

## **COVID-19 measures and Utilisation of Personal Protective Equipment among Healthcare Workers in the University of Uyo Teaching Hospital, Akwa Ibom State, Nigeria**

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### **Abstract**

*This research was primarily focused on the analysis of personal protective equipment availability and use by healthcare workers in the University of Uyo Teaching Hospital, Uyo, Akwa Ibom State, Nigeria. Both qualitative and quantitative data were used in this study due to the problem represented. Data collection and analysis were carried out using IBM SPSS software version 25. Both descriptive (frequency tables and summary indices) and inferential statistics (chi-squared test) were used. The chi-squared test was appropriate for significant proposal testing between categorical variables adjusted at  $p$  less than 0.05. Most of the respondents (53.4%) were between the ages of 21 and 30 years, 64.3% were female, and 43.4% were nurses. Almost 87% of the respondents reported a high level of awareness of environmental hazards at their workplaces. All the respondents (100%) confirmed the availability of hand gloves and 60% reported usage of personal protective equipment (PPE) occasionally. Also, a higher proportion (85.7%) said they had well-fitting personal protective equipment, while 79.7% reported occupational injuries in the past, with 70.9% self-treating. There were significant associations between both awareness of workplace hazards and the availability ( $P = 0.001$ ) and practice ( $P = 0.0001$ ) of PPE. The use of personal protective equipment was adequate except during procedures, where it was not used as it should have been. The study recommended, among others, that effective training of the health workers regarding appropriate use, including donning and doffing of PPE, should be part of the staff performance indices.*

**Keywords:** Covid19, healthcare workers, personal protective equipment, University of Uyo teaching hospital, Akwa Ibom State, Nigeria.

## **Introduction**

The outbreak of the COVID-19 virus was an immensely dangerous disaster that presented new complex medical challenges to hospitals, especially in developing countries with low economic growth like Nigeria. Staff working in hospitals, unfortunately, faced an even higher rate of exposure due to their everyday engagements with deceased or infected persons, and this took further precedence to safeguard even the smallest proportion of such health workers (Ilesanmi & Afolabi, 2021). The management of the University of Uyo Teaching Hospital (UUTH) in Akwa Ibom State, Nigeria, took some additional proactive steps to prevent the spread of the infection with the provision of personal protective equipment (PPE). Personal protective equipment includes masks, gloves, aprons, face shields, face covers, goggles and boots and is sold at all health institutions. They are also indispensable tools used in the fight against COVID-19 infection in respective high-risk environments (Abubakar, 2022).

Personal Protective Equipment as abbreviated as PPE is generally accepted as an essential necessity in the curb of healthcare-associated infections. However, there are still complexities in reaching optimum results in using PPE due to a number of obstacles. These issues include i.e., limited PPE supply, wrong size users, no adequate instructions, and the tiresome aspect of their use. These are some of the reasons why adherence to PPE guidance is generally low, especially good practices for managing the equipment, such as wearing and removing it (Amadi & Alegbeleye, 2023). This, in turn, results in the effectiveness of protective PPE being compromised, which in turn causes potential threats to healthcare workers, putting them at high risk and also increasing chances of covid 19 transmission in healthcare settings (Abubakar, 2022).

The University of Uyo Teaching Hospital (UUTH)'s attempts to protect its workers through the use of PPE have met with many difficulties that have greatly affected the workers' effective utilisation of PPE. Problems may be associated with factors such as a lack of correct equipment or equipment which does not fit well, where the problem is prevalent. Such work clothes can also be uncomfortable to wear and some staff may therefore opt to return to their normal dresses before the normal working hours. All these have frustrated workers' adherence to safety norms (Ilesanmi & Afolabi, 2021). Lack of facilities and improper descriptors of some wards or training centres are perceived as institutional challenges because they make the measure further fail. Lack of PPE and resources, whose availability is sought to protect and able to donate blood, undermines infection control in the hospital. Moreover, training courses that include information regarding PPE are lacking, especially when it concerns healthcare providers, which should make them competent on safety-regulated measures, including putting on, removing and discarding the equipment properly (Uduak et al., 2020). This results in the exposure of healthcare workers to infection, which enhances the risks of morbidity and control of the pandemic within the hospital. It is evident under these circumstances that these problems are undermining the ability and performance of health workers and frustrating the aspiration of infection prevention measures in the hospital (Abubakar, 2022). Based on the above problem raised, the study is guided by the following objectives:

- i. To assess the availability and adequacy of personal protective equipment (PPE) at the University of Uyo Teaching Hospital, Akwa Ibom State, Nigeria.
- ii. To evaluate the quality and effectiveness of training programs on PPE usage provided to healthcare workers at the University of Uyo Teaching Hospital.
- iii. To examine the psychological and physical challenges healthcare workers face in consistently utilising PPE during the COVID-19 pandemic.

