

ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES

BLACK LION HOSPITAL



ASSESSMENT KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING PERSONAL PROTECTIVE EQUIPMENT OF COVID-19 AMONG NURSES WORKING IN TIKUR ANBESA SPECIALIZED HOSPITAL OPERATION ROOM AND INTENSIVE CARE UNIT, ADDIS ABABA, ETHIOPIA.

By: Yemane Fitsum (MD)

Advisors: Dr. Rahel Tilahun (Cardiothoracic Anesthesiologist)

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LIST OF ACRONYMS

CDC	<i>Center of Disease Control</i>
COVID-19	<i>Corona Virus Disease 2019</i>
CSA	<i>Central Statistics Agency</i>
HCPs	<i>Health Care Practitioners</i>
HCWs	<i>Health Care Workers</i>
ICU	<i>Intensive Care Unit</i>
IPC	<i>Infection Prevention and Control</i>
OR	<i>Operation Room</i>
OT	<i>Operation Theater</i>
PPE	<i>Personal Protective Equipment</i>
RRR	<i>Relative Risk Ratio</i>
TASH	<i>Tikur Anbesa Specialized Hospital</i>
WHO	<i>World Health Organization</i>

Abstract

Background: Coronavirus disease 2019 (COVID-19) is a respiratory illness that can spread between people through direct, indirect, or close contact with infected people via mouth and nose secretions. Facility cleaning, regular and proper handwashing, respiratory hygiene and etiquette, advice on national travel, emphasis on staying at home for infection containment, events and meeting arrangement rules, case notification and management, and proper use of face masks are the prevention methods of this pandemic. PPE is a physical barrier worn by HCWs to prevent spreading of a pathogen from either a suspected or confirmed case or a pathologic specimen.

Objective: To assess level of knowledge, attitude and practices and associated factors of Intensive care unit and operation rooms nurse's towards use of personal protective equipment to prevent COVID-19 in Tikur Anbesa Specialized hospital, Addis Ababa, Ethiopia.

Method: A cross sectional study was conducted between September and November 2020 among 113 nurse professionals working in TASH OR and ICU department. Data was collected using self-administered structured questionnaire. Data entry, analysis and quality of data were maintained by SPSS version 25 software. Level of statistical significance was set at $p < 0.05$.

Result: Of 113 total respondents, 62(54.9%) were female and the age of participant's lies between 20 - 55. Almost half of the participants does not gate training related to COVID-19. The overall mean knowledge score of participants was 63.8 (SD \pm 19.8), mean attitude score was 64.68 (SD \pm 16.1), and mean practice score was 64.7 (SD \pm 22.8). There were strong association between work experience and training status on knowledge score ($p=0.005$ and 0.002 respectively). Similarly, work experience, training status and knowledge on PPE were association factors that affected nurses' attitude towards PPE. In addition, educational status ($p= 0.026$) and knowledge on PPE ($p=0.003$) were significantly associated with practice score of nurses on PPE.

Conclusion: One nurses out of three had good knowledge, and half of the participant had, favorable attitude and good practice. Work experience and training on PPE were factors that affects both knowledge and attitude of nurses towards PPE. knowledge on PPE affected both attitude and practice of nurses on personal protective equipment.

Introduction

1.1. Background

Coronavirus disease 2019 (COVID-19) is a respiratory illness that can spread from person to person. The virus that causes COVID-19 is a novel coronavirus that was first identified during an investigation into an outbreak pneumonia in Wuhan City, Hubei Province, China towards the end of 2019 (1). Due to the rapid spread of this highly transmitted virus to many countries, WHO declared it as a "public health emergency of international concern" on January 30, 2020. Later, due to the continual rise in the number of affected countries, cases, and fatalities, WHO declared COVID-19 as a global pandemic on 11 March 2020 (2).

Current evidence suggests that COVID-19 spreads between people through direct, indirect (through contaminated objects or surfaces), or close contact with infected people via mouth and nose secretions. These include saliva, respiratory secretions or secretion droplets. These are released from the mouth or nose when an infected person coughs, sneezes, speaks or sings. People who are in close contact (within 1 meter) with an infected person can catch COVID-19 when those infectious droplets get into their mouth, nose or eyes (3).

Facility cleaning, regular and proper handwashing, respiratory hygiene and etiquette, advice on national travel, emphasis on staying at home for infection containment, events and meeting arrangement rules, case notification and management, and proper use of face masks are the prevention methods of this pandemic (4,5). Especially in health care setting; various guidelines were developed and indicating the proper use of infection and prevention control (IPC) including personal protective equipment (PPE) by healthcare workers (HCWs) to safeguard both HCWs and patients from a greater risk of contracting the disease (6–8).

PPE is a physical barrier worn by HCWs to prevent spreading of a pathogen from either a suspected or confirmed case or a pathologic specimen. It serves the dual role of preventing disease spread from patients to HCWs and vice versa. These physical barriers include goggles, face shields, fluid-resistant medical or surgical masks, particulate respirators (e.g., powered air-purifying and N95 respirators), gloves, disposable gowns, disposable coveralls, waterproof or heavy duty aprons, waterproof boots, and hoods or headcovers in conjunction with other IPC methods (7,9).

1.2. Statement of the Problem

This COVID-19 causes morbidity in the range of mild respiratory illness to severe complications characterized by acute respiratory distress syndrome, septic shock, and other metabolic and hemostasis disorders and death (10,11). Most of the fatal cases and severe illnesses like acute respiratory distress syndrome (ARDS) occurred in older adults and people who have underlying medical comorbidities like diabetes, cancer, hypertension, heart, lung, and kidney diseases (12).

Health workers are at the front line of any outbreak response and as such are exposed to hazards that put them at risk of infection with an outbreak pathogen like in case of COVID-19. Hazards include pathogen exposure, long working hours, psychological distress, fatigue, occupational burnout, stigma, and physical and psychological violence (13). A poor understanding of the disease among HCWs can result in delayed identification and treatment leading to rapid spread of infections. Guidelines for healthcare workers and online refresher courses have been developed by WHO, CDC, and various governmental organizations in various countries to boost the knowledge and prevention strategies (14).

The fact that HCWs are at risk of infection in the epidemic chain is a critical issue because HCWs help in controlling the outbreak. Therefore, all possible actions must be taken to control the spread of the infection to HCWs, first by identifying the risk factors for infection and then by taking appropriate measures to reduce these risks (15).

It is well established that transmission of the disease among HCWs is associated with overcrowding, absence of isolation room facilities, and environmental contamination. However, this is likely compounded by the fact that some HCWs have inadequate awareness of infection prevention practices (16). Knowledge of a disease may influence HCWs' attitudes and practices, and incorrect attitudes and practices directly increase the risk of infection (17).

According to Johns Hopkins university, as of September 28, 2020 COVID-19 is affecting 188 countries and territories around the world resulting in more than 33 million of morbidity, more than 24 million recovered and more than one million of deaths(18).

On 13 March, the first coronavirus case was reported in Ethiopia, and since September 28, 2020 a total of 73,332 cases, 30,363 recovery and 1,170 deaths was recovered due to the pandemic (18,19).

According to WHO, about 10% and 5% of all cases are health workers globally and Africa respectively have been infected with COVID-19. In sub-Saharan Africa alone, more than 10% of health workers affected by this epidemic. (20). The report showed that at least 90,000 healthcare workers have been infected and more than 260 nurses had died in the COVID-19 pandemic globally (21). This showed a sign of the challenges medical staff on the frontlines of the outbreak face.

1.3. Literature review

A narrative review on Personal protective equipment during the COVID -19 pandemic – summarizes that Personal protective equipment is only one part of a system to protect staff and other patients from COVID -19 transmission. Appropriate use of PPE significantly reduces risk of viral transmission and infection. Overuse of PPE is a form of misuse. Misuse of PPE depletes limited stocks, leads to avoidable shortages and increases risk to staff (22). A Cochrane review on Protective clothes and equipment for healthcare workers to prevent them from catching coronavirus and other highly infectious diseases stated that there is very low-certainty evidence that covering more parts of the body leads to better protection. For ease of difficult donning and doffing Face-to-face training in PPE use may reduce errors more than folder-based training (23).

