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Practices of Covid-19 Safety Measures among Health Workers in Edo State, Nigeria

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Abstract **Original Research Article**

This study examined the practices of COVID-19 safety measures among health workers in Edo State, Nigeria. It also investigated whether differences existed in safety practices based on sex, age, work experience and educational qualification. A descriptive cross-sectional research design was adopted for the study. The population comprised 3,223 health workers from Irrua Specialist Teaching Hospital, University of Benin Teaching Hospital and Central Hospital, Benin City. A sample of 1,617 health workers was selected using a stratified random sampling technique. Data were collected using a researcher-developed structured questionnaire. The instrument was divided into sections covering the demographic characteristics of respondents and their practices of COVID-19 safety measures. The reliability of the instrument was assessed through a pilot study using the split-half method. Data collected were analysed using the Statistical Package for the Social Sciences (SPSS), Version 26. Frequency counts, percentages and mean scores were used to answer the research questions, while the independent samples t-test was used to test the hypotheses at a 0.05 level of significance. The findings indicated that hand hygiene, physical safety measures and vaccine-related safety practices were poorly observed by some health workers. The study also found significant differences in safety practices based on sex, age, work experience and educational qualification. Female, older, more experienced and better-educated health workers generally demonstrated better safety practices. The study concluded that demographic and professional characteristics may influence the practice of COVID-19 safety measures among health workers. It therefore recommended regular training, adequate provision of personal protective equipment, improved supervision and continuous health education to strengthen infection prevention and control practices in healthcare facilities.

Keywords: COVID-19, Safety Measures, Health Workers, Hand Hygiene.

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INTRODUCTION

The outbreak of Coronavirus Disease 2019 (COVID-19) brought serious changes to the way healthcare services were provided across the world. COVID-19 is an infectious disease caused by the Severe Acute Respiratory Syndrome

Coronavirus 2 (SARS-CoV-2). The disease spreads mainly through infectious respiratory particles when an infected person breathes, talks, coughs or sneezes. It can spread easily in healthcare settings where health workers have regular contact with patients, including those who may be infected without knowing their COVID-19 status. This made the prevention and control of infection an important responsibility for health workers during the pandemic (World Health Organization [WHO], 2023).

Nigeria recorded its first confirmed case of COVID-19 on 27 February 2020, following the confirmation of an Italian citizen who had travelled to Lagos. The report led to increased public health activities across the country, including disease surveillance, contact tracing, testing, isolation and infection prevention training. The Nigeria Centre for Disease Control (NCDC) worked with state governments and healthcare facilities to strengthen preparedness and reduce the spread of the disease. Health workers were particularly important in this response because they were responsible for identifying suspected cases, collecting samples, providing treatment and educating members of the public on preventive measures (NCDC, 2020; NCDC, 2021).

In Edo State, the COVID-19 outbreak placed additional responsibilities on health workers in public and private healthcare facilities. Doctors, nurses, laboratory scientists, pharmacists, community health practitioners and other healthcare personnel were involved in different aspects of patient care and infection control. Their duties exposed them to possible contact with infected patients, body fluids and contaminated healthcare environments. As a result, following recommended safety measures became necessary to protect health workers, patients, their families and the wider community. The importance of these measures was not limited to treating people with confirmed COVID-19, as infection could also occur when patients visited hospitals for other health conditions (Afemikhe et al., 2020; WHO, 2023).

COVID-19 safety measures refer to the actions taken to prevent or reduce the spread of the virus. In healthcare settings, these include regular handwashing with soap and water, the use of alcohol-based hand sanitisers, wearing appropriate face masks and personal protective equipment, proper disposal of medical waste, cleaning and disinfection of surfaces, adequate ventilation, respiratory hygiene and following isolation procedures when necessary. Health workers are also expected to observe standard precautions when attending to patients, regardless of whether the patients have been diagnosed with an infectious disease. The World Health Organization explains that effective infection prevention requires a combination of appropriate protective equipment, hand hygiene, staff training, early identification of suspected cases and suitable environmental measures (WHO, 2023).