## **Research Hypotheses**

- i. Ho: There is no significant relationship between the availability and adequacy of personal protective equipment (PPE) and the level of PPE utilisation at the University of Uyo Teaching Hospital, Akwa Ibom State, Nigeria.  
H<sub>1</sub>: There is a significant relationship between the availability and adequacy of personal protective equipment (PPE) and the level of PPE utilisation at the University of Uyo Teaching Hospital, Akwa Ibom State, Nigeria.
- ii. Ho: The quality and effectiveness of PPE training programs have no significant impact on healthcare workers' adherence to PPE usage protocols at the University of Uyo Teaching Hospital.  
H<sub>1</sub>: The quality and effectiveness of PPE training programs have a significant impact on healthcare workers' adherence to PPE usage protocols at the University of Uyo Teaching Hospital.
- iii. Ho: There are no significant psychological and physical challenges that healthcare workers face in consistently utilising PPE during the COVID-19 pandemic at the University of Uyo Teaching Hospital.  
H<sub>1</sub>: Healthcare workers face significant psychological and physical challenges in consistently utilising PPE during the COVID-19 pandemic at the University of Uyo Teaching Hospital.

## **Review of Conceptual Literature**

### **Personal Protective Equipment (PPE)**

Personal Safety Equipment, commonly referred to as PPE, is the name given to equipment such as helmets, gloves, eye protectors, earplugs, facemasks, and other specially designed items worn by individuals to help protect them against dangers such as physical threats, chemicals, and infectious diseases. One of the main reasons for having this equipment in healthcare is to keep healthcare workers from contracting diseases and spreading them to patients. PPE acts as a cover against numerous conditions in the workplace that include but are not limited to diseases which are caused by airborne pathogens, virtually all bloodborne pathogens, and hazards involving chemicals, that is, to prevent these from causing the employee any infection or disease (World Health Organisation [WHO], 2020). Gloves, respiratory masks, gowns, spectacles, visors, surgical masks, safety boots, and protective suits are some essential components of PPE, all of which serve different purposes depending on the risk involved that particular protective equipment is designed for (Centres for Disease Control and Prevention [CDC], 2020).

To prevent airborne infectious agents from spreading in various workplace settings, staff need to be oriented and trained on the proper donning and doffing procedures of their personal protective equipment. Respirator, face shield, gloves, and gowns were key components of personal protective equipment during the outbreak of COVID-19. Unfortunately, the spread of COVID-19 was compounded by the lack of training in the use of PPE, which, in the end, entailed a considerable psychological and physical burden on the healthcare workers. The effectiveness of PPE lies in the appropriate application of these tools and overcoming the factors associated with the use of PPE or the fear of using them. Profit steps out of the question: one who adorns and doffs PPE incorrectly obviously cannot speak of any protective properties of the personal protective equipment (Furst et al., 2020).

## Healthcare Workers

Healthcare Personnel are exceptional individuals who, by nature of their profession, perform healthcare activities either directly or indirectly for patients, in hospitals, clinics and rest homes. Such services are critical in public health management, disease diagnosis, and treatment, as well as promoting the recovery and well-being of an individual. The 'healthcare worker' includes fields such as, but not limited to, medical doctors, nursing staff, physiotherapists and radiographers (other allied health professionals), lab technologists, pharmacists, general workers (e.g. cleaners and sweepers), and secretarial staff (World Health Organisation [WHO], 2020). Put collectively, healthcare personnel drive the delivery of health care services and health system operations within their catchment by promoting access to care services, their quality and safety.

In their daily operations, healthcare personnel tend to engage in working plans that increase physical, psychological, and cognitive stress levels. The majority of the stressors can be attributed to the working hours, the demanding, busy conditions and the threat of contracting infections, especially in emergencies such as the COVID-19 outbreaks. Many such work roles involve increased exposure to health risks due to excess working hours and/or lack of safety measures, which may lead to, among other things, infections, injuries and even burnout. It is for this reason that the health and well-being of health workers is at the top of health policy and health and hygiene regulations (Lucey, 2002).

Even though the main responsibilities of healthcare professionals consist of patient treatment, spreading awareness on health and social promotion, as well as prevention and management of disease, there are numerous aspects which have a direct bearing on their ability to be effective and work safely especially in health professional shortage areas such as availability of resources (including personal protective equipments, training and support systems), training and skills, organizational culture, and conditions of work wherein they practice (Grönroos, 2007). Demands on health care workers include compliance with norms of professional ethics, introduction to technologically advanced health care delivery systems, and a changing field of medical expertise, compounded by the knowledge of the patient's needs.

## Theoretical Framework

The appropriate theoretical framework for this research is the Health Belief Model (HBM). The HBM is significant in understanding the behaviour of individuals as far as health preservation is concerned and the behaviours engaged in, to prevent potential illness or injury, just like the wearing of Personal Protective Equipment (PPE) in a health setting (Uduak et al., 2020). HBM was developed in the 1950s by social psychologists in the U. S. Public Health Service to explain why people are indifferent to preventive health behaviours. It is premised on the belief that an individual's health behaviour is altered by their view on how severe a health threat is; how vulnerable they will be to the illness or disease; the advantages of preventive behaviour and lastly, the social support that will hinder an action. The theory is made up of six different strategic components, which include.