The concepts of knowledge, attitude and practice are related to each other, and it is not easy to separate them. If an individual has knowledge about something, he or she will develop either a positive or negative attitude towards that thing. Good practice or acceptable practice is usually the result of appropriately acquired knowledge.

Knowledge about Personal Protective Equipment

In many African countries infection prevention and control measures aimed at preventing infections in health facilities are still not fully implemented. When WHO assessed clinics and hospitals across the continent for these measures, only 16% of the nearly 30,000 facilities surveyed had assessment scores above 75% or good knowledge (20).

There was a lower knowledge on PPE among study participants at Nigeria and Trinidad and Tobago, those study shows that a only 25.7% and 20.3% of the respondents respectively had adequate knowledge about PPE (24,25) and of the respondents who presumed they had adequate knowledge about donning and doffing PPE 56% were incorrect (24). But another Nigerian descriptive cross-sectional study shows Most (89%) of study participant had heard of personal protective equipment but only 38% could correctly define it. Although almost half 45% had received training on personal protective equipments (26).

According to another institutional based study at Nigeria shows that, 75% of nurses were trained in the past three years preceding the study, but only 60% knew about PPE and the use of them (27).

Attitude towards Personal Protective Equipment

Attitude towards PPE usage can have an influential effect on the usage of PPE. It is a type of behavior and attitude influences behavioral practices. This is noted among 95% of the study participants believed that standard precautions will prevent them from acquiring infection from the hospital. Seven per cent were of the view that there was no need to wash or decontaminate hands after touching patients' surroundings, while 98.9% agreed that gloves should always be worn before procedure(28). While another Trinidad and Tobago study shows that only 46.7% had good attitude towards personal protective equipment (25).

A study done among Chinese Critical Care Clinicians result shows that, about 80% of respondents believed that they knew self- and patient protection during the pandemic. In particular, 87.5% of respondents believed that use of appropriate PPE would confer adequate protection for HCWs, while only 68.5% stated that this protection was adequate for vulnerable patients. Half of respondents reported that PPE use was inconvenient, while 21.2% believed that PPE use would interfere with patient (29). A similar Egyptian study shows that 45.7% of study participant nurses agreed that usage of PPE can reduce the work hazards (30).

A research paper conducted at Gondar University referral Hospital 64.2% of the study participants had favorable attitude scores regarding infection prevention and almost all the study participants 99.3% respond that safety precaution is important for the healthcare facilities (31).

Practice of Personal Protective Equipment

A hospital based cross sectional study in Oyo State, Nigeria, showed that use of personal protective equipment (PPE) among their health care workers was low (56.8%) (32). A study in Uganda resulted in good practices among health care workers toward COVID-19 and age was a factor associated with good practice (33). Another Nigerian study shows that only 4.3% of health workers claim to always wear the appropriate personal protective equipments during work(26).

Among 862 HCPs who work outside the operation theatre (OT) and ICU, appropriate uses of PPE were only 156 (18.1%). It was high among doctors 109 (31.5%) followed by nurses 39 (9.3%) and technicians 8 (8.2%) which was statistically significant $p=0.0001$. HCPs working in OT and ICU were 423 and 183 respectively. Among HCPs working in OT, appropriate use of gloves, mask, apron, gown and hair cover was 100%. But the use of goggles and shoe cover was very low. The reasons for inappropriate use of PPE was non availability 562 (78%) followed by not aware of the importance 77 (11%) (34).

In 2003, a cross-sectional study was conducted in Trinidad and Tobago amongst Emergency Medical Technicians (EMT) to assess PPE knowledge, attitude and prevalence of use during the outbreak of Severe Acute Respiratory Syndrome and one year post Severe Acute Respiratory Syndrome, the majority (73%) of the respondents said they had always used most of the items available (Visetin, Bondy, Scwartz & Morrison, 2009:online). And also 44% had good practices (25).

Routine use of disposable gloves has been recommended for all patient contacts. Gloves ideally should be removed after seeing a patient and the hands washed thoroughly before re-gloving to see a new patient. A research study conducted at Saudi Arabia on hospital nurses, 86 % claimed to wear fresh gloves before patient examination and procedures but only 57 % of the staff actually did it during observations and also 68.1% claimed that they always wore gloves before patient examination (35).

1.4. Significance of the study

Due to inadequate access to personal protective equipment or weak infection prevention and control measures, raise the risk of health worker infection, and health workers can also be exposed to patients who do not show signs of the disease and are in the health facilities for a range of other services (20).

In a developing country like Ethiopia, where trained human resources and equipment for the treatment of COVID-19 are scarce, working on prevention of the viral spread should be a priority and feasible intervention. Government of Ethiopia has declared a state of emergency to stop the spread of the disease. These include proper utilization of personal protective equipment, implementation of staying home as much as possible, avoiding close contact with others, cleaning and disinfecting frequently touched surfaces, washing hands often with soap and water for at least 20 seconds, or using hand sanitizer containing at least 60% alcohol (36). For successful implementation of these preventive measures, knowledge of the health worker about prevention measure coronavirus disease (Covid-19) and practice of its preventive measures have to be optimum. However, the level of knowledge and practice of the people is not well understood. Thus, this study is intended to identify the level of knowledge and practice towards personal protective equipment of Covid-19 prevention among health workers in Ethiopia.

Understanding HCWs' knowledge, attitudes, and practices (KAPs) and possible risk factors helps to predict the outcomes of planned behavior. Thus, this study aimed to investigate KAPs concerning PPE in preventing COVID-19 among HCWs. If HCWs' KAPs concerning the virus and the factors that affect their attitudes and behaviors can be determined promptly in the early stages of the epidemic, then this information can inform relevant training and policies during the outbreak and guide HCWs in prioritizing protection and avoiding occupational exposure.

2. OBJECTIVES

2.1. General objective

To assess level of knowledge, attitude and practices and associated factors of Intensive care unit and operation rooms nurse's towards use of personal protective equipment to prevent COVID-19 in Tikur Anbesa Specialized hospital, Addis Ababa, Ethiopia, 2020.

2.2. Specific objectives

- Assess the knowledge of Intensive care unit and operation rooms nurse's about PPE to prevent COVID-19
- Determine the attitude of Intensive care unit and operation rooms nurse's about PPE to prevent COVID-19
- Explain the practices of Intensive care unit and operation rooms nurse's about PPE to prevent COVID-19
- To assess factors that affect KAP on Intensive care unit and operation rooms nurse's about PPE to prevent COVID-19

3. Methodology

3.1. Study design and setting

The study was carried out in Tikur Anbesa Specialized Hospital which is found in Addis Ababa (capital city of Ethiopia). According to Central Statistical Agency of Ethiopia (CSA), as of 2007 the town of Addis Ababa has a total population of 2,739,551, with 52.3% of them are women. Originally the hospital was built to accommodate 500 beds and currently has more than 600 beds. It serves about 250,000 patients per year in its outpatient department and about 24,000 in the inpatient and same number in the emergency departments. It is also the largest teaching hospital of the country; it trains large number of undergraduate medical students as well as several residents and fellows. There are 20 ICU beds and fifteen (15) operation rooms for both adult and children.

The study was conducted from September 01 to November 30, 2020.

3.2. Study design

An institution based cross sectional study was conducted.

3.3. Source of population

The source population were all nurses that work in ICU and OR at Tikur Anbesa Specialized Hospital during the study period.

3.4. Study population

The study population were randomly selected nurses that work in ICU and OR at Tikur Anbesa Specialized Hospital during the study period.

3.5. Inclusion and exclusion criteria

3.5.1. Inclusion criteria

All full-time nurses that work in ICU and OR at Tikur Anbesa Specialized Hospital during the study period was included in the study.

3.5.2. Exclusion criteria

- Nurses who were not ready and volunteer to participate in the study.
- Student nurses who were on apparent ship.
- Nurses who were unable to respond due to various conditions during the study period.

