

UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENT AND ASSOCIATED FACTORS AMONG NURSES AT THIKA LEVEL 5 HOSPITALUsman Yusuf^{*1}, Okova Rosemary² and Affey Fatuma³¹Masters Student, ²Senior Lecturer, and ³Lecturer
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ABSTRACT

Hospital acquired infections have been recognized as a problem affecting the quality of health care and a principal source of adverse healthcare outcomes globally. Hospital acquired infection occurs due to poor utilization of Personal Protective Equipment (PPE) among healthcare workers. 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 creates a barrier between the nurse and the infectious organisms thereby preventing the nurse, the patient, and the visitors from being infected, and also prevents the spread of infection within the hospital. Personal Protective Equipment (PPE) refers to specialized clothing or equipment used for protection against infectious materials. They are 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. Good practice guidelines advocate risk appraisal of the potential for exposure and use of appropriate equipment to manage this risk (Karen et al., 2015). This study examined the utilization of PPE among nurses at Thika level 5 hospital, Kiambu County, Kenya. The study adopted a cross-sectional descriptive survey design which provided both quantitative and qualitative data. The study population was 246 nurses working in Thika level 5 hospital and with more than 1 year experience. Both descriptive and inferential statistics were used in line with the study hypotheses. Analysis of data revealed that nurses at Thika level 5 hospital were using this equipment when handling clients (M= 2.12, SD = 0.96). In addition, analysis of data concerned with the level of utilization of PPE indicated that majority of nurses 45.7% were frequently using PPE when dealing with patients. However, 43.6% indicated they sometimes used PPE, even though they were not complying with the set guidelines on 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. Healthcare acquired infections can be significantly reduced or avoided through good and consistent utilization of recommended PPE when dealing with patients in hospitals.

KEYWORDS: Utilization, Personal Protective Equipment Nurses, nosocomial infection.**INTRODUCTION**

Health care professionals are constantly exposed to microorganisms, many of which can cause serious or even lethal infections. Health-care-associated infection (HAI) refers to infection that is acquired during the process of care and not manifested at the time of admission to a hospital or other health-care facility (Nejad et al., 2011). 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 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).

This study aimed at establishing the utilization of Personal Protective Equipment (PPE) among nurses at Thika level 5 hospital.

METHODOLOGY

The study adopted a cross-sectional descriptive research design comprising both quantitative and qualitative methods in order 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 a study and data on all variables are only collected once.

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 north-east 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 10th 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 30th 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 centre 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.

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 purpose of the current study, the target population was all nurses working at Thika level 5 Hospital totaling to 243 nurses (Thika level 5 hospital, 2016).

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 1 year of working, a practicing nurse is expected to have achieved familiarity with the environment as well as the practices within the hospital.

Inclusion Criteria

Inclusion criteria refers to a set of already defined features used by a 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, in order 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.

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 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.

Study Variables

The study comprised both the independent and dependent variables.

Independent variables

In a 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 attitude toward 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 with regard to the use of PPE.

Dependent variables

A dependent variable in a study is a variable that is explained by one or more variables. The study dependent variable was 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.

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 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 unit.

To select the study participants, proportionate convenience sampling technique was used in order to ensure 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, 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.

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 have 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).

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

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

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

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

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

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

Table 3: 1. Sample size computation.

Units	No. of Nurses	Proportionate sample size	Proportionate %
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
Total	243	149	100.0

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

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 testing of the study hypotheses. The questionnaire had four parts. The first part was used to collect data on the participant's demographic variables. The second part was designed to collect data on the participant's attitude toward use of personal protective equipment. The last part was used to gather data on the level of utilization of personal protective equipment and the general utilization of these equipment.

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 in order to detect and remediate issues with the questionnaire prior to 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, 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 completely 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.

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

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). In order 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. Two separate Chronbach's alphas was computed for the construct on

attitude and utilization of PPE among nurses. The results are presented in Table 3.1.

Table 3: 2. Reliability Results.