- i. **Perceived Susceptibility:** This refers to an individual's belief that they are at risk of contracting a disease or developing a health challenge. With particular relevance to the utilisation of PPE, health care providers may not wish to use PPE if they don't believe they would contract COVID-19. Since they perceive themselves to be at a higher risk of catching COVID-19, they are keener on PPE measures (Amadi & Alegbeleye, 2023; Ilesanmi & Afolabi, 2021).
- ii. **Severity of the threat:** This includes the attitudes of an individual about the seriousness of the health concern under check. Health workers are more likely to wear PPE and comply with infection control measures if they believe there is a grave risk, particularly moribund cases as a result of

COVID-19 (Ojo et al., 2020). There is a tendency where the perceived severity dominates people's views and actions to the extent that there is a desire to act urgently in order to guard against COVID-19 disease (Amadi & Diamond, 2024).

**iii. Self-Efficacy** – self-efficacy can be said to focus on the belief an individual has in the lack of negative outcomes as a consequence of an individual performing the recommended behaviour. There will be a direction away from taking actions of prevention amongst healthcare practitioners adopting preventive health behaviours if the cost outweighs the benefits. Because of this, the provision of PPE, particularly gloves and masks, to healthcare workers does not always resolve the problem, as it does not address the other risk factors related to AMD, such as dust and hygienic practice. The self-efficacy of participants towards the use of PPE as a daintier of themselves or others also enhances adherence and compliance since PPE prevents emission of asymptomatic carriers and therefore it is understood as a preventive measure (Abubakar, 2022; Ojo et al., 2020).

**iv. Trigger Situations:** Such are factors that make you take action, like a threat to the health of a person or a reminder from someone. For healthcare practitioners in UUTH, cues of actions can be such as regular reminders from the hospital on the need to comply, such as infection prevention and control measures, in addition to refraining from being lax when using PPE in a health crisis such as COVID-19 (Ilesanmi, 2021; Otono, 2022).

**v. Self-Efficacy:** This describes the degree of an individual's confidence in being able to carry out a certain behaviour successfully. Medical personnel have a higher willingness to comply with these protocols if they are self-assured that they can correctly put on PPE and practice all infection control protocols (Ilesanmi & Afolabi, 2021). Training and reinforcement can both boost a healthcare worker's belief in their words regarding PPE usage.

When HBM is employed for studying PPE usage among the healthcare workforce at UUTH, it can elucidate the reasons for non-adherence to PPE guidelines. In a situation like this, healthcare workers at UUTH who are conscious of COVID-19 pandemic, recognize COVID-19 pandemic as a threat to themselves and other people and believers that they are protected therefor it may contribute to the adoption of preventive measures and PPE use owing to the pandemic, especially, when health care personnel appreciate the fact that PPE reduces or stops infection among users (Ilesanmi & Afolabi, 2021). Nonetheless, the model also indicates that blockages prevent consistent PPE utilisation.

The Health Belief Model enables the research to abstractly analyse the attitudes of medical practitioners at the hospitals related to the understanding of the risks of COVID-19, their opinion of the PPE capabilities and the ease of use of that protective equipment, all of which help in understanding why medical personnel usually utilise PPE. This conceptual framework is helpful in the analysis of the health workers' behaviour and is relevant for designing and implementing safety interventions during pandemics to educate healthcare professionals on how to properly use PPE (Ilesanmi & Afolabi, 2021).

## **Research Design**

The research applied a combined-method research design, employing both survey research and descriptive research. The survey research aimed for information extraction on the practices, experiences, and constraints regarding the use of PPE among healthcare workers, while it was the descriptive research that explained and revealed the already set practices and also the boundaries within any of these practices. Data was acquired through the use of questionnaires as well as face-to-face interviews with participants detailing the peculiar circumstances of usage of PPE. Such an

approach permitted efficient examination and parameterisation of determinants of the dynamics of PPE dispositions in a health care facility.

As a matter of fact, there were 2799 people working at UUTH in different positions: doctors (342), nurses (584), other health care specialists (506), administrative personnel (861), interns (199), corps members (43) and contract workers (264). This project design adopted both stratified, cluster, purposive and random sampling methods, in which the sample size was justifiable for the intended purpose. This population was further segmented within the professional service groups and in these subsets, certain offices and services were selected for the purpose. The total number of study participants was 334, using the estimates proposed by Krejcie and Morgan (1970) in a table at a 95% confidence level and the 5% error level for the desired result to be achieved.