3.6. Sample Size determination

The required sample size was determined by using the statistical formula for single population proportion by considering non-response rate of 10% and sustainability prevalence of 50 % (no information about P, in order to get the maximum value of P).

$$n = \frac{Z_{\alpha/2}^2 \cdot P(1-P)}{d^2}$$

Sample size, n=384

Where

d= Degree of precision = 5%

Z = Confidence level of 95% =1.96

For a total of 143 source population (it is less than 1000) finite population correction is needed to calculate a true sample size

$$\begin{aligned} \text{True } n &= \frac{\text{sample size} \times \text{total population}}{\text{Sample size} + \text{total population}} \\ &= \frac{384 \times 143}{384 + 143} \\ &\approx \underline{104} \end{aligned}$$

The total number of sample size of the study was 114 after adding 10 participants as a contingency.

3.7. Sampling procedures and techniques

In order to assess knowledge, attitudes and practices regarding personal protective equipment of COVID-19, stratified sampling method was employed. Simple random sampling technique was used after proportional to population size allocation to both units was done. After that all nurses in the randomly selected from both units were included as study subjects.

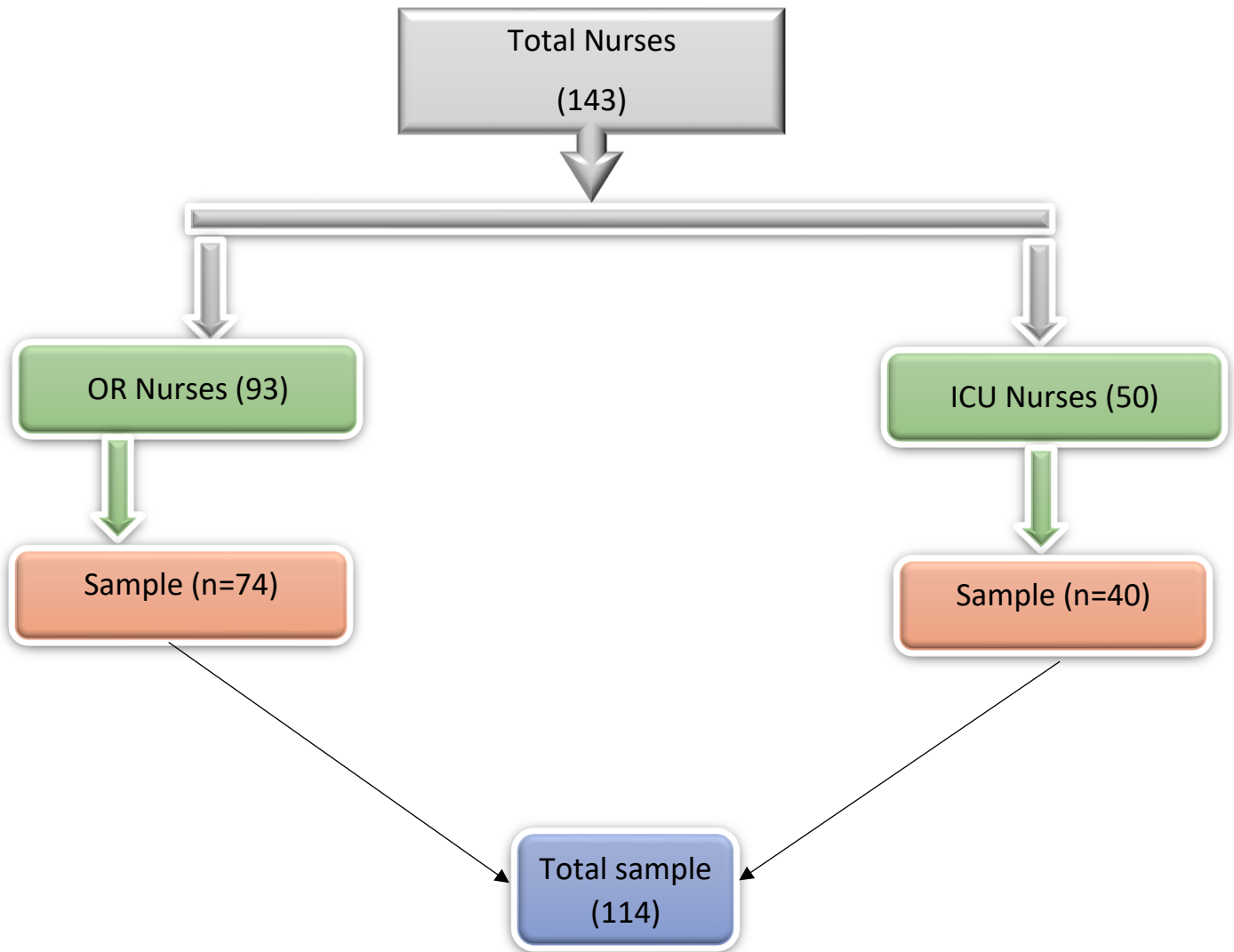


Figure 1: Sampling procedure

3.8. Data collection procedure

After random selection and identification of the study participant, all eligible nurses were gathered in to their respective unit free room. After separating them, they were properly orientated by providing clear explanation on the purpose and usefulness of the study, then provided with the anonymous structured self-administered questionnaire after getting verbal consent. The tool was developed after reviewing different similar existing literatures.

3.9. Study Variables

3.9.1. Independent variables

- Socio-demographic Characteristics
 - ✓ Age
 - ✓ Sex
 - ✓ Working department
 - ✓ Educational status
 - ✓ Work experience
- Training on PPE

3.9.2. Dependent variables

- Knowledge about Personal Protective Equipment
- Attitude towards Personal Protective Equipment
- Practice of Personal Protective Equipment

3.10. operational definition

The scores for KAP were transformed into percentage scores by dividing the scores obtained by the respondents with the possible maximum scores and multiplied by 100. The sum score of each outcome was assessed based on Bloom's cut off point (37). Based on the sum scores;

- Good knowledge: Health workers who answered $\geq 80\%$ of knowledge questions correctly.
- Moderate knowledge: Health workers who answered 60-79 % of knowledge questions correctly.
- Poor knowledge: Health workers who answered $< 60\%$ of knowledge questions correctly.
- Favorable/Positive attitude: Health workers who answered $\geq 80\%$ of attitude questions.
- Moderate attitude: Health workers who answered 60-79 % of attitude questions correctly.

- Unfavorable/Negative attitude: Health workers who answered < 60 % of attitude questions.
- Good practice: Health workers who have properly practiced \geq 80 % of practice questions.
- Moderate practice: Health workers who answered 60-79 % of practice questions correctly.
- Poor practice: Health workers their properly practice is < 60% of practice questions.

3.11. Data quality control

The data quality control method was started by recruiting two BSc Nurses and one senior Nurse out of hospital for data collection and supervision respectively. After hiring them; quality assurance measures were also continued by providing adequate training and orientation for both the data collectors and supervisor. Before conducting the actual data collection, study participants were clearly orientated about the purpose and usefulness of the survey and thereby creating friendly atmosphere to reduce their stress.

Finally, necessary comments and feedback were incorporated for the final instrument. A supervisor and the principal investigator were supervising the overall data collection process and consistency of the questionnaires and corrected immediately.

3.12. Data processing and analysis

After completing the data collection, they were categorized to participant and nonparticipant. The data entry and cleaning were performing by using Epi Info version 7 statistical packages. The data entering was check for its consistency. Frequencies and cross tabulations were used to check for missing values and variables. Errors identified were correct after revising the original questionnaire.

Frequencies, proportions and measures of central tendency and measures of variation are used to describe the study subjects. The strength of association between variables was determined by using multinomial logistic regression analysis with RRR (Relative Risk Ratio), with 95% confidence interval employing SPSS version 25 software package to assess the relative effect of selected explanatory variables on the outcome variable.

3.13. Ethical considerations

Ethical clearance was obtained from Ethical Review board of Addis Ababa University health Science College. A formal letter of cooperation was written to Addis Ababa University Black Lion Specialized Hospital. After the purpose and objective of the study informed, verbal informed consent was obtained from each study participant. Data were kept anonymously in the distributed questionnaire in order to keep confidentiality.

