**RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on *“Utilization of personal protective equipment among nurses at Thika Level 5 Hospital,”* I am pleased to inform you that you have been authorized to undertake research in **Kiambu County** for the period ending **3<sup>rd</sup> August, 2018.**

You are advised to report to **the County Commissioner, the County Director of Education and the County Director of Health Services, Kiambu County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a **copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

  
**GODFREY P. KALERWA MSc., MBA, MKIM**  
**FOR: DIRECTOR-GENERAL/CEO**


Copy to:

The County Commissioner  
Kiambu County.

The County Director of Education  
Kiambu County.

## Appendix 8: Clearance to Conduct Research in Kiambu County

**COUNTY GOVERNMENT OF KIAMBU  
DEPARTMENT OF HEALTH SERVICES**



All correspondence should be addressed to HEAD  
HRDU – HEALTH DEPARTMENT  
Email address: [mndiritu@gmail.com](mailto:mndiritu@gmail.com)  
[mkwasa@hrvc.com](mailto:mkwasa@hrvc.com)  
Tel. Nos: 0721641516  
0721974633

HEALTH RESEARCH AND DEVELOPMENT  
UNIT  
P. O. BOX 2344 – 00900  
KIAMBU

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Ref No: KBU/HRDU/GEN/VOL 1/43 Date: 7<sup>th</sup> August 2017

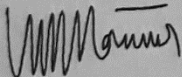
**TO WHOM IT MAY CONCERN**

**RE: CLEARANCE TO CONDUCT RESEARCH IN KIAMBU COUNTY**

Kindly note that we have received a request by Yusuf Usman of the Mount Kenya University to carry out research in Kiambu County, the research topic being on "**Utilisation of personal protective equipment among nurses at Thika Level 5 Hospital**"

We have duly inspected his documents and found that he has been cleared by the NACOSTI to carry out the research for a period ending 3<sup>rd</sup> August 2018. He thus does not need any further clearance with another regulatory body in order to conduct research within the county of Kiambu.

However, it is incumbent upon the institution where he is carrying out research to ensure that he receives adequate supervision during the process of conducting the research. This note also accords him the duty to provide a feedback on his research to the county at the conclusion of his research.



**DR. KWASA MAGOMA  
FOR: HEAD, HEALTH RESEARCH DEVELOPMENT UNIT  
KIAMBU COUNTY**

**Appendix 9: Research Authorization (Ministry of Interior and Coordination of National Government)**



**OFFICE OF THE PRESIDENT  
MINISTRY OF INTERIOR AND COORDINATION OF  
NATIONAL GOVERNMENT**

Telegrams: "DISTRICTER" Thika  
Telephone: Thika 067-21222 and 21884  
Fax: 067 - 31199

THE DEPUTY COUNTY COMMISSIONER  
THIKA WEST SUB COUNTY  
P.O Box 128-01000  
THIKA

When replying please quote

REF: CORR. ¾ IX/55

Date: 15<sup>th</sup> August 2017

Assistant County Commissioner  
**MUNICIPALITY DIVISION.**

**RE: RESEARCH AUTHORIZATION – YUSUF USMAN.**

Attached please find a letter from the National Commission for Science and Technology Ref; NACOSTI/P/17/24220/17856 dated 3/8/2017 on the above subject.

The above mentioned person has been authorized to carry out a research in Kiambu County on "Utilization of personal protective equipment among nurses at Thika Level 5 Hospital".

This is to bring the contents of the letter to your attention and officers under your purview.

**C.M NYONGESA  
FOR: DEPUTY COUNTY COMMISSIONER  
THIKA WEST SUB COUNTY.**

✓ Copy Yusuf Usman  
Mount Kenya University  
P.O Box 342 – 01000  
**THIKA.**

## Appendix 10: Letter of Introduction to Thika Level 5 Hospital

# Mount Kenya University



## SCHOOL OF POSTGRADUATE STUDIES

REF: MSCN/2014/79195

15<sup>TH</sup> August, 2017

*The Medical Superintendent  
Thika Level 5 Hospital  
Kiambu County*

Dear Sir/Madam,

RE: USMAN YUSUF - REGISTRATION NO - MSCN/2014/79195

The purpose of this letter is to introduce the above named student who is pursuing Master of Science in Nursing in the Department of Medical and Surgical Nursing in the School of Nursing.

The title of his project is *"Utilization of Personal Protective Equipment among Nurses at Thika Level 5 Hospital, Kiambu County."*

He has been cleared by the University's Ethics Review Committee (Certificate attached) and now needs to proceed to the field to collect data for his research for the period ending 3<sup>rd</sup> August, 2018.

Any assistance accorded to him will be highly appreciated.

Thank you.

Dr. Samuel Karenga  
Dean, School of Postgraduate Studies


Mount Kenya University  
Dean, School of Postgraduate Studies  
P. O. Box 342 - 01000  
Thika

Enc

## Appendix 11: Approval to Conduct Research in Thika Level 5 Hospital

COUNTY GOVERNMENT OF KIAMBU  
DEPARTMENT OF HEALTH

Tel. Thika 067 21621/2 fax 21778  
All correspondence should be addressed to  
MED.SUPT.  
When replying please quote



THIKA LEVEL 5 HOSPITAL  
P.O. BOX 227  
THIKA

Ref. NO. MOMSTKA VOL III (360)

Date: 24<sup>th</sup> August, 2017

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**APPROVAL TO CARRY OF RESEARCH**

Principle investigator: **USMAN YUSUF**

**RESEARCH TOPIC: UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENT (PPE)  
AMONG NURSE AT THIKA LEVEL 5 HOSPITAL**

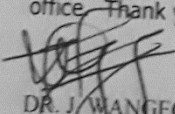
Following deliberations by Thika Level 5 hospital research committee, your proposal to carry out the above research at this facility has been approved. However, you will need to provide us with licence from NACOSTI before you can commence the data collection.

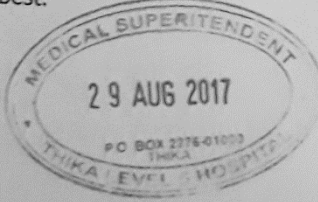
Take note that you are required to submit a copy of your research findings upon completion of the study to the hospital. It is also expected that the Ethical consideration and the research subjects confidentiality will be maintained as you have outlined in your proposal.

Any patient confidential information that you may access during your research should not be used without consent.

This letter is valid up to 24<sup>th</sup> February, 2018.

For any queries feel free to contact the committee chair through the Medical Superintendent's office. Thank you and all the best.

  
DR. J. WANGECHI  
CHAIR TREC  
**THIKA LEVEL 5 HOSPITAL**



**Appendix 12: Map of Thika sub-location in Kiambu County**