However, having knowledge of these safety measures does not always mean that health workers practise them correctly and consistently. Some workers may know the importance of wearing protective equipment but fail to use it when supplies are limited, when they are under pressure or when the equipment causes discomfort. Others may not follow hand hygiene procedures at every recommended opportunity because of heavy workloads, inadequate facilities or poor supervision. These problems can increase the possibility of infection within healthcare facilities. Therefore, it is important to examine what health workers actually do in their daily practice rather than relying only on what they know about COVID-19 prevention (Afemikhe et al., 2020; WHO, 2023).

Study from Edo State shows that the practice of COVID-19 safety measures deserves attention. Afemikhe et al. (2020) studied 367 frontline nurses in public health facilities in the state and found that 314 (85.6%) demonstrated good transmission-based precaution practices. The study also reported that 327 nurses (89.1%) practised hand hygiene. Although these findings showed a good level of compliance among many of the nurses, they also indicated that good practice had not been achieved by every respondent. The researchers identified fear of contracting the virus, fear of infecting family members and lack of financial motivation among the challenges experienced by nurses. This

suggests that the practice of safety measures may be affected by both individual and workplace conditions (Afemikhe et al., 2020).

Further evidence from Edo State also shows that infection prevention practices should not be taken for granted. A 2025 multi-site study by Ferguson examined standard infection control practices among healthcare workers in primary, secondary and tertiary healthcare facilities in the state. The study reported that fewer than one-third of the health workers across the levels of care had good overall standard precaution practices. It also found differences in the reported use of gloves during patient care across the three levels of healthcare. Although standard precautions cover a wider range of infection prevention activities than COVID-19-specific measures, the findings are relevant because they show the need for continued attention to protective practices in Edo State healthcare facilities (Ferguson, 2025).

The practice of COVID-19 safety measures may also differ according to the personal and professional characteristics of health workers. These characteristics are important because health workers do not all have the same educational background, years of service, age or work experience. For instance, a nurse who has received regular infection prevention training may approach patient care differently from a health worker who has had limited training. Similarly, workers in different age groups may have different levels of professional exposure and familiarity with infection prevention guidelines. It is therefore necessary to examine whether these characteristics are associated with differences in the way health workers practise COVID-19 safety measures (Afemikhe et al., 2020; WHO, 2023).

One important characteristic to consider is sex. Male and female health workers may have similar professional responsibilities, but their experiences, work duties and exposure to patients may differ. Such differences could influence their opportunities to observe safety measures, particularly when working in busy hospital departments. It is also possible that male and female workers may have similar levels of compliance because they receive the same workplace instructions and are expected to follow the same infection prevention guidelines. Afemikhe et al. (2020) examined precautionary practices among nurses in Edo State, but the findings on overall compliance do not, on their own, establish whether male and female health workers differ in their practice. This makes it important to investigate the possible difference between male and female health workers in the present study.

Age is another factor that may influence the practice of COVID-19 safety measures. Younger and older health workers may differ in their length of service, professional exposure, physical demands and experience with infection prevention procedures. Younger workers may have received more recent training on some infection control guidelines, while older workers may have gained practical knowledge through years of working in healthcare facilities. However, age alone does not determine whether a health worker follows safety measures correctly. Both younger and older workers are expected to observe the same professional standards. For this reason, comparing the practices of younger and older health workers will help to establish whether age is associated with differences in compliance in Edo State (WHO, 2023; Afemikhe et al., 2020).

Years of work experience may also be related to how health workers practise COVID-19 safety measures. Experienced health workers may have developed practical skills through regular contact with patients and previous exposure to infection prevention procedures. On the other hand, less experienced workers may have more recent theoretical knowledge of current guidelines and may be more familiar with recent training methods. Neither group should automatically be assumed to have better practices, as compliance may also depend on the availability of protective materials, supervision and the nature of their duties. A study published in BMJ Public Health in 2025, which assessed healthcare workers' knowledge, attitudes and practices towards COVID-19 in three Nigerian states, reported an association between years of work experience and satisfactory preventive practice. In that study, workers with 11–15 years

of experience were less likely to demonstrate satisfactory practice than those with fewer than two years of experience. These finding shows why the relationship between work experience and safety practices deserves further investigation (BMJ Public Health, 2025).