3.14. Dissemination of the result

The result of this study will be disseminated to policy makers, Black Lion Specialized Hospital, AAU school of Medicine and other concerned bodies through presentations and publications.

4. Result

Assessment of knowledge, attitudes and practices regarding personal protective equipment of COVID-19 among OR and ISU nurses' was conducted from September 1 to November 30/2020. Out of 114 administered questionnaires a total of 113 participants responded to the questionnaire effectively with 99% of response rate. And also, there is no any missed value on the result.

4.1. Socio-Demographic Characteristics of the Study Population

Among the total participants sixty-two (54.9%) were female. The participant's age range was starting from twenty (20) up to fifty five (55) years old with a mean age of 31 SD \pm 7.07 years. The majority (71.1%) of participants had education level of BSc degree and only fifteen (13.3%) of the participants had diploma. From the total 113 respondents, majority seventy-three (64.6%) of them were working under Operation Room department. Regarding work experience of the participants, those who were working between 5-10 were high in number followed by working experience less than 5 years with forty-eight (42.5%) and thirty-nine (34.5%) respectively (Table 1).

Table 1: Socio-demographic characteristics of ICU and OR Nurses' in the Tikur Anbesa Specialized Hospital OR and ICU Nurses, Addis Ababa, Ethiopia, 2020

Variables	Frequency	Percent
Sex		
Male	51	45.1
Female	62	54.9
Age		
20-29 Years	52	46.0
30-39 Years	46	40.7
40-49 Years	10	8.8
>=50 Years	5	4.4
Educational Status		
Diploma	15	13.3
BSc	81	71.7
MSc	17	15.0
Department		
OR	73	64.6
ICU	40	35.4
Working Experience		
Less than 5 years	39	34.5
5 - 10 years	48	42.5
More than 10 years	26	23.0

4.2. Knowledge about Personal Protective Equipment

One hundred-one (89.4%) of nurses were able to define “what mean personal protective equipment” correctly and ninety-seven (85.8%) correctly stated the types of PPE from the list of PPEs as a response. Concerning to the knowledge of the appropriateness of wearing N-95 face mask, seventy-six (67.3%) of respondents had good knowledge. More than half, sixty-one (54%) of the respondents correctly knew the levels of protection associated with PPE utilization, but only thirty-four (30.1%) of participants could identify the image of the level of a PPE suit on the questionnaire. Regarding knowledge on steps of putting and removing of full PPE, seventy-three (64.6%) of the participant did select the correct list of putting personal protective equipment, but majority ninety-two (81.4%) of the respondents were not able to know the correct sequence of removing full PPE. Regarding the overall knowledge of the respondents about PPE, the mean knowledge towards PPE of the nurses was 63.8 (SD±19.8) and ranges from 25 to 100 percent, but only thirty-six (31.9%) of them had high knowledge towards PPE used for prevention of COVID-19 (Table 2).

Table 2: Knowledge about personal protecting equipment of ICU and OR Nurses' in the Tikur Anbesa Specialized Hospital OR and ICU Nurses, Addis Ababa, Ethiopia, 2020

Variables	Frequency	Percent
Knowledge on defining PPE		
Good Knowledge	101	89.4
Poor Knowledge	12	10.6
Correctly state types of PPE		
State Goodly	97	85.8
State Poorly	16	14.2
Knowledge about the appropriateness of wear N-95 face mask		
Good Knowledge	76	67.3
Poor Knowledge	37	32.7
Knowledge about levels of protection associated with PPE utilization		
Good Knowledge	61	54
Poor Knowledge	52	46
Knowledge of identifying level VI protection image		
Identify Goodly	34	30.1
Identify Poorly	79	69.9
Knowledge on steps of putting full PPE		
Good Knowledge	73	64.6
Poor Knowledge	40	35.4
Knowledge on steps of removing full PPE		
Good Knowledge	21	18.6
Poor Knowledge	92	81.4
Knowing exact seconds of handwashing practice before donning PPE		
Good Knowledge	110	97.3
Poor Knowledge	3	2.7
Overall knowledge about PPE		
Mean Knowledge (\pm SD)	63.8 (SD \pm 19.8)	
Low Knowledge	36	31.8
Moderate Knowledge	56	49.6
High Knowledge	21	18.6

4.3. The Multinomial Logit Models

This study presents three multinomial logit equations with every nurses' knowledge, attitude and practice level on personal protective equipment on COVID-19 with poor knowledge, poor attitude and poor practice are serving as reference category/baseline category.

The first multinomial logit model compares nurses' good and moderate knowledge level to poor knowledge level on personal protective equipment on COVID-19 regarding some predictor variables (age of nurses, sex of nurses, educational status, work experience, working department and training status regarding subject area). The second multinomial logit model compares nurses' good and moderate attitude level to poor attitude level on personal protective equipment on COVID-19 regarding some predictor variables (age of nurses, sex of nurses, educational status, work experience, working department, knowledge on PPE and training status regarding subject area). And the third multinomial logit model also compares nurses' good and moderate practice level to poor practice level on personal protective equipment on COVID-19 regarding some predictor variables (age of nurses, sex of nurses, educational status, work experience, working department, knowledge on PPE, attitude regarding PPE and training status regarding subject area).

4.3.1. Association Factors Affecting Knowledge on PPE

Regarding associated factors affecting knowledge level; the findings in Tables 3 further show that the relative risk of a nurse having a good knowledge about PPE on preventing COVID-19 relative to the poor knowledge, increased by a factor of 10.73 (95 % CI = 2.03-56.6) among OR and ICU nurses with < 5 years of work experience category, compared to those with > 10 years of work experience category. The log-odds of having good knowledge relative to having poor knowledge on PPE, increased among nurses who trained on PPE than those who doesn't (RRR = 7.27; 95 % CI = 2.13 – 24.86). (Table 3).

Table 3: Coefficients of multinomial logistic regression-moderate versus low and good versus low level of knowledge on personal protective equipment in the Tikur Anbesa Specialized Hospital OR and ICU Nurses, Addis Ababa, Ethiopia, 2020

Variable/Category	Moderate Knowledge			Good Knowledge		
	RRR	95 % CI	P Value	RRR	95 % CI	P value
Sex						
Male	0.91	[0.31,2.67]	0.606	0.70	[0.30,1.62]	0.862
Female	1	-		1	1	
Working Experience						
< 5 years	0.93	[0.24,3.83]	0.957	10.73	[2.03,56.60]	0.005
5 - 10 years	1.41	[0.44,4.50]	0.562	2.59	[0.51,13.16]	0.251
> 10 years	1	-		1	-	
Trained on PPE						
Yes	2.98	[0.96,9.25]	0.059	7.27	[2.13,24.86]	0.002
No	1	-		1	-	

4.4. Status of training

From the total of 113 participants half, fifty-seven (50.4%) of them attended training about personal protective equipment. From those who took training almost half, twenty-eight (49%) of them were trained before 6 months ago (Fig. 2).