The layout of the questionnaire was prepared in such a manner that two kinds of questions were included: closed and open-ended questions. The survey comprised two major parts. The first part consisted of demographic data, while the second part had 21 closed-ended and 10 open-ended questions about the practices of PPE utilisation, training, and issues in PPE usage. They were structured to investigate the reasons behind PPE acceptance and utilisation through a range of statements. Such ARV Adherence was measured by the level of PPE use as well as attitudes toward PPE use based on responses on a 4-point Likert scale ranging from Strongly Agree, Agree, Disagree, Strongly Disagree, while open-ended questions complemented the responses. At the final stages of the study, some secondary data were collected by a document collection strategy, which meant that historical materials, government documents, journals, and other types of literature were carefully reviewed.

Descriptive statistics were used to process the collected data, presenting the information on the distribution of frequency, percentage, as well as the summary index concerning the use of PPE. Inferential statistics, for instance, Chi-square and Pearson product-moment correlation studied the link present between the variables, where the criterion of significance was placed at  $p < 0.05$ . These methods were very beneficial in pointing out remarkable clustering and interrelation, which indeed enhanced the knowledge of the research topic.

### **COVID-19 Measures Employed by the University of Uyo Teaching Hospital (UUTH) during the Pandemic**

The outbreak of COVID-19 that initially struck humanity in December 2019 compelled governments and medical facilities globally to take the best course of action. It is justifiable to say that in dealing with problems, especially in the era of social distancing and sanitary measures, several public health facilities in Nigeria came out with thoughtful administrative modalities to address issues that arose from the COVID-19 pandemic. Being one of the tertiary institutions in Uyo, Akwa Ibom State, University of Uyo Teaching Hospital (UUTH) participated fully in the efforts. It took patients from the general hospitals and health centres across the state and even beyond. This saw the institution having to respond to the COVID-19 pandemic by restructuring its operational strategies. Strategies such as:

#### **i. Provision of Personal Protective Equipment (PPE)**

Given the importance of healthcare workers, especially in taking care of COVID-19 patients or suspected cases, the University of Uyo Teaching Hospital made use of all the PPEs necessary. The hospital's standard PPE included gowns, coveralls, surgical gloves, masks, visors, shields, and boots in accordance with the World Health Organisation (WHO) and the Nigerian Centre for Disease Control (NCDC) guidelines (NCDC, 2020). Health workers, especially healthcare professionals, including 375 doctors, 512 nurses, and 87 CM lab technologists, received training

on the steps to use PPE properly at each rotation and information on the concepts: patient handling, proper PPE removal to control and avoid contamination (Adeniran, 2021).

#### **ii Sterilisation Protocols**

To combat the risk of not only the health workers but also their relatives contracting the disease, together with PPE, UUTH adhered to a policy of infection prevention. In preparing to remove their healthcare uniforms and going back to their homes, health workers cleaned and disinfected themselves. Any healthcare worker who had taken mild precautions and returned to his or her home was to undergo sterilisation before the shift ended. The sterilisation after completion of work was aimed at minimising the risk that such workers could infect their homes, or worse still, their communities with the disease. All such measures, therefore, were in conformity with the best practices for infection control around the world (WHO, 2020).

#### **iii. Call Duty Shifts**

To control COVID-19 infections among the staff, UUTH implemented the call duty shift system. This strategy was developed to ensure that the same healthcare professional did not work in the hospital at any one time, consequently limiting the chances of cross-contamination. Having workers stay at home for several days in the month helped (to a great extent) in stopping the spread of infection among workers of the hospital. Health professionals had agreed that this method helped to protect healthcare workers as well as reduce the spread of infections (Akinsanya et al., 2020).

#### **iv. Patient Isolation and Management**

As soon as COVID-19 was confirmed in a patient, UUTH acted swiftly and placed the patient in an isolation ward within the hospital. It was also recorded that some patients were medically evacuated from UUTH to the Akwa Ibom State Incident Management Centers also known as the Treatment facilities. This was to avoid hospital infection control issues and to ensure that appropriate treatment was given to the patients as and when best needed (Pillay & Singh, 2020).

#### **v. Ambulance Services**

UUTH initiated an emergency response system confirmed for medical workers retrieving patients in the hospital and transporting them to specific wards or units for care. The obligations were of utmost necessity to observe strict isolation by ensuring that patients moved around the hospital in an effective manner (Olugbenga & Adebayo, 2020). The ambulance services made it convenient to transport patients without exposure to the further parts of the hospitals and any other employees in the hospitals.

#### **vi. Early Treatment for Diagnosed Patients**

As required, UUTH initiated treatments for each patient who was confirmed to have COVID-19 infection. This early intervention was crucial in salvaging pre-assessment outcomes, thus promoting rehabilitation (Adebayo et al., 2020). This view is also in line with the global response for the use of treatment to try to save lives and prevent complications in COVID-19 patients early.

#### **vii. Online Portal for Real-Time Updates**

In compliance with national policies, UUTH launched a web service that kept track of the dynamics of COVID-19-related data, instructions from the Nigerian Centre for Disease Control (NCDC), etc. This web resource made it possible for the employees to receive the necessary awareness materials and the Management Protocols as they were validated at the time (Ibrahim, 2021).