Educational qualification is equally important when examining the practice of COVID-19 safety measures among health workers. Health workers with higher educational qualifications may have received more detailed instruction in infection prevention, disease transmission and occupational safety. However, formal education does not always guarantee that a person will follow recommended safety procedures. Practical training, professional experience, workplace supervision and access to protective equipment also influence daily practice. In the Edo State study by Afemikhe et al. (2020), academic qualification was identified as a significant predictor of good transmission-based precaution practices, with nurses who held a degree in nursing more likely to demonstrate good practice. This finding provides a reason to compare the safety practices of less-educated and more-educated health workers in order to determine whether educational qualification makes a difference in the study population.

Despite the evidence from previous studies, there is still a need to examine COVID-19 safety practices among health workers in Edo State in relation to sex, age, years of work experience and educational qualification. Previous research has provided useful information about nurses' compliance with transmission-based precautions and the challenges associated with infection prevention. However, findings from studies involving nurses alone may not fully represent the practices of all categories of health workers. In addition, findings from other Nigerian states may not necessarily reflect the situation in Edo State because healthcare facilities, working conditions, training opportunities and availability of protective equipment may differ. A study involving different categories of health workers will therefore provide a broader understanding of their safety practices and the factors associated with them (Afemikhe et al., 2020; Ferguson, 2025; BMJ Public Health, 2025).

The issue of educational qualification is also supported by recent Nigerian evidence. Okonkwo et al. (2025), in a study involving 1,341 healthcare workers across three states in Nigeria, found that only 5.3% of the participants demonstrated satisfactory COVID-19 prevention practices, despite a higher proportion having satisfactory knowledge. The study also identified differences in knowledge and attitudes across certain demographic groups. Although the study did not establish that educational qualification caused better preventive practice, its findings show that knowledge alone may not be enough to ensure proper compliance. It is therefore necessary to examine whether health workers with lower and higher educational qualifications differ in their practice of COVID-19 safety measures in Edo State (Okonkwo et al., 2025).

Based on these issues, the present study seeks to examine the practices of COVID-19 safety measures among health workers in Edo State, Nigeria. It will assess the safety measures commonly practised by health workers and determine whether differences exist between male and female workers, younger and older workers, less experienced and more experienced workers, and workers with lower and higher educational qualifications. The study is important because its findings may help identify groups that require additional training, supervision and support. It may also provide useful information for hospital management, the Edo State Ministry of Health and other relevant health authorities in planning programmes that will improve infection prevention and control in healthcare facilities.

In view of the continued importance of infection prevention in healthcare delivery, it is necessary to understand how health workers apply these measures in their daily duties. Although COVID-19 is no longer at the emergency stage it was during the pandemic, the lessons learnt remain relevant to the prevention of respiratory infections and other communicable diseases. This study will therefore provide information on the practice of COVID-19 safety measures among health workers in Edo State and examine

whether sex, age, work experience and educational qualification are associated with differences in their practices.

Studies on Practices of Covid-19 Safety Measures among Health Workers Afemikhe, Esewe, Enuku and Ehwarieme (2020) conducted a study titled Transmission-Based Precaution Practices among Nurses in Edo State, Nigeria during COVID-19 Pandemic. The study aimed to assess the level of transmission-based precaution practices among nurses, identify factors influencing their practices and examine the challenges they experienced during the COVID-19 pandemic. The researchers adopted a descriptive cross-sectional survey design. The population consisted of frontline nurses working in public health facilities in Edo State, while a sample of 367 nurses participated in the study. The sampling technique was not clearly stated in the published abstract. Data were collected using a structured online questionnaire administered through Google Forms. The questionnaire obtained information on nurses' precautionary practices, factors influencing compliance and challenges experienced during the pandemic. Data were analysed using descriptive statistics and logistic regression analysis. The findings revealed that 314 (85.6%) of the respondents demonstrated good transmission-based precaution practices, while 327 (89.1%) reported practising hand hygiene. The study further revealed that educational qualification was a significant predictor of good precautionary practices, with nurses who possessed a degree in nursing more likely to demonstrate good practices.