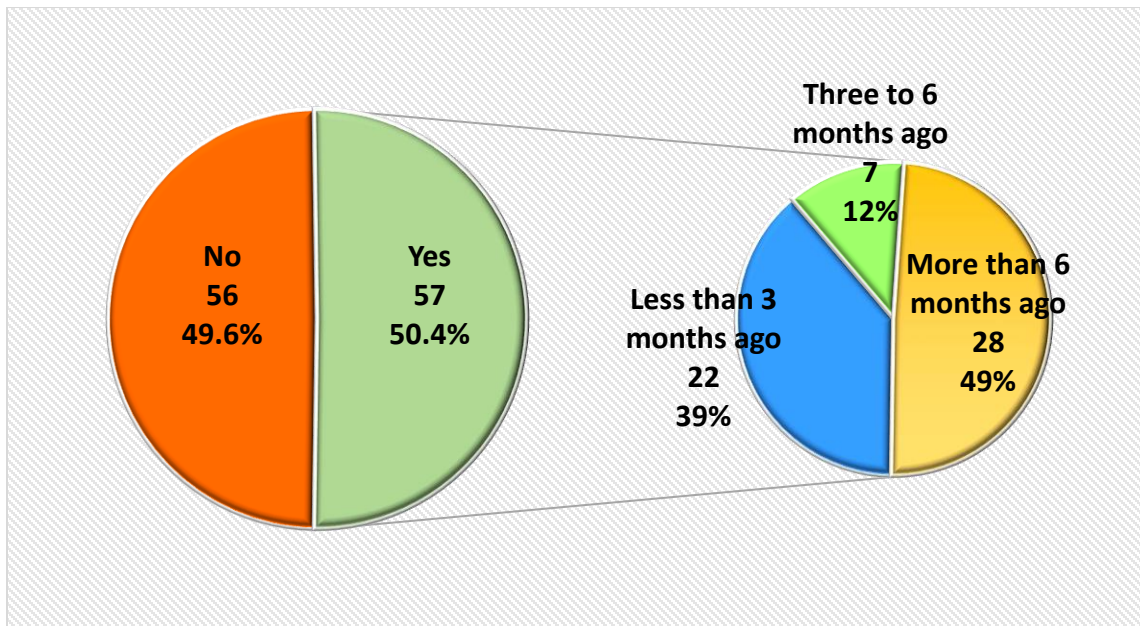


Figure 2: Personal Protective Equipment training status of ICU and OR Nurses' in the Tikur Anbesa Specialized Hospital OR and ICU Nurses, Addis Ababa, Ethiopia, 2020

From all trained nurses', majority, forty (70.2%) of them were trained in class room lecture, but only seven (12.3%) of the respondents were trained by In-person seminar in-service training (Fig. 3).

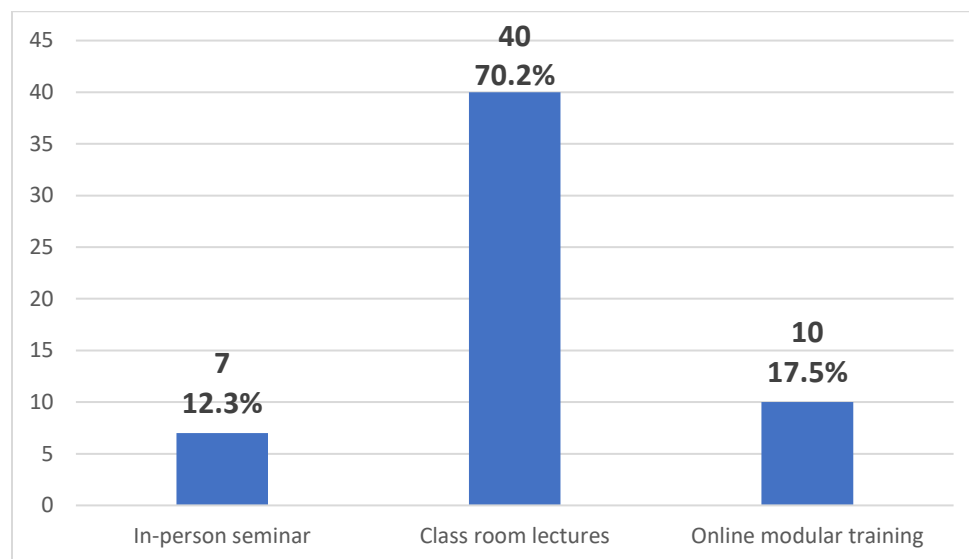


Figure 3: ICU and OR nurses' response regarding ways of gaining training at the Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia, 2020

4.5. Attitude towards Personal Protective Equipment

Almost all (99.1%) of the respondents believed the importance of standard precautions to prevent from acquiring infection from the hospital. About sixty-one (54%) of the respondents had good attitude about hand washing practice after touching patients' surroundings. Regarding attitude towards harmfulness of taking ward coat to home, only sixty-nine (61.1%) believed that it is harmful in transporting infection from hospital to home. And also, sixty-six (58.4%) of the respondents believed the mandatoriness of following strict rules in removing PPE. Majority, eighty-eight (77.9%) of the respondents believed that there is special health worker that required a full PPE for managing patient in ICU or OR units. And also, more than half, sixty-one (54%) of them had good level of attitude regarding the standard quality of the available PPEs in Tikur Anbesa Specialized Hospital (Table 4).

Table 4: Attitude of ICU and OR nurses towards Personal Protective Equipment, at the Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia, 2020

Variables	Frequency	Percent
Attitude about the use of standard precaution for prevention of infection		
Good Attitude	112	99.1
Poor Attitude	1	0.9
Attitude towards hand washing or decontaminate hands after touching patients' surroundings		
Good Attitude	52	46
Poor Attitude	61	54
Attitude towards the using of highest level of PPE when the need arises		
Good Attitude	94	83.2
Poor Attitude	19	16.8
Attitude towards the PPE provided by the facility used in the wake of COVID-19 pandemic		
Good Attitude	93	82.3
Poor Attitude	20	17.7
Attitude towards harmfulness of taking lab/ward coat to home		
Good Attitude	69	61.1
Poor Attitude	44	38.9
Attitude towards the mandatory of following strict rules in removing PPE		
Good Attitude	66	58.4
Poor Attitude	47	41.6
Attitude towards choice of patients' safety		
Good Attitude	84	74.3
Poor Attitude	29	25.7
Attitude towards requirement of PPE for some special health worker		
Good Attitude	25	22.1
Poor Attitude	88	77.9
Attitude towards present level of knowledge on PPE		
Good Attitude	98	86.7
Poor Attitude	15	13.3
Attitude towards the effectiveness of the available PPE in preventing infectious disease		
Good Attitude	80	70.8
Poor Attitude	33	29.2

By using the above data, sixty (53%) of the respondents had good attitude level regarding PPE for the prevention of COVID-19 with a mean of 64.68 with a SD of ± 16.1 , and the range of this attitude response lied between 27.27% up to 100% (fig. 4).

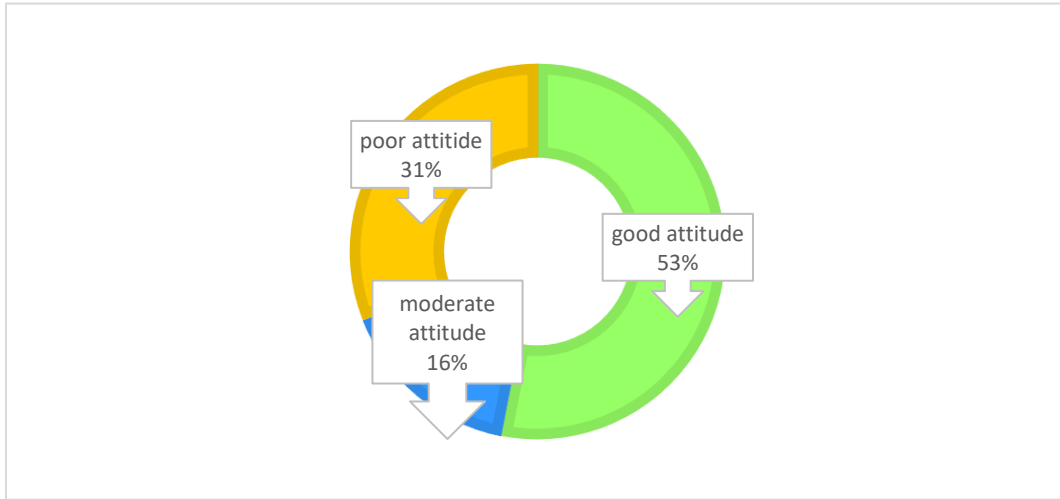


Figure 4: Mean attitude score of ICU and OR nurses working at Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia, 2020

4.6. Association Factors Affecting Attitude Level of ICU and OR nurses towards PPE

The results showed that nurses who had less than five years (<5 years) of work experience were 2.1 (95% CI: 1.43 – 10.06) times more likely to have moderate attitude level relative to poor attitude level with regard to personal protective equipments on COVID-19 than nurses with greater than 10 years' work experience. Similarly nurses who had less than five years work experience were more likely to have good attitude level relative to poor attitude level compared to those nurses whose work experience is more than 10 years (RRR = 5.33; 95 % CI = 2.92 – 30.64). Regarding training, trained nurses on PPE were approximately 4 times more likely to have both moderate and good attitude than nurses who were not trained. It is also observed that, nurses who had good and moderate knowledge on PPE were 4.9 and 1.3 times more likely to have moderate attitude relative to poor attitude than those who had poor knowledge with a CI of 1.23 - 19.51 and 1.01 – 3.35 respectively. And also, nurses who had good knowledge were 9.8 (95 % CI: 3.72 – 17.57) times more likely have good attitude relative to poor attitude compared with those nurses who had poor knowledge (table 5).