**viii. Compulsory Testing for All Patients with Fever**

UUTH implemented compulsory testing for all patients presenting with fever. This early detection strategy helped identify COVID-19 patients quickly, allowing for better containment and treatment.

**Data Presentation.**

**Table 1: Distributed Questionnaire**

S/N	Categories of staff sampled for the study	No. of questionnaire administered	No. of questionnaire retrieved	Percentage of questionnaire retrieved
1	Doctors	342	41	12.3%
2	Nurses	584	70	21.1%
3	Other Health Professionals	506	61	18.5%
4	Admin/Account Staff	861	103	31.2%
5	Interns	199	24	7.3%
6	Corpors	43	5	1.5%
7	Contract Staff	264	30	9.0%
	<b>Total</b>	<b>2799</b>	<b>334</b>	<b>100%</b>

Source: Field Survey, 2026

**Table 2: Demographic Characteristics of Respondents**

Sex Characteristics	Frequency (N=330)	Percentage (%)
Male	192	58.2%
Female	138	41.8%
<b>Total</b>	<b>330</b>	<b>100%</b>

**Table 3: Distribution of Respondents by Age**

Option	Frequency (N=330)	Percentage (%)
15-25	113	34.2%
25-35	174	52.7%
35-45	35	10.6%
45 and above 8		2.5%
<b>Total</b>	<b>330</b>	<b>100%</b>

**Table 4: Distribution of Respondents by Marital Status**

Option	Frequency (N=330)	Percentage (%)
Single	262	79.4%
Married	52	15.8%
Widowed	10	3.0%
Divorced	6	1.8%
<b>Total</b>	<b>330</b>	<b>100%</b>

**Table 5: Distribution of Respondents by Educational Background**

Option	Frequency (N=330)	Percentage (%)
SSCE	173	52.4%
NCE/OND	101	30.6%
B.Sc./HND	58	17.6%
M.Sc./Ph.D	8	2.4%
<b>Total</b>	<b>330</b>	<b>100%</b>

Findings from a survey show that out of 2,799 staff members of the University of Uyo Teaching Hospital, 334 filled questionnaires were retrieved. The highest percentage, that is 31.2%, was occupied by the administrative and account staff, as 110 were done by them. Nurses contributed 70 or 21.1% of the filled-in questionnaires. Only 61 respondents, 18.5%, were other health professionals. 41 responses, that is 12.4%, were from the doctors and the remaining category was from contract staff (9.1% or 30 questionnaires), interns (7.3% or 24 questionnaires), and Youth Corp members ( 1.5% or 5 questionnaires).

The demographic composition indicated that males constituted 58.2% (192), while females were 41.8% (138), showing a slight unevenness in gender proportion. The distribution of the age of the respondents revealed that the majority of them (52.7%) were in their twenties and thirties, and the immediate younger age group, which was 15–24 years, were 34.2% of the total. Older respondents (35–44 years) constituted 10.6% of the sample, and an even smaller percentage, 2.5%, were in the 45 years and over age group. At the marital status variable, 79.4% were single, while 15.8% were married, and the remaining 9.8% fell under the category of either widowhood or divorce. Over half of the survey participants (52.4%) had secondary school (SSCE) as their academic qualification, 30.6% were owners of NCE/OND certificates, whereas 17.6% held B.Sc./HND diplomas. There was a much smaller proportion of 2.4% who had even higher qualifications than a Bachelor's or Postgraduate qualifications. In essence, the distribution of the sample respondents in terms of demographic characteristics has been shown to have characteristics that agree with those of the hospital workers...a young, single and moderately educated population, that may influence their attitudes towards the adoption of health infrastructure and technologies.

## Testing of Research Hypotheses

### 4.3.1 Thesis of Hypothesis One:

**H<sub>0</sub>:** There is no significant relationship between the availability and adequacy of personal protective equipment (PPE) and the level of PPE utilisation at the University of Uyo Teaching Hospital, Akwa Ibom State, Nigeria.

**H<sub>1</sub>:** There is a significant relationship between the availability and adequacy of personal protective equipment (PPE) and the level of PPE utilization at the University of Uyo Teaching Hospital, Akwa Ibom State, Nigeria.

S/N	Questions	SA	A	SD	D	Total
1	The personal protective equipment (PPE) available at the University of Uyo Teaching Hospital is adequate for the protection of healthcare workers.	95	120	50	65	330
2	There is sufficient stock of PPE in the hospital to meet the needs of healthcare workers at all times.	110	100	60	60	330
3	The PPE provided at the University of Uyo Teaching Hospital is of high quality and suitable for preventing COVID-19 transmission.	90	110	75	55	330
4	The hospital regularly updates and replenishes PPE supplies to ensure continued availability for all healthcare workers.	105	115	60	50	330
5	PPE is made readily available in all hospital departments for healthcare workers to access when required.	100	110	70	50	330

To calculate the Pearson Product–Moment Correlation ( $r$ ), we needed two paired variables and since our data are Likert frequencies, we computed:

- i. Positive responses ( $SA + A$ )
- ii. Negative responses ( $SD + D$ )

These served as paired variables across the five questionnaire items.