Oche et al. (2020) conducted a study titled Knowledge, Attitude and Practices Related to COVID-19 Prevention among Healthcare Workers in Sokoto Metropolis, Nigeria. The study assessed the knowledge, attitudes and preventive practices of healthcare workers towards COVID-19 in Sokoto metropolis, Sokoto State. A cross-sectional research design was adopted, and the study population comprised healthcare workers in health facilities within the metropolis, including doctors, nurses and other healthcare personnel. A total of 427 healthcare workers participated in the study, and a multistage sampling technique was used to select the respondents. Data were collected using a self-administered structured questionnaire containing questions on knowledge of COVID-19, attitudes towards the disease and preventive practices. The data were analysed using the Statistical Package for Social Sciences (SPSS), with frequencies, percentages and chi-square tests used to summarise the responses and examine associations between selected variables. The findings revealed that 99% of the respondents had heard about COVID-19, while 78.2% had good knowledge of the disease. Furthermore, 91% demonstrated positive attitudes towards COVID-19 prevention, but only 68.4% demonstrated appropriate preventive practices. The study also reported that 83% of the respondents were willing to work in isolation centres provided adequate personal protective equipment was available. .

Abubakar, Usman, Baba, Sulaiman, Kolo, Adamu and Saleh Jaber (2022) conducted a study titled Practices and Perception of Healthcare Workers towards Infection Control Measures during the COVID-19 Pandemic: A Cross-Sectional Online Survey from Nigeria. The study examined the practices and perceptions of healthcare workers towards infection prevention and control measures during the COVID-19 pandemic in Nigeria. The researchers adopted a descriptive cross-sectional online survey design. The population consisted of healthcare workers across Nigeria, including pharmacists, nurses, midwives, medical doctors and other healthcare professionals. A total of 426 healthcare workers participated in the study. The researchers used an online voluntary response approach, distributing the questionnaire through professional associations, societies and hospitals. Data were collected using a structured online questionnaire containing 25 items on infection prevention practices, availability of personal protective equipment, previous training and challenges affecting compliance. The data were analysed using descriptive and inferential statistical methods to assess respondents' practices and perceptions of infection control measures. The findings revealed that fewer than half of the healthcare workers had received

previous training on COVID-19 and the proper use of personal protective equipment.

Orji et al. (2023) conducted a study titled Knowledge, Attitudes and Practices of Infection Prevention and Control among Healthcare Workers during the COVID-19 Pandemic: A Descriptive Cross-Sectional Study in Three Nigerian States. The study examined healthcare workers' knowledge, attitudes and practices concerning infection prevention and control during the COVID-19 pandemic in Ebonyi, Ondo and Niger States. The researchers adopted a descriptive mixed-methods cross-sectional design involving both quantitative and qualitative approaches. The population consisted of community health workers and facility-based healthcare providers working in selected public health facilities in the three states. A total of 622 healthcare workers were interviewed, although 536 respondents were included in the final quantitative analysis. The sample comprised 278 community health workers and 258 facility-based healthcare providers. The researchers also conducted interviews with 54 key informants as part of the qualitative component. Data were collected using structured questionnaires and semi-structured interviews. The questionnaires obtained information on knowledge, attitudes and infection prevention practices before and during the pandemic, while the interviews explored the experiences of healthcare workers and health administrators. Quantitative data were analysed using descriptive statistics, independent t-tests, chi-square tests and Fisher's exact tests. Qualitative data were analysed thematically using Atlas.ti software. The findings revealed that healthcare workers had moderate knowledge, attitudes and practices concerning infection prevention and control. Only 25.6% of the providers correctly answered at least eight out of ten infection prevention knowledge questions. Facility-based healthcare workers had higher mean knowledge scores than community-based workers, with a statistically significant difference ($p = 0.001$). The study also revealed that reported infection prevention practices increased during the pandemic compared with the period before the pandemic. However, gaps remained in the use of N95 masks, hand sanitisers and correct hand hygiene practices.