Construct	Number of Items	Chronbach's alpha
Utilization of PPE among nurses	2	0.815

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

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 to test the relationship between two categorical variables. In this study, 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 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 on the basis of data in the predictor variable. Therefore, this statistical test yields a regression model that helped 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, simple linear regressions were computed.

Simple linear regression was computed between attitude and utilization of PPE among nurses. Coefficient of determination was used to establish the percentage of variance that could be explained by the study significant variables. The significance of the simple linear regression model was examined using Analysis of Variance f-test at 95% confidence level. To analyze the qualitative data, 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.

Data analysis plan	
Objective(s)	Statistical analysis
To establish the utilization level of PPE among nurses at Thika Level 5 Hospital	Descriptive statistics (means, standard deviations, percentages and frequencies)

Ethical Considerations

The study ethical considerations comprised several procedures and steps in order 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, permit to carry out 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 the purposes of this study only. The researcher further notified the

participants that participation in the study was on voluntary basis and one could refuse to participate or terminate his or her participation without incurring any harm whatsoever.

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 at Thika level 5 hospital utilize PPE. Another assumption was that nurses at Thika level 5 hospital have high level of utilization of PPE.

RESULTS

Utilization of Personal Protective Equipment

With regard to 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 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, other 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 use on same patient	4.23	0.99

As indicated, participants agreed with touching their face and other parts of their body, other 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 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.

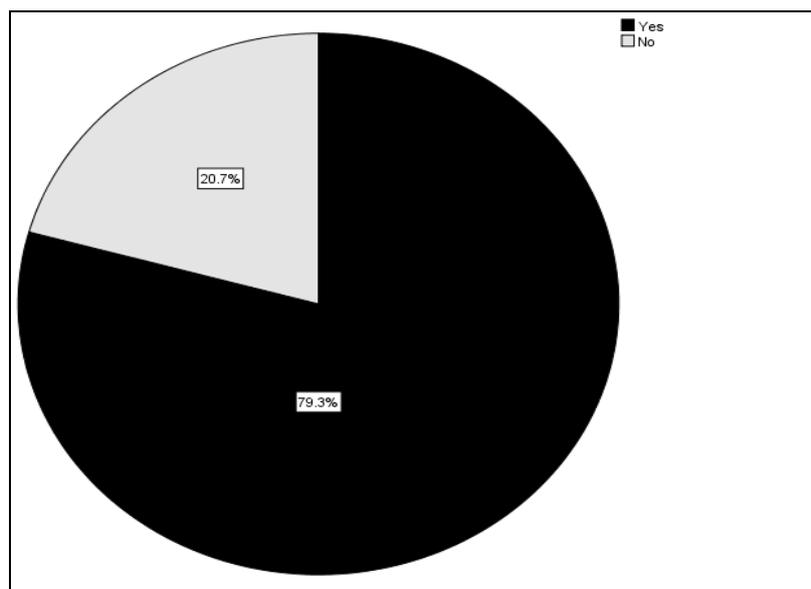


Figure 4: 1. Use of appropriate PPE while working.

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, 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.

