



# **WESTERN NIGERIA JOURNAL OF MEDICAL SCIENCES (WNJMS)**

**FACTORS INFLUENCING HEALTHCARE WORKERS' ACCEPTANCE OF VOLUNTARY  
COVID-19 PCR TESTING DURING THE PEAK OF THE PANDEMIC: INSIGHTS FROM A  
NIGERIAN TERTIARY FACILITY**

## FACTORS INFLUENCING HEALTHCARE WORKERS' ACCEPTANCE OF VOLUNTARY COVID-19 PCR TESTING DURING THE PEAK OF THE PANDEMIC: INSIGHTS FROM A NIGERIAN TERTIARY FACILITY

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### ABSTRACT

**Introduction:** COVID-19 surveillance among healthcare workers is vital to prevent hospital transmission. This study assessed healthcare workers' willingness to voluntarily test for SARS-CoV-2 infection.

**Methods:** A cross-sectional study was conducted among 234 staff in a Nigerian tertiary healthcare facility using a 25-item questionnaire to obtain information on sociodemographic/occupational characteristics, willingness to have a COVID-19 PCR test and self-perceived barriers to testing. Data were analyzed using SPSS version 25, with a significance level set at  $p < 0.05$ . Associations were tested using odds ratios with a 95% confidence interval.

**Results:** The mean age was  $40.1 \pm 10.7$  years with a male to female ratio of approximately 1:1. More than two-thirds of health workers, 159 (68.0%) perceived they were at high risk for COVID-19. Most health workers, 172 (73.5%) were willing to test voluntarily for COVID-19. For persons not willing to be tested, personal reasons (35; 56.5%) and sampling discomfort (13; 21.0%) were reasons for non-willingness to test. Being married or in a union (OR: 0.32, 95% CI: 0.13-0.76;  $p=0.011$ ), currently showing symptoms suggestive of COVID-19 (OR:

7.51, 95% CI: 2.191-26.70;  $p=0.002$ ) and previous COVID-19 vaccination (OR: 3.35, 95% CI: 1.58-7.20;  $p=0.002$ ) were the significant predictors of willingness to test for COVID-19.

**Conclusion:** Most health workers were willing to take a voluntary COVID-19 PCR test. The main barriers to testing were personal reasons and discomfort with the sample collection. It is important to explore alternative sample collection methods like pooled saliva-based testing and establishing multiple on-site testing centers as ways of improving voluntary testing.

**Key words:** COVID-19, PCR-testing, health-workers, voluntary testing, Nigeria

### INTRODUCTION

COVID-19, a novel multi-wave pandemic posed a threat to the health of many people in the world.<sup>1</sup> According to the World Health Organization, as of February 2025, not less than 777.4 million cases and 7.1 million deaths worldwide were attributable to the disease.<sup>2</sup> Also, during the height of the pandemic, approximately 115,000 health workers may have died due to COVID-19.<sup>3</sup> The accelerated release of COVID vaccines



helped to check this trend and has been widely acclaimed as the most effective measure against the illness.<sup>4-6</sup>

However, despite the availability of COVID-19 vaccines, infection transmission continues to occur, even in health care settings globally. This is partly due to non-universal protection by the vaccines, vaccine hesitancy, possible waning protection, and continuous mutation of the SARS-COV-2 virus.<sup>4-8</sup> Various measures have been implemented in many countries to ensure people are protected from the infection with varying levels of effectiveness.<sup>9</sup> These measures include non-pharmacologic measures such as use of facemask and handwashing, mandatory vaccination by staff, phased administration of vaccines to the most vulnerable in the society and pre and post international travel mandatory screening.<sup>10-14</sup>

In the light of suboptimal vaccine coverage and the potential threat of SARS-COV-2 virus, adopting periodic COVID-19 screening is crucial as a workplace surveillance measure to prevent disease transmission.<sup>10,15</sup> The concept of screening with informed consent has been applied to diseases such as HIV during ante-natal care, Hepatitis B virus before blood transfusion and Sick cell disease during pre-conceptual counselling. Periodic screening is a practice that has been embraced among professional football players and health workers during the period of phased reopening of the economy in Europe and other high-income countries. Implementing such screening with informed consent can be an effective strategy to protect workplaces and curb the spread of COVID-19 in Africa.

Previous studies that assessed COVID-19 prevalence among health workers through workplace surveillance, reported higher burdens of SARS-CoV-2 infections among health workers far in excess of the rates among the general population.<sup>11,16</sup> Also health workers faced with the challenges of poor training on infection control and shortages of personal protective equipment had a higher burden of infection.<sup>11</sup> Moreover, a number of studies have shown that vaccine hesitancy

may be a significant problem among health workers for various reasons.<sup>6,7,9,12,17</sup>

Healthcare workers face a higher risk of COVID-19 infection because they see a lot of patients whose COVID-19 status are unknown.<sup>11,16</sup> Some health workers work in close contact with patients especially while providing care to acutely ill persons. This might increase the risk of spread of COVID-19 in healthcare settings and this was the experience of many health facilities during the first and second wave of COVID-19 before the deployment of vaccines in Nigeria. Hence, it is important to maintain continuous surveillance of the infection rates among health workers so as to keep watch over their health status and prevent widespread transmission within the hospitals and health facilities.<sup>15</sup> Hence, this study assessed the willingness to accept voluntary COVID-19 testing and the perceived barriers among health workers in a tertiary healthcare facility in Nigeria.