Durowade et al. (2023) conducted a study titled Compliance and Perception towards COVID-19 Preventive Protocols among Hospital Staff in a Tertiary Health Facility, Southwest Nigeria. The study assessed the level of compliance with COVID-19 preventive protocols among hospital staff at the Federal Teaching Hospital, Ido-Ekiti, Ekiti State. It also examined the perceptions of healthcare workers towards preventive guidelines and factors associated with compliance. The researchers adopted a descriptive cross-sectional research design. The population comprised hospital staff working at the Federal Teaching Hospital, Ido-Ekiti, including healthcare workers involved in the delivery of health services. A multistage sampling technique was used to select the respondents. The exact sample size should be confirmed from the full published article before submission. Data were collected over five months, from June to October 2021, using an interviewer-administered semi-structured questionnaire. The questionnaire obtained information on respondents' knowledge of COVID-19 preventive protocols, perceptions of the guidelines and compliance with recommended safety measures. Data were analysed using the Statistical Package for Social Sciences (SPSS), version 27. Descriptive statistics were used to summarise the respondents' characteristics, while inferential statistics were employed to examine associations and predictors of compliance. The findings revealed that 60.1% of the respondents received information about COVID-19 preventive protocols through seminars and workshops. However, 28.8% reported suboptimal use of available personal protective equipment, while 35.8% considered the preventive protocols too strict. Although 93.3% of the respondents demonstrated good perceptions of the protocols, only 58.7% demonstrated good compliance. The study also found that age, marital status and sex were significantly associated with compliance.

COVID-19 created serious challenges for health workers because of their frequent contact with patients and possible exposure to the virus. To reduce the spread of the infection, health workers were expected to observe safety measures such as regular handwashing, wearing face masks,

using personal protective equipment (PPE), maintaining good respiratory hygiene and keeping their working environments clean. However, following these measures consistently was sometimes difficult because of inadequate protective equipment, poor facilities, heavy workload and insufficient training (WHO, 2023).

In Edo State, Afemikhe et al. (2020) found that 85.6% of nurses demonstrated good transmission-based precaution practices, while 14.4% did not. The study also identified fear of contracting the virus, fear of infecting family members and lack of financial motivation as challenges affecting nurses. Similarly, Abubakar et al. (2022) reported that inadequate PPE and insufficient training affected infection prevention practices among healthcare workers in Nigeria.

Another concern is that health workers may differ in their practice of COVID-19 safety measures based on their sex, age, work experience and educational qualification. Male and female workers, younger and older workers, as well as less and more experienced and educated workers, may have different levels of exposure, training and professional knowledge. However, it is not clear whether these differences influence their actual safety practices among health workers in Edo State.

Although previous studies have examined COVID-19 preventive practices among healthcare workers, there is still a need for further research involving different categories of health workers in Edo State. Therefore, this study seeks to examine the practices of COVID-19 safety measures among health workers in Edo State, Nigeria, and determine whether differences exist based on sex, age, work experience and educational qualification. The findings may help identify areas where additional training, supervision and support are needed to improve safety practices among health workers.

Research Questions

The following research questions guides this study:

1) What are the practices of COVID-19 safety measures among health workers in Edo State, Nigeria?
2) Is there any difference between male and female health workers' practice of COVID-19 safety measures in Edo State Nigeria?
3) Is there any difference between young and old health workers' practice of COVID-19 safety measures in Edo State, Nigeria?
4) Is there any difference between less and well experienced health workers' practice of COVID-19 safety measures in Edo State Nigeria?
5) Is there any difference between less and well-educated health workers' practice of COVID-19 safety measures in Edo State Nigeria?

Hypotheses

The following research hypotheses were formulated and tested in this study:

1) There is no significant difference between male and female health workers' practice of COVID-19 safety measures in Edo State, Nigeria
2) There is no significant difference between young and old health workers' practice of COVID-19 safety measures in Edo State, Nigeria
3) There is no significant difference between less and well experienced health workers' practice of COVID-19 safety measures in Edo State, Nigeria
4) There is no significant difference between less and well-educated health workers' practice of COVID-19 safety measures in Edo State, Nigeria

Methods

A descriptive cross-sectional research design was adopted for this study. This design involves collecting data from a selected group of

respondents at a particular point in time to describe a situation or examine a phenomenon. It was considered suitable because the study seeks to assess the practices of COVID-19 safety measures among health workers in Edo State, Nigeria. The design was also appropriate because the respondents were not exposed to any form of treatment or manipulation. Rather, information was obtained directly from them through a structured questionnaire. It also allowed the researcher to examine whether differences exist in the practice of COVID-19 safety measures based on demographic characteristics such as sex, age, years of work experience and educational qualification.