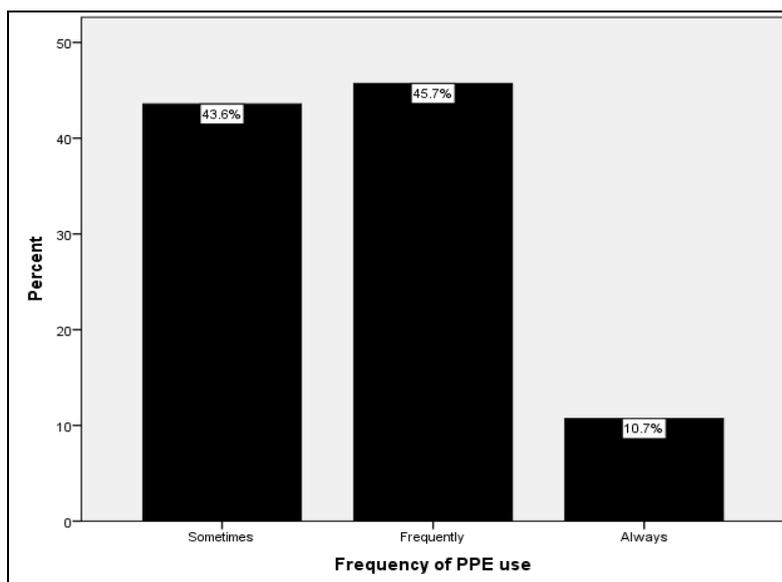


Figure 4: 2. Frequency of PPE Utilization.

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 low PPE utilization rate, 41.4% (58) had moderate PPE utilization rate and only 8.6% (12) of the sample had 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 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 minority are males.

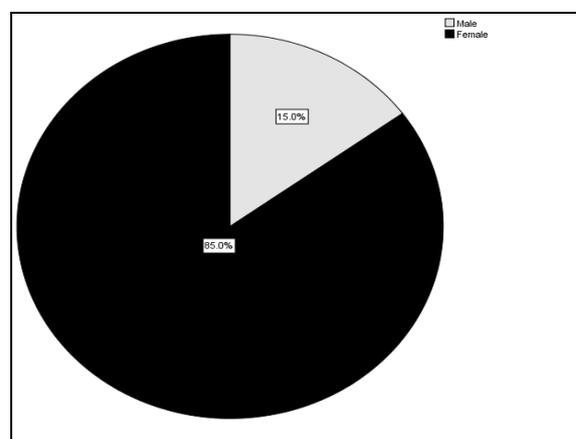


Figure 4: 3. Analysis of Participants' Gender.

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)	
Total	79.3% (111)	20.7% (29)	

4.4 Age of Participants and Utilization of Personal Protective Equipment

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

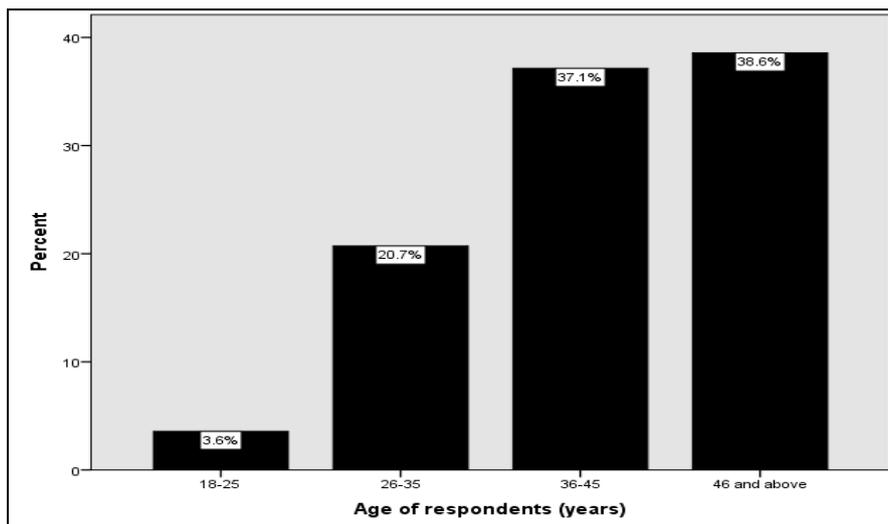


Figure 4: 3. Analysis of respondents' age profile.