Table 5: Coefficients of multinomial logistic regression-moderate versus low and good versus low level of attitude on personal protective equipment in the Tikur Anbesa Specialized Hospital OR and ICU Nurses, Addis Ababa, Ethiopia, 2020

Variable/Category	Moderate Attitude			Good Attitude		
	RRR	95 % CI	P value	RRR	95 % CI	P value
Working Experience						
< 5 years	2.08	[1.43,10.06]	0.036	5.33	[2.92,30.64]	0.013
5 - 10 years	0.65	[0.19,2.20]	0.496	0.92	[0.21,4.05]	0.325
> 10 years	1	-		1	-	
Trained on PPE						
Yes	3.78	[1.22,11.71]	0.021	3.86	[1.13,13.19]	0.031
No	1	-		1	-	
Knowledge on PPE						
Good knowledge	4.90	[1.23,19.51]	0.000	9.80	[3.72,17.57]	0.000
Moderate Knowledge	1.32	[1.01,3.35]	0.000	4.81	[4.81,2.45,15.31]	0.057
Poor Knowledge	1	-		1	-	

4.7. Practice of Personal Protective Equipment

From 113 participants sixty (53.1%) of them effectively practiced PPE on preventing COVID-19. The overall mean of nurses to practice PPE effectively were 64.7 with a SD \pm 22.8. From the total participants one hundred three (91.2%) and eighty (70.8%) of them used any type of personal protective equipment and N-95 face mask respectively to prevent the transmission of infection. Just one hundred one (89.4%) of them responded to the practice questions regarding the timing of re-use of N-95 face mask. In relation to surgical face mask, majority one hundred ten (97.3%) of the respondents were using surgical mask only, but only seventy (61.9%) practice effectively towards the length of wearing surgical mask while working in ICU or OR units. Regarding to correctly applying and removing of personal protective equipment, less than half fifty-five (48.7%) of the respondents correctly applied PPE and only seventy-seven (68.1%) correctly removed PPEs after finishing the procedure (Table 4).

Table 6: Practice of ICU and OR nurses towards Personal Protective Equipment on prevention of COVID-19, at the Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia, 2020

Variables	Frequency	Percent
Ever used PPE before		
Yes	103	91.2
No	10	8.8
Ever used N-95 face mask		
Yes	80	70.8
No	33	29.2
Practice of timing of re-use N-95		
Good Practice	101	89.4
Poor Practice	12	10.6
Practice of correct days of re-use N-95		
Good Practice	78	69
Poor Practice	35	31
Practice of using precautions to disinfect N-95		
Good Practice	60	53.1
Poor Practice	53	46.9
Practice of using surgical mask		
Yes	110	97.3
No	3	2.7
Practice of effectively length of wearing surgical mask while working in ICU/OR		
Good Practice	70	61.9
Poor Practice	43	38.1
Practice of using face shield/goggle while working in ICU/OR		
Yes	65	57.5
No	48	42.5
Practice of timing to use water proof gown/apron while working in ICU/OR		
Good Practice	51	45.1
Poor Practice	62	54.9
Practice of correctly applying PPE		
Good Practice	55	48.7
Poor Practice	58	51.3
Practice of correctly removal of PPE		
Good Practice	77	68.1
Poor Practice	36	31.9

To determine overall participants practical characteristic towards to PPE, level of practice was classified in to poor, moderate and good categories. The mean & standard deviation value were 64.7 & \pm 22.8 respectively. The overall study finding indicated that about sixty (53.1%) participants had good practice, while eighteen (15.9%) and thirty-five (31%) had moderate as well as poor level of practice respectively (Fig. 5)

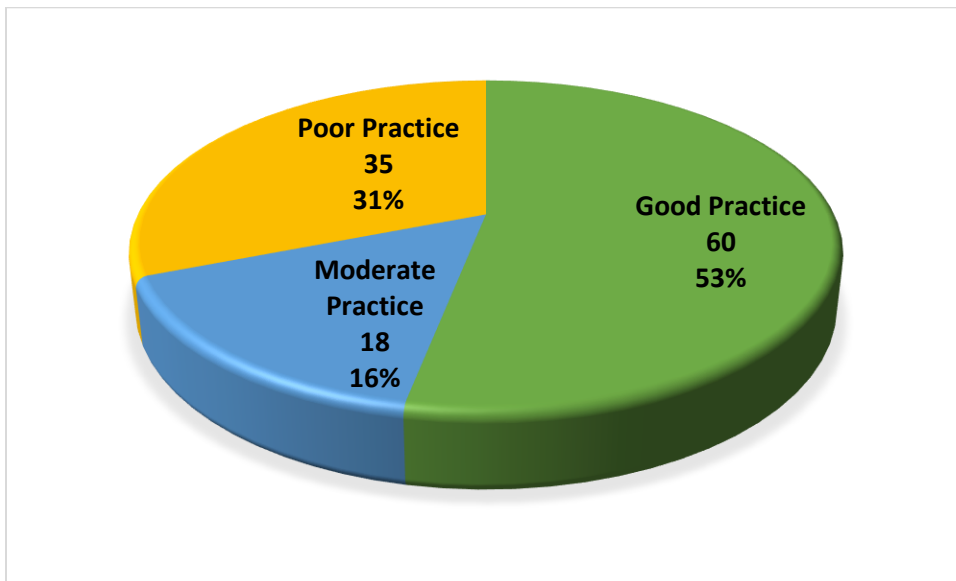


Figure 5: Attitude level of ICU and OR nurses in Tikur Anbesa Specialized Hospital towards PPE, Addis Ababa, Ethiopia, 2020

4.8. Associated factors affecting practice level of Nurses' towards PPE

The log-odds of good practice of personal protective equipment to prevent COVID-19 was 14 times increased significantly among diploma nurses compared to MSc nurses (95 % CI =1.37-27.88). In the other way, the relative risk of moderate and good practice of nurses, compared to the poor practice decreased by 19% and 16% (RRR= 0.19, 95 % CI = 0.04-0.82 and RRR= 0.16, 95% CI= 0.05-0.53 respectively) among nurses having moderate knowledge, compared to good knowledge.

Figure 6: Factors associated with practice towards personal protecting equipment of ICU and OR Nurses' in the Tikur Anbesa Specialized Hospital OR and ICU Nurses, Addis Ababa, Ethiopia, 2020

Variable/Category	Moderate Practice			Good Practice		
	RRR	95 % CI	P value	RRR	95 % CI	P value
Educational Status						
Diploma	1.163	[1.041,6.342]	0.763	14.00	[1.372,27.888]	0.026
BSc	0.557	0.143,2.164]	0.398	1.429	0.417,4.889]	0.570
MSc	1	-		1		
Knowledge on PPE						
Poor knowledge	0.245	[0.039,1.522]	0.131	0.251	[0.061,1.039]	0.056
Moderate Knowledge	0.190	[0.044,0.825]	0.027	0.160	[0.048,0.530]	0.003
Good Knowledge	1			1		

5. DISCUSSION

In order to have a better understanding of the possible areas for improving on Personal Protective Equipment Knowledge, Attitude and Practice in Tikur Anbesa Specialized Hospital as well as in Addis Ababa and country level, I set out to assess the KAP status of PPE among nurses in TASH ICU and OR section. with a 99% response rate.