The population of the study comprised 3,223 health workers in three selected health facilities in Edo State, Nigeria. These facilities included Irrua Specialist Teaching Hospital (ISTH), Irrua; University of Benin Teaching Hospital (UBTH), Benin City; and Central Hospital, Benin City. The population consisted of 591 doctors, 1,515 nurses, 267 medical laboratory scientists, 105 pharmacists, 22 physiotherapists, 23 radiographers and 701 clinical assistants. The clinical assistants included orderlies, community health education workers, social health workers and environmental health workers.

Based on the total population of 3,223 health workers, a sample size of 1,617 respondents was selected for the study. This represents approximately 50% of the total population. A stratified random sampling technique was adopted to select the respondents. The three selected health facilities were treated as separate strata to ensure that health workers from each facility were represented in the study. The sample was drawn from each facility based on its staff population. A researcher-developed structured questionnaire was used for data collection. The questionnaire was developed after reviewing relevant literature on COVID-19 prevention and safety measures among healthcare workers. The questionnaire was designed to obtain information about the demographic characteristics of the respondents and their practices regarding COVID-19 safety measures. It was divided into two main sections:

This section obtained information about the respondents' sex, age, professional category, years of work experience and educational qualification.

Section B: Practice of COVID-19 Safety Measures

This section contained statements on the safety measures observed by health workers. These included regular handwashing, use of alcohol-based hand sanitisers, wearing of face masks, use of personal protective equipment (PPE), respiratory hygiene, proper disposal of used protective materials and maintenance of a clean working environment. The responses were measured using a four-point Likert scale: Strongly Disagree (SD) = 1, Disagree (D) = 2, Agree (A) = 3 and Strongly Agree (SA) = 4. A mean score of 2.50 or above was regarded as good practice, while a mean score below 2.50 was regarded as poor practice. Data collected were coded and analysed using the Statistical Package for the Social Sciences (SPSS), Version 26. Mean scores were used answer the research questions. A four-point Likert scale was used to assess the practice of COVID-19 safety measures. A mean score of 2.50 and above indicated good practice, while a score below 2.50 indicated poor practice. The independent samples t-test was used to test differences in practice based on sex, age, work experience and educational qualification. All hypotheses were tested at a 5% level of significance ($p = 0.05$).

Results

Research Question 1: What are the practices of COVID-19 safety among health workers in Edo State, Nigeria?

Table 1: Mean score and Standard Deviation on the practices of COVID-19 safety among health workers in Edo State, Nigeria

		N = 1617		
s/n	**Safety Measures of preventing COVID-19 spread**	**$\bar{X}$**	**SD**	**Remarks**
	Hand Safety Practice			
1	I practice hand washing with clean water and soap	2.39	1.092	Poorly practiced
2	I use alcohol based hand sanitizers	2.17	1.078	Poorly practiced
3	I cover my mouth with my elbow while coughing	2.83*	.999	Well practiced
	Mean score 2.46			
	Physical Safety Practice			
4	I avoid touching frequently torched surfaces like door handles, rails in offices and motor parks	2.79*	1.037	Well practiced
5	I maintain social distancing with people	2.25	1.002	Poorly practiced
6	I avoid visiting crowded place	2.12	1.123	Poorly practiced
	Mean score 2.39			
7	I have taken the first dose of the Covid-19 vaccine	2.27	1.083	Poorly practiced
8	I have taken second dose of covid-19 vaccine	2.10	1.100	Poorly practiced
9	I have taken more booster shots of the covid-19 vaccine	2.40	1.113	Poorly practiced
	Vaccine Safety Practice			
	Mean score 2.26			

** Significant mean ($\bar{X} \geq 2.50$)*

Result in Table 3 shows that health workers had good practice on item 3 and 4 with mean score of 2.79 and 2.83 and poorly practiced on item 1, 2, 5, 6, 7, 8 and 9 with a mean score from 2.10 to 2.40 respectively. However, result from the table further showed that the overall mean score of items 1 to 3 on hand safety practices was 2.46; physical safety practice was 2.39 while on vaccine safety practice the mean score was 2.26. Hence, the result showed that the three key COVID-19 safety practices - hand safety practice, physical safety practice and vaccine safety practices are poorly practiced among health workers in Edo State, Nigeria.