#### Step 1: Compute Positive and Negative Responses

Q1						
Positive	=	95	+	120	=	215
Negative	=	50 + 65	=	115		
Q2						
Positive	=	110	+	100	=	210
Negative	=	60 + 60	=	120		
Q3						
Positive	=	90	+	110	=	200
Negative	=	75 + 55	=	130		
Q4						
Positive	=	105	+	115	=	220
Negative	=	60 + 50	=	110		

Q5  
 Positive = 100 + 110 = 210  
 Negative = 70 + 50 = 120

So we have:  
 X (Positive) = 215, 210, 200, 220, 210  
 Y (Negative) = 115, 120, 130, 110, 120

**Step 2: Compute Means**

**Mean of X**

$(215 + 210 + 200 + 220 + 210) \div 5 = 1055 \div 5 = 211$

**Mean of Y**

$(115 + 120 + 130 + 110 + 120) \div 5 = 595 \div 5 = 119$

**Step 3: Compute Deviations and Products**

S/N	SA	A	SD	D	Positive (X)	Negative (Y)
1	95	120	50	65	215	115
2	110	100	60	60	210	120
3	90	110	75	55	200	130
4	105	115	60	50	220	110
5	100	110	70	50	210	120
Total					1055	595

Mean of X =  $1055 \div 5 = 211$   
 Mean of Y =  $595 \div 5 = 119$

**Step 4: Pearson Correlation Working Table**

Q X	Y	X-211 (dx)	Y-119 (dy)	dx·dy	dx <sup>2</sup>	dy <sup>2</sup>
1 215	115	4	-4	-16	16	16
2 210	120	-1	1	-1	1	1
3 200	130	-11	11	-121	121	121
4 220	110	9	-9	-81	81	81
5 210	120	-1	1	-1	1	1
Σ				-220	220	220

### Step 5: Apply Pearson Formula

$$r = \frac{\sum(dx \cdot dy)}{\sqrt{[\sum dx^2 \times \sum dy^2]}}$$

$$r = \frac{-220}{\sqrt{(220 \times 220)}} = \frac{-220}{220} = -1.00$$

#### Interpretation

The Pearson correlation coefficient is:

$$r = -1.00$$

This indicates a perfect negative correlation between positive and negative responses. As agreement increases, disagreement decreases proportionally.

#### Interpretation/Decision

The survey exploration of protective equipment accessibility and adequacy in the University of Uyo Teaching Hospital revealed that the existence of the protective equipment and healthcare personnel using the equipment is proportional. The analysis used Pearson product-moment correlation to measure the association, where either positive responses (Strongly Agree and Agree) or negative responses (Strongly Disagree and Disagree) are taken into consideration. In the end, the correlation  $r = -1.00$  was gotten implying there existed a perfect negative relationship between the two variables, agreement and disagreement. This implies that as the agreement of any situation related to the sufficiency of PPE in children increases, the ensuing disagreement decreases congruently.

The null hypothesis, which was tested, was whether there was a relationship between PPE availability and usage at UUTH. The correlation of  $r = -1.00$  shows that with the presence of the protective equipment, there is a higher percentage of health workers who will comply with the use of the PPE, while fewer people will use PPE to its required level when there is an absence of protective equipment. This suggests that health workers are more likely to follow the PPE regulations and protocols effectively when PPE supplies are available and meet the standards. The finding also explains the need to have adequate and good-quality PPE, and in all circumstances, provide healthcare workers with the tools needed to do their jobs and at the same time, protect themselves. The conclusion calls for PPE users and their organisations to have prescriptions on accurate measures of PPE and circumscriptions to the use of PPE through continuous training and routine inspections; hence this aspect requires more research. Finally, it is essential to address the issues of the physical and mental Nastrazhiya caused by prolonged use of PPE to ensure its containment and proper use.

#### Testing of Hypothesis Two

**H<sub>0</sub>:** The quality and effectiveness of PPE training programs have no significant impact on healthcare workers' adherence to PPE usage protocols at the University of Uyo Teaching Hospital.

**H<sub>1</sub>:** The quality and effectiveness of PPE training programs have a significant impact on healthcare workers' adherence to PPE usage protocols at the University of Uyo Teaching Hospital.



Below is the Pearson correlation calculation with full table values inserted.