The results in figure 4.4 indicated that very few young nurses aged 18 to 35 years are working at Thika Level 5 Hospital. Age of respondents was cross tabulated with utilization of personal protective equipment and the results are presented in Table 4.3. As shown in Table 4.3, 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	
Age	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)	
Total		79.3% (111)	20.7% (29)	

4.5 Marital Status and Utilization of Personal Protective Equipment

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

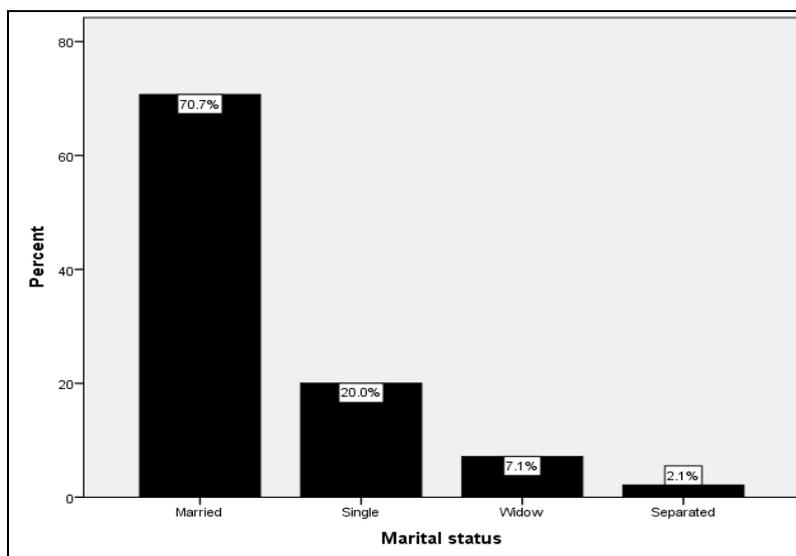


Figure 4: 4. Analysis of respondents' marital status

Results illustrated in figure 4.5 show that 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 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 utilization of personal protective equipment and results

are presented in Table 4.4. As shown in the table, majority 74.7% (74) of the married respondents reported that they were using PPE while working. A same trend was observed with those who were single (92.9%, 26), widowed (90.0%, 9), and separated with 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	
Marital Status	Married	74.7% (74)	25.3% (25)	$X^2 = 5.371, df = 3, p = .147$
	Single	92.9% (26)	7.1% (2)	
	Widow	90.0% (9)	10.0% (1)	
	Separated	66.7% (2)	33.3% (1)	
Total		79.3% (111)	20.7% (29)	

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, 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).

groupings of work experience utilized PPE while working.

Specifically, for those who had work experience between 0 to 5 years, 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.

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 utilization of personal protective equipment. Results demonstrated in Table 4.6 reveals that majority of respondents across all

For those with work experience of above 5 years, 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 of (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	
Work Experience	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)	
Total		79.3% (111)	20.7% (29)	

4.7 Education Qualification and Utilization of Personal Protective Equipment

With regard to participants’ education qualifications, 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	

A 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 certificate 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	
Education Qualifications	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)	
Total		79.3% (111)	20.7% (29)	

DISCUSSION OF FINDINGS

4.11.1 Utilization of Personal Protective Equipment

Analysis of data with regard to utilization of personal protective equipment indicated that respondents agreed that they were using this equipment when handling clients ($M = 2.12$, $SD = 0.96$). This demonstrated that nurses in Thika level 5 hospital were utilizing personal protective equipment when taking care of patients. In addition, respondents indicated that they were not complying with the set guidelines on 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 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, result on the utilization rate corroborated those of utilization level. The study results found out that majority 45.7% (61) of nurses who participated in this study had 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 low utilization rate of PPE. This clearly indicated that nurses at Thika Level 5 were not really 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, 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 majority (38.6%) of the study participants were aged 45 years and above, which implied that nursing is a 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, age of a nurse could influence utilization of PPE.

In addition, 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, 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 utilization of PPE among nurse. This could be the case because as a nurse gains experience, he or she comes across different patients or rather experience 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 totally engaged into 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 really act as agent of utilizing PPE.

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 in regard to 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 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.

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:

Attention should be paid to the importance of utilizing PPE and the consequences for doing the contrary. Besides, management of hospitals should ensure that, at all times, recommended PPE are available and accessible. The County governments should ensure that quality PPE are available to hospitals. This would ensure that recommended PPE are available for use by nurses while attending to patients.

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

Third, future research should focus on other dimensions influencing utilization of PPE among nurses.

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