Hypothesis 1: There is no significant difference between male and female health workers practice of COVID-19 safety measures in Edo State

Table 12: T-test analysis on significant difference between male and female health workers practice of COVID-19 safety Measures in Edo State

Variable	Sex	N	$\bar{X}$	S.D	t-cal.	P-value	Remark
Hand-Based Safety Practices	Male	785	2.27	.757	-10.214*	0.000	Reject null hypothesis
	Female	816	2.65	.755			
Physical Safety Practices	Male	785	2.09	.755	-16.760*0	0.020	Reject null hypothesis
	Female	816	2.68	.645			
Vaccination Safety Practices	Male	785	2.15	.713	-5.904*	0.000	Reject null hypothesis
	Female	816	2.36	.746			

** t-calculated is significant at 0.05 level (2-tailed test taken in absolute terms)*

Result in Table 12 shows that the calculated t-value of -10.214 for hand-based safety practices, -16.760 for physical safety practices, -5.905 for vaccination safety practices were all statistically significant ($p<0.05$). Therefore, the null hypothesis is rejected. This means that there is a significance difference between male and female health workers in Edo State, Nigeria on all the of COVID-19 safety practices. From the mean distribution, female health workers engaged better with all the practices - hand-based safety, physical safety and vaccination safety practices than their male counterparts.

Hypothesis 2: There is no significant difference between young and old health workers practice of COVID-19 safety measures in Edo State

Table 13: T-test analysis on significant difference between young and old health workers Practice of COVID-19 Safety Measures in Edo State

Variable	Age	N	$\bar{X}$	S.D	t-cal.	P-value	Remark
Hand-Based Safety Practices	Below 40yrs	898	2.48	.837	1.190	.234	No significant difference exist
	40yrs and above	703	2.44	.701			
Physical Safety Practices	Below 40yrs	898	2.28	.779	-6.863	.000	Significant difference exist
	40yrs and above	703	2.53	.710			
Vaccination Safety Practices	Below 40yrs	898	2.26	.710	.353	.724	No significant difference exist
	40yrs and above	703	2.25	.772			

** t-calculated is significant at 0.05 level (2-tailed test taken in absolute terms)*

Result in Table 13 shows that the calculated t-value of 1.190 for hand-based safety practices, and the t-value of -.353 for vaccination safety practices were not statistically significant ($p>0.05$). However, the calculated t-value of 6.863 for physical safety practices was statistically significant ($p<0.05$). Therefore, the null hypothesis is rejected.

Hypothesis 3: There is no significant difference between less and well experienced health workers practice of COVID-19 safety measures in Edo State

Table 14: T-test analysis on significant difference between less and well experienced health workers in Edo State, Nigeria on their practice of COVID-19 safety

Variable	Experience	N	$\bar{X}$	S.D	t-cal.	P-value	Remark
Hand-based safety Practices	Less experienced	997	2.19	.645	-20.506*	.000	Significant difference exist
	Well experienced	604	2.92	.768			
Physical safety Practices	Less experienced	997	2.20	.694	-13.559*	.020	Significant difference exist
	Well experienced	604	2.70	.761			
Vaccination safety Practices	Less experienced	997	2.03	.570	-17.480*	.000	Significant difference exist
	Well experienced	604	2.64	.822			

** t-calculated is significant at 0.05 level (2-tailed test taken in absolute terms)*

Result in Table 14 shows that the calculated t-value of -20.506 for hand-based safety practices,-13.559 for physical safety practices, -17.480 for vaccination safety were statistically significant ($p<0.05$). Therefore, the null hypothesis was rejected.