Half (50.4%) of the participants had training on PPE, from those almost half (49%) were trained 6 months ago and 70.2% were trained in class room lecture. This means there are not enough onsite or seminar training about PPE to prevent COVID-19 as well as other infectious disease that acquired inside hospital. This result is consistent with similar Nigerian study, in which 47.8% of participants had trained, and from those 49% had the training for more than six months (24).

In this study, 89.4% and 54% of them had properly defined what personal protective equipment means and correctly knew the levels of protection associated with PPE utilization, but only thirty-four (30.1%) of participants did correctly identify the picture of the level a PPE suit on the questioner. Similarly, this finding was also better than the study found in Nigeria in which 38%, 46.3% and 27.2% of the respondents correctly defined PPE, admitted levels of PPE utilization and identified the image correctly (24,26). Possible justification could be due to research time gap and/or socio-economic difference.

From all participants, only twenty-one (18.6%) of the respondent had good knowledge regarding personal protective equipment to prevent COVID-19. This finding is consistent with other study conducted at Nigeria (24), but it is lower compared to other study finding conducted in Israel, Saudi Arabia and Pakistan with 60%, 76.2% and 70.8% respectively (35,38,39). This possible difference might be due to dissimilar of sample size, participant's professional difference and difference of personal understanding on subject as well as level of the health institutions.

Regarding correctly identifying steps of putting and removing full PPE, 64.6% of the participant did correctly identify steps of putting full PPE, but only 18.6% of participants knew ways of removing PPE correctly. This result is higher than a similar study conducted at Nigeria with only 6.6% and 12.5% knew the correct sequence for donning and removal of

PPE, respectively (24). This variation may occur as a result of sample size, knowledge status of professionals and training opportunities in the countries.

On multinomial logistic regression, nurses' who had less than 5 years' work experience had good knowledge on PPE compared with nurses with 10 years and above work experience. This showed that nurses who were trained, regardless of their work experience, tend to have better knowledge than those not trained.

**Respondents status of training on PPE * experience practice
Crosstabulation**

		Year experience practice			Total
		<5	5-10	>10	
Respondents status of training on PPE	Yes	22(56%)	23(47%)	12(46%)	57
	No	17	25	14	56
Total		39	48	26	113

In this study training taken on PPE also significantly affected respondent's knowledge level. Nurses who were trained on PPE were 7.27 times more likely to have good knowledge relative to poor knowledge. This finding is consistent to other study conducted at Amhara region, Ethiopia (40).

This study showed that 53% participant had good/favorable attitude towards personal protective equipment. This result is consistent with other study conducted in China and Jamaica with 55% and 52% respectively (29,41), but it was higher than studies conducted in Nigeria 5% (24). This difference could be due to sample size, study site, difference of study participants profession and the professional's readiness for attitudinal transform.

On the other side, the study multinomial logistic regression found that work experience, training on PPE and knowledge regarding PPE are factors that affect the attitude of nurses on PPE. Nurses who had less than 5 years' work experience had 2 and 5.3 times more likely to have a moderate and good attitude respectively compared with nurses who had 10 and more years work experience. Nurses who were trained on PPE had 3.8 and 3.8 times higher on having moderate and good attitude regarding PPE equipment than poor attitude

compared with nurses without training. And also, nurses had good and moderate knowledge on PPE were 4.9 and 1.3 times respectively more likely to have moderate attitude than those who had poor knowledge and nurses who had good knowledge are 9.8 times more likely to have good attitude compared with poor knowledgeable nurses.

This study found that 53%, 18% and 35% of participants had good, moderate and poor practice on PPE respectively; this finding is lower than other similar study conducted in Amhara region, Ethiopia where 62% of HWs had good prevention practices towards COVID-19 (40). According to multinomial logistic regression, nurses who had diploma were 14 times more likely to have good practice than those who have master's level, and also nurses who had moderate knowledge level on PPE had 19% and 16% reduce their moderate and good level of practice respectively compared with nurses who had good knowledge. This result is consistency with other similar study conducted at Amhara region, Ethiopia (40).

Respondents status of training on PPE * Educational status of the respondent Crosstabulation

		Educational status of the respondent			Total
		Diploma	BSc	MSc	
Respondents status of training on PPE	Yes	14(93%)	39(48%)	4(23%)	57
	No	1	42	13	56
Total		15	81	17	113

6. CONCLUSION

In conclusion, half of OR and ICU nurses had attended training on PPE, from those majority of them were at class room lecture, and also the majority of HWs in TASH had defined PPE effectively, but only one nurses from three had over all good knowledge regarding personal protective equipment to prevent COVID-19. Regarding attitude and practice towards PPE, approximately half of the participant had favorable attitude and good practice.

Work experience and training on PPE were factors that affected both knowledge and attitude of nurses towards PPE. Similarly, knowledge on PPE affected both attitude and practice of nurses on personal protective equipment.

7. Recommendation

Based on the study finding to improve the professional knowledge, attitude and practice as well as to prevent COVID-19 and other hospital acquired infection the following ideas are recommended.

- Periodic reinforcement and training/orientation programs are needed for all level of health care workers for adherence with appropriate knowledge, attitude and use of personal care equipment during his or her employment time.
- Creating an awareness of the factors which determine KAP of nurses may be necessary
- Developing health safety policies and changing health care attitude to think safety first.
- Making IP guidelines and information sources available are crucial to prevent COVID-19 infection.
- Future research should focus on evaluating implementation strategies that optimize compliance with knowledge, attitude and practice of personal protection equipment and provide effective barriers to disease transmission.

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Annex I: Information Sheet and Consent Form

Information sheet

Title of the Research Project

Assessment Knowledge, Attitudes and Practices Regarding Personal Protective Equipment of Covid-19 Among Nurses Workers in Tikur Anbesa Specialized Hospital Operation Room and Intensive Care Unit, Addis Ababa, Ethiopia.

Name of Principal Investigator: - Dr. Yemane Fitsum

Name of the Organization: Addis Ababa University, College of Health Sciences, school of medicine, Department of Anesthesiology, critical care and pain medicine.

Purpose of the research Project: -

To assess the level of knowledge, attitudes and practices regarding personal protective equipment of COVID-19 among nurses' workers in Tikur Anbesa Specialized Hospital operation room and intensive care unit, Addis Ababa University

Autonomy: Autonomy of the participant will be respected and granted with right of withdraw in the study at any time.

Anonymity: All identification of the participants will be kept anonymous; your name will not be written in this format or any other relevant information which will be mentioned on the data collection forms

Risk and /or Discomfort: There is no social or physical harm when you are participating in this research project except wasting of your time about 15-20 minutes.

Benefits: When you are participating in this research, there may not be a direct benefit to you rather than identifying the gap of knowledge, attitude and practice and improves services delivered in the study area.

Confidentiality

All collected data will be kept in a secure place to which only the researcher will be have access. It will be stored in a file using codes.

Whom to contact:

This research project will from institutional ethical review board of institute of College of Health Sciences School of medicine, Addis Ababa University. If you want to know more information, you can contact the following individuals and you may ask at any time you want.

- Dr. Yemane Fitsum

Mobile: +251904650296

Email: ftyemi@gmail.com

- Dr. Rahel Tilahun

Mobile; +251911761065

Consent: - Are you willing to participate in the study? Make on a sign your choice

Yes

No

Annex II: Individual consent form

**Addis Ababa University College of Health Sciences, school of medicine,
Department of Anesthesiology and critical care**

Individual consent form

INTRODUCTION:

My name is _____. I am working with a research entitled, *to assess Knowledge, Attitude and practice regarding personal protective equipment of COVID-19 among nurses work in Operation room and Intensive care unit in Tikur Anbesa Specialized Hospital (TASH).*

You have been selected to participate in this study. The finding of the study will be used for better planning & and practice of personal protective equipment in TASH as well as Addis Ababa and Ethiopia. Therefore, I am requesting you to fill this questionnaire by yourself. There are no rights or wrong answers. Your response is completely confidential. You do not need to write your name and will never be used in connection with any of the information you give me.