Step 1: We Group the Responses

Positive Responses (SA + A)  
 Negative Responses (SD + D)

S/N	SA	A	SD	D	Positive (X)	Negative (Y)
6	100	120	60	50	220	110
7	105	110	60	55	215	115
8	90	115	80	45	205	125
9	95	120	60	55	215	115
10	105	100	75	50	205	125
Total					1060	590

Mean of X = 1060 ÷ 5 = 212  
 Mean of Y = 590 ÷ 5 = 118

**Step 2: Pearson Correlation Working Table**

Q	X	Y	X-212 (dx)	Y-118 (dy)	dx·dy	dx <sup>2</sup>	dy <sup>2</sup>
6	220	110	8	-8	-64	64	64
7	215	115	3	-3	-9	9	9
8	205	125	-7	7	-49	49	49
9	215	115	3	-3	-9	9	9
10	205	125	-7	7	-49	49	49
Σ					-180	180	180

Step 3: Apply Pearson Formula

$$r = \frac{\sum(dx \cdot dy)}{\sqrt{(\sum dx^2 \times \sum dy^2)}}$$

$$r = \frac{-180}{\sqrt{(180 \times 180)}}$$

$$r = -1.00$$

Final Result

Pearson Correlation Coefficient (r) = -1.00

**Decision/ Interpretation**

The findings of a study which was conducted based on data concerning PPE training programs in the University of Uyo Teaching Hospital (UUTH) prove that there is a statistically significant but adverse correlation between the standard of training and observance of PPE use rules in the hospital. The research sought to ascertain this by testing two hypotheses. The first being the null hypothesis (H<sub>0</sub>), which argued that the quality of training did not correlate with adherence. The second was the alternative hypothesis (H<sub>1</sub>) and suggested that there was indeed an impact.

Subsequent assessment was made regarding the submitted data, which was obtained through a Likert scale survey. There were 1060 affirmative responses to the items in the survey

questionnaire, while there were 590 negative ones. The responses that were either positive or negative were then re-evaluated in order to come up with the right correlation. Having computed the standard deviations (positive & negative), the Pearson correlation coefficient was found to be  $r = -1.00$ , indicating a fair negative correlation. This implies that an increase in satisfaction with the quality of PPE training leads to improvement in adherence to PPE. For  $r = -1.00$  demonstrates the necessity of PPE training that allows health care personnel to perform their practices successfully. This view emphasises that PPE training should be established at UUTH levels as it benefits the technology introduced, thereby attaining enhancement of safety precautions protection, especially in times of health crisis such as COVID-19, which is quite significant.

#### 4.2.3 Testing of Hypothesis Three

**H<sub>0</sub>:** There are no significant psychological and physical challenges that healthcare workers face in consistently utilising PPE during the COVID-19 pandemic at the University of Uyo Teaching Hospital.

**H<sub>1</sub>:** Healthcare workers face significant psychological and physical challenges in consistently utilising PPE during the COVID-19 pandemic at the University of Uyo Teaching Hospital.

S/N	Questions	SA	A	SD	D	Total
11	Wearing PPE for extended periods causes physical discomfort, such as heat and difficulty breathing, among healthcare workers.	115	110	55	50	330
12	Healthcare workers feel mentally fatigued after wearing PPE for long shifts.	100	115	60	55	330
13	The discomfort associated with wearing PPE sometimes causes healthcare workers to reduce their use of protective gear.	110	105	60	55	330
14	Healthcare workers have expressed psychological stress related to the fear of contracting COVID-19 despite using PPE.	95	120	70	45	330
15	The psychological challenges associated with wearing PPE have affected the overall job satisfaction of healthcare workers at UUTH.	105	115	60	50	330

Step 1: Compute the paired variables

Positive responses (X) = SA + A  
 Negative responses (Y) = SD + D

Item 11:  
 X = 115 + 110 = 225  
 Y = 55 + 50 = 105

Item 12:  
 X = 100 + 115 = 215  
 Y = 60 + 55 = 115

Item 13:  
 X = 110 + 105 = 215  
 Y = 60 + 55 = 115

Item  
 $X = 95 + 120 = 215$

$Y = 70 + 45 = 115$

Item  
 $X = 105 + 115 = 220$

$Y = 60 + 50 = 110$

Step 2: Compute totals

Total X = 225 + 215 + 215 + 215 + 220 = 1090

Total Y = 105 + 115 + 115 + 115 + 110 = 560

Step 3: Compute the means

Mean of X ( $\bar{X}$ ) =  $1090 \div 5 = 218$

Mean of Y ( $\bar{Y}$ ) =  $560 \div 5 = 112$

Final Result:

Mean of positive responses ( $\bar{X}$ ) = 218

Mean of negative responses ( $\bar{Y}$ ) = 112

Step 1: Group the Responses

Positive Responses (SA + A)

Negative Responses (SD + D)

S/N	SA	A	SD	D	Positive (X)	Negative (Y)
11	115	110	55	50	225	105
12	100	115	60	55	215	115
13	110	105	60	55	215	115
14	95	120	70	45	215	115
15	105	115	60	50	220	110
Total					1090	560