Hypothesis 4: There is no significant difference between less and well-educated health workers in practice of COVID-19 safety measures in Edo State

Table 15: T-test analysis on Significant Difference between Less and Well-Educated Health Workers Practice of COVID-19 Safety Measures in Edo State

Variable	Edu Qual.	N	$\bar{X}$	S.D	t-cal.	P-value	Remark
Hand-Based Safety Practices	Less qualified	790	2.16	.706	-16.556*	.000	Reject null hypothesis
	Well qualified	811	2.76	.736			
Physical Safety Practices	Less qualified	790	2.18	.770	-11.299*	.000	Reject null hypothesis
	Well qualified	811	2.59	.692			
Vaccination Safety Practices	Less qualified	790	2.03	.625	-12.842*	.000	Reject null hypothesis
	Well qualified	811	2.48	.770			

** t-calculated is significant at 0.05 level (2-tailed test taken in absolute terms)*

Result in Table 15 shows that the calculated t-value of -16.556 for hand-based safety practices, -11.299 for physical safety practices, -12.842 for vaccination safety were statistically significant ($p<0.05$).Therefore, the null hypothesis is rejected.

Discussions

The findings of this study showed that hand hygiene, physical safety measures and COVID-19 vaccine-related safety practices were poorly observed by some health workers in Edo State, Nigeria. This revealed that although health workers are expected to follow infection prevention and control guidelines, challenges may affect their consistent practice of these measures. Such challenges may include inadequate personal protective equipment (PPE), insufficient facilities, heavy workload and limited access to regular training. The finding is partly different from that of Afemikhe et al. (2020), who showed that some nurses faced challenges such as fear of contracting the virus, fear of infecting family members and lack of financial motivation.

Similarly, Oche et al. (2020) examined COVID-19 preventive practices among healthcare workers in Sokoto State. Their findings highlighted the importance of observing preventive measures to reduce the risk of infection among health workers. The poor practice observed in this study may also be linked to inadequate resources and facilities in some health institutions. Where PPE, handwashing facilities and other protective materials are not readily available, health workers may find it difficult to follow safety guidelines consistently.

The findings also revealed significant differences in the practice of COVID-19 safety measures based on sex, age, work experience and educational qualification among health workers in Edo State. Female, older, more experienced and better-educated health workers generally demonstrated better safety practices than their counterparts. This finding suggests that demographic and professional characteristics may influence how health workers observe safety measures. The finding is partly supported by Erfani et al. (2020), whose study examined knowledge, attitudes and practices relating to COVID-19 among healthcare workers and highlighted the relationship between professional experience and these factors. Similarly, Ilesanmi and Afolabi (2020) emphasised the importance of health workers' knowledge and preventive practices in controlling the spread of COVID-19.

Conclusion

Based on the findings of this study, it can be concluded that health workers in Edo State, Nigeria, demonstrated varying levels of practice of COVID-19 safety measures. Differences were

also observed in safety practices based on sex, age, work experience and educational qualification. Female, older, more experienced and better-educated health workers generally demonstrated better safety practices than their counterparts. These findings highlight the importance of regular training, adequate provision of protective equipment and continuous supervision to improve compliance with COVID-19 safety measures among health workers.

Recommendations

Based on the findings in this study, the following recommendations were made:

1) Provision of protective equipment: Management of health facilities in Edo State should ensure the regular availability of personal protective equipment (PPE), face masks, hand sanitisers and other materials needed for infection prevention.
2) Regular training: Health workers should receive regular training and updates on COVID-19 safety measures, including proper hand hygiene, respiratory hygiene and the correct use of protective equipment.
3) Improved supervision: Hospital management should strengthen supervision and monitoring to encourage health workers to follow recommended safety practices consistently.
4) Special attention to younger and less experienced workers: Additional guidance and practical training should be provided for younger and less experienced health workers to improve their compliance with safety measures.
5) Continuous health education: Health facilities should organise awareness programmes to improve health workers' understanding of the importance of COVID-19 prevention and control measures.
6) Improvement of healthcare facilities: Government and hospital authorities should provide adequate handwashing facilities, clean working environments and other essential resources to support effective infection prevention practices.

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