You are kindly requested to answer every question and you may stop filling the form at any time you want to. However, your honest answers to these questions will help us better understand what the ground activity of pediatric patient preoperative fluid management. According to the questions it is allowed to have more than one answer.

We would greatly appreciate your help in responding to these questions. The survey will take about thirty minutes to fill this questionnaire. Would you be willing to participate?

Consent: - Are you willing to participate in the study? Make on a sign your choice

Yes

No

Name of Data Collector: _____

Signature of data collector: _____

Data collection Date: _____

Annex III. QUESTIONNAIRE

ADDIS ABABA UNIVERSITY SCHOOL OF MEDICINE

COLLEGE HEALTH SCIENCE

DEPARTMENT OF ANESTHESIOLOGY

Assessment of Knowledge, Attitude and practice regarding personal protective equipment of COVID-19 among nurses work in Operation room and Intensive care unit


Instruction: Choose and Circle the answer that seems best for you from the alternatives that are under each question and for those that you give direct answer, write the answer in the space provided

Part I. Socio-demographic Characteristics

No.	Question and filter	Alternative Choices	Skip
Q101.	Age in year	_____ Years old	
Q102.	Sex	1. Male 2. Female	
Q103	Working department	1. OR 2. ICU	
Q104	Educational status	1. Diploma 2. BSc 3. MSc	
Q105.	Work experience	_____ Years	

Part II. Knowledge of PPE

No.	Question and filter	Alternative Choices	Skip
Q201.	What is PPE?	1. Is equipment worn to protect health care worker from infectious diseases 2. Is equipment used to treat SARS COV-2 3. Does not include face shield	
Q202.	Which of the following is a not a PPE?	1. Maintain physical distance 2. Glove 3. Surgical mask 4. Goggle	
Q203	It is appropriate for health care workers to wear N-95	1. True 2. False	

	all the time when they are in the hospital, even when they are working with COVID (-) patients.		
Q204	How many levels of protection are associated with PPE utilization?	<ol style="list-style-type: none"> 1. Two 2. Three 3. Four 4. One 	
Q205	What level of PPE is demonstrated below? 	<ol style="list-style-type: none"> 1. Level D 2. Level C 3. Level B 4. Level A 	
Q206	When putting full PPE, which one is comes first?	<ol style="list-style-type: none"> 1. Put on the mask 2. Put on the gown 3. Put on eye protection 4. Put on gloves 	
Q207	When removing full PPE, which one is comes last?	<ol style="list-style-type: none"> 1. Remove gloves 2. Remove eye protection 3. Remove the gown 4. Perform hand hygiene 	
Q208	Before donning PPE how many Seconds you should wash your hand	<ol style="list-style-type: none"> 1. 10 2. 20 3. 40 4. 60 	

Part III. Training on PPE

No.	Question and filter	Alternative Choices	Skip
Q301	Have you ever been trained on PPE?	1. Yes 2. No	
Q302	If yes to Q301, when were you trained?	1. Less than 3 months ago 2. Three to 6 months ago 3. More than 6 months ago	
Q303	How were you trained?	1. In-person seminar 2. Class room lectures 3. In-person on job training 4. Online modular training 5. Other: _____	

Part IV. Attitude of PPE

No.	Question and filter	Alternative Choices	Skip
Q401	Using standard precautions will prevent from acquiring infection from the hospital	1. Definitely 2. Probably 3. Possibly 4. Probably not 5. Definitely not	
Q402	No need to wash or decontaminate hands after touching patients' surroundings	1. Definitely 2. Probably 3. Possibly 4. Probably not 5. Definitely not	
Q403	The highest level of PPE should be used when the need arises	1. Definitely 2. Probably 3. Possibly 4. Probably not 5. Definitely not	
Q404	The PPE provided by your facility should be used in the wake of COVID 19 pandemic	1. Definitely 2. Probably 3. Possibly 4. Probably not 5. Definitely not	
Q405	Taking your lab /ward coat home is not harmful	1. Strongly Agree 2. Agree 3. Undecided 4. Disagree 5. Strongly Disagree	

Q406	Following strict rules in removing gloves, face shield and goggles is mandatory	<ol style="list-style-type: none"> 1. Strongly Agree 2. Agree 3. Undecided 4. Disagree 5. Strongly Disagree 	
Q407	Patients' safety should be your first choice	<ol style="list-style-type: none"> 1. Strongly Agree 2. Agree 3. Undecided 4. Disagree 5. Strongly Disagree 	
Q408	PPE is required by only some special health worker	<ol style="list-style-type: none"> 1. Strongly Agree 2. Agree 3. Undecided 4. Disagree 5. Strongly Disagree 	
Q409	Your present level of knowledge of PPE	<ol style="list-style-type: none"> 1. Excellent 2. Good 3. Fair 4. Poor 5. Very Poor 	
Q410	The available PPE are effective in preventing infectious disease	<ol style="list-style-type: none"> 1. Definitely 2. Probably 3. Possibly 4. Probably not 5. Definitely not 	
Q411	The available PPE are of standard quality	<ol style="list-style-type: none"> 1. Excellent quality 2. Good quality 3. Fair quality 4. Poor quality 5. Very poor quality 	

Part V. Practice regarding PPE

No.	Question and filter	Alternative Choices	Skip to
Q501.	Have you ever used PPE before?	<ol style="list-style-type: none"> 1. Yes 2. No 	
Q502.	How often do you wear PPE?	<ol style="list-style-type: none"> 1. Never 2. Rarely 3. Sometimes 4. Often 5. Always 	
Q503.	On average how many times do you re-use N-95?	<ol style="list-style-type: none"> 1. Never 2. 2-3 3. 4-5 	

		4. > 5	
Q504.	After how many days do you re-use your N-95?	<ol style="list-style-type: none"> 1. Daily 2. Every other day 3. Every 3 days 4. Every 4 days 5. Every 5 days 	
Q505.	What precautions do you use to disinfect your N-95?	<ol style="list-style-type: none"> 1. Nothing 2. Keep it in plastic bag 3. Apply dry heat 4. 70% ethanol spray 5. UV light 	
Q506.	How often do you use only surgical mask?	<ol style="list-style-type: none"> 1. Never 2. Rarely 3. Sometimes 4. Often 5. Always 	
Q507.	On average for how long do you use your surgical mask while working in ICU/OR?	<ol style="list-style-type: none"> 1. 4 hours 2. 6 hours 3. 8 hours 4. >8 hours 	
Q508.	How often do you use face shield/goggle while working in ICU/OR?	<ol style="list-style-type: none"> 1. Never 2. Rarely 3. Sometimes 4. Often 5. Always 	
Q509.	How often do you use water proof gown/apron while working in ICU/OR?	<ol style="list-style-type: none"> 1. Never 2. Rarely 3. Sometimes 4. Often 5. Always 	
Q510.	Which of these steps is most appropriate for wearing PPE?	<ol style="list-style-type: none"> 1. Wear gown, Inner glove, respiratory, head shield, outer glove 2. Wear Inner glove, gown, respiratory, head shield, outer glove 3. Wear gown, respirator, inner glove, head shield, outer gloves 4. Wear inner gloves, outer gloves, wear gown, head shield, respiratory 5. None of the above 	

Q511.	Which of these options is the most appropriate sequence for removal of PPE?	<ol style="list-style-type: none"> 1. Remove outer gloves, gown, the head shield, outer gloves and respirator 2. Remove gown, outer gloves, respirator, the head shield and inner gloves 3. Remove gown, the head shield, outer gloves, respirator and inner gloves 4. Remove outer gloves, respirator, gown, the head shield and inner gloves 5. Remove the head shield, outer gloves, gown, respirator, inner gloves 	
Q512	How often do you make mistakes during donning and doffing?	<ol style="list-style-type: none"> 1. Never 2. Rarely 3. Sometimes 4. Often 5. Always 6. I don't have experience 	