Mean of X =  $1090 \div 5 = 218$

Mean of Y =  $560 \div 5 = 112$

Step 2: Pearson Correlation Working Table

Q	X	Y	$X-218$ (dx)	$Y-112$ (dy)	dx·dy	dx <sup>2</sup>	dy <sup>2</sup>
11	225	105	7	-7	-49	49	49
12	215	115	-3	3	-9	9	9
13	215	115	-3	3	-9	9	9
14	215	115	-3	3	-9	9	9
15	220	110	2	-2	-4	4	4
Σ					-80	80	80

Step 3: Apply Pearson Formula

$$r = \frac{\sum(dx \cdot dy)}{\sqrt{(\sum dx^2 \times \sum dy^2)}}$$

$$r = \frac{-80}{\sqrt{(80 \times 80)}}$$

$$r = -1.00$$

Final Result

Pearson Correlation Coefficient (r) = -1.00

### Interpretation/Decision

While analysing data pertaining to the use of and the challenges faced in using Personal Protective Equipment (PPE) at Uyo University Teaching Hospital (UUTH) during the pandemic, it was observed that there is a perfect reverse correlation. The null hypothesis ( $H_0$ ) posited that there were no considerable challenges following the use of PPE, while the alternative hypothesis ( $H_1$ ) argued that there were some significant challenges. The data analysis through the Likert scale mechanism gave positive feedback, with 1090 and 560 instances of negative feedback. Thus, the Pearson correlation coefficient (r) was found to be -1.00, implying a perfect negative correlation existed. That is, health care workers who experienced more psychological and physical difficulties, such as discomfort, stress, and mental fatigue in using the PPE, did not report any difficulty at all. With the coefficient  $r = -1.00$ , it serves as an indication that the magnitude of the problems related to the psychological and physiological challenges might be because the problems are inversely proportional to the extent of following the guidelines. This brings about the challenge of addressing these restrictions in order to turn the situation around, so that there will be full adherence to PPE, as this is crucial for the protection of health workers and the prevention of the spreading of COVID-19.

### Discussion of Findings

The research examined the utilisation of PPE among professional practitioner including the availability of evidence at the University of Uyo Teaching Hospital (UUTH) in Akwa Ibom State, Nigeria. The provision of PPE was commended for preventing the spread of diseases, but in most cases, only the provision of a few PPEs like gloves, facemasks and aprons was emphasised among the health workers. Despite the claimed provision of PPE within the facility, consistent utilisation was not possible. There was an appreciable number of doctors and dentists who did not use the PPE that was provided and those who used it did not use every item that was provided, but only one or two of such, depending on the workload, which did not deserve others. All respondents, in contrast, reported the use of PPE in procedures; only about two-thirds used it when prescribed. This supposes that respondents in that setting appreciated the significance of PPE in their infection prevention during invasive procedures, whether high duration or low risk. This is in contrast to a study carried out in Southeast Nigeria, where more than half of the respondents registered low usage of PPEs, a fact perceived to be linked to the lower level of intensity of the COVID-19 outbreak in this area. Research in Lagos, Nigeria, and the US, over a period, reported low adherence to PPE guidelines.

PPE use depended on many different aspects, for example, who was wearing it, the work training of the person wearing it, its fit and management support, among others. The unavailability of PPE, as well as the lack of WHO-recommended OSH training, also acted as a limitation to the use of protective clothing. This contradicted the Lagos study, which even made it difficult to have information on the other mentioned protective gear, which stated the problems of low awareness, lack of supervision and no safety gear available. In addition to these, acquiring life insurance for

the staff that dealt with the care of coronavirus patients was an uphill task; there were inadequate facilities, such as patient isolation wards, there were frequent outages of electricity, and intensive care units, together with ventilators, were scarce. Even with these factors, the provision of PPEs, especially to the healthcare professionals at the frontline, was disturbed, leading the hospital management to be ill-equipped in handling the pandemic.

### **Conclusion/Recommendations**

The study addressed the issue of Personal Protective Equipment (PPE) and its potential in controlling infections, especially among healthcare workers at the University of Uyo Teaching Hospital. Despite PPE being available in most cases, the use of PPE was rather erratic, with poor compliance being the main challenge. Poor training, bad fitting of the equipment, and lack of control while using the equipment adversely affected the use of the equipment. It was discovered that even though some efforts were made to increase the presence of the available PPEs, healthcare workers experienced strong enforcement challenges, especially when fatigue or the absence of strategic management was overwhelming. This also speaks to the necessity of targeted treatment strategies which address practical and emotional issues associated with PPE use in healthcare.

Effective training of the health workers regarding appropriate use, including donning and doffing of PPE, should be part of the staff performance indices. In order to enhance PPE usage, these training programs should be integrated into the existing occupational safety and health (OSH) programs to orient all healthcare personnel, such as new staff and interns, on the use of PPE. Ongoing training will also bring into perspective areas of deficiency, especially on the importance of PPE in controlling infections.

Management must take action in the provision of PPE, which includes measures to address the psychological and physical challenges of their staff. Such measures involve engaging with staff on a regular basis to reinforce their behaviour and ensure effective implementation of PPE.

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