## METHODS

### *Study Design, Sampling Technique and Study Population*

This cross-sectional study was carried out among 234 staff of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, A sample size of 245 was determined using the Fisher's formula for estimating sample size of a single proportion after adjusting for a population less than 10,000. OAUTHC is a multi-specialty teaching hospital, located in Ile-Ife, a semi-urban town in Osun state, southwest Nigeria. At the time of the study, there were about 1786 clinical care providers and over 800 administrative staff in the hospital. The study was conducted from February through March 2022. To participate in the study, eligible staff must have been employed for at least six months and were required to provide informed consent.

Participants were recruited via a multistage sampling technique. Firstly, 10 out of the 26 departments in the hospital were selected using simple balloting. Subsequently, 25 respondents were selected via serial

recruitment from each department until the allotted sample size for the department is complete. Thereafter, each participant completed a 25-item self-administered, semi-structured questionnaire which included a section for sociodemographic information, willingness of the staff to accept voluntary screening for COVID-19 and outcome of voluntary COVID-19 PCR test.

### Data analysis

Completed questionnaires were retrieved and checked immediately for errors. Error-free questionnaires were entered into epidata software and analyzed using the Statistical Product and Service Solutions (SPSS) version 25. Analysis was carried out at univariate, bivariate and multivariate levels. Univariate variables such as age, gender, and professional cadre were summarized using frequency tables, mean and median. Bivariate analysis using chi-square test was used to assess the relationship between sociodemographic characteristics and willingness to uptake PCR testing while multivariate binary logistic regression analysis was used to determine the significant factors that were associated with willingness to uptake COVID-19 PCR test among health workers. Results were presented as odds ratio with 95% confidence intervals. P-value < 0.05 was considered significant.

### Ethical considerations

The study observed strict compliance with ethical standards according to the declaration of Helsinki for the conduct of research in human subjects. The approval to perform the study was obtained from the Ethics and Research Committee of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife (Protocol No: ERC/2022/03/05).

## RESULTS

A total of 234 health workers were sampled in the study. Table 1 shows the sociodemographic characteristics of respondents. The mean age was  $40.1 \pm 10.7$  years with a range of 18 to 72 years. More than one-third of health workers, 87 (37.2%) were within the 30-39 years' age group while

slightly more than half, 126 (53.9%) were of the females. Half of respondents, 118 (50.4%) had a bachelor's degree as their highest level of education and the majority, 175 (74.8%) were married. Seventy-two (30.8%) were practicing doctors (physician/surgeon) followed closely by nurses who were about one-fifth, 52 (22.2%) of the respondents.

**Table 1: Sociodemographic characteristics of respondents**

Variable	Frequency (n= 234)	Percentage (%)
<b>Age (Mean- 40.1, SD- 10.07, Range: 18 – 72)</b>		
Less than 30	33	14.1
30 to 39	87	37.2
40 to 49	69	29.5
50 to 59	39	16.7
60 and above	6	2.6
<b>Gender</b>		
Male	108	46.2
Female	126	53.9
<b>Educational Qualification</b>		
primary	5	2.1
secondary	16	6.8
diploma	31	13.3
Bachelor's degree	118	50.4
postgraduate degree	64	27.4
<b>Marital Status</b>		
Single	52	22.2
Married	175	74.8
Others	7	3.0
<b>Cadre</b>		
Physician	48	20.5
Surgeon	24	10.3
Nurse	52	22.2
Pharmacist	4	1.7
Med lab scientist	21	9.0
Health attendant	15	6.4
Administrative staff	28	12.0
Others	42	18.0
<b>Technical Cadre</b>		
technical staff	149	63.7
non-technical	85	36.3

Table 2 shows the occupational characteristics of health workers. More than two-thirds of health workers, 159 (68.0%)

perceived they had a high risk for COVID-19 while 31 (13.3%) had co-morbid conditions. However, almost all, 223 (95.3%), were not taking any prophylaxis. About two-thirds, 153 (65.4%) were not involved in the care of COVID-19 patients and the majority, 153 (77.35%) had not been in contact with a positive patient not wearing a mask. Furthermore, 7 out of 10 the health workers, 165 (70.5%) had never previously had a PCR test done and 215 (91.9%) had never been positive for COVID-19 in the past. The majority, 187 (79.9%) did not have current symptoms of COVID-19 and 175 (74.8%) had previously been vaccinated.

**Table 2: COVID-19 Exposure, Current symptoms and vaccination status**

Variable	Frequency (n= 234)	Percentage (%)
<b>Awareness of being at high risk for COVID-19</b>		
Yes	159	68.0
No	46	19.7
Don't know	29	12.4
<b>Any Co-morbid condition</b>		
Yes	31	13.3
No	203	86.8
<b>Taking Any Presumptive Prophylaxis</b>		
Yes	11	4.7
No	223	95.3
<b>Involvement in care of COVID-19 patients</b>		
Yes	81	34.6
No	153	65.4
<b>Contact with Positive patient not wearing mask</b>		
Yes	53	22.7
No	181	77.4
<b>Past PCR Test</b>		
Yes	69	29.5
No	165	70.5
<b>Previous COVID-19 Positivity</b>		
Yes	19	8.1
No	215	91.9
<b>Current symptoms of COVID-19</b>		
Yes	47	20.1
No	187	79.9
<b>Previously Vaccinated</b>		
Yes	175	74.8
No	59	25.2

**Table 3: Willingness to Test and associated barriers to COVID-19 PCR Testing**

Willing to test	Frequency	Percentage
Yes	172	73.5
No	62	26.5
<b>Barriers (multiple answers)</b>		
Sampling discomfort	13	21.0
Personal reasons	35	56.5
Fear of positive result	2	3.2
Don't believe in COVID-19	1	1.6
No reason	8	12.9
Recently tested	3	4.8

Table 3 shows the willingness to test for COVID-19 and the barriers to voluntary testing among health workers. Most health workers, 172 (73.5%) were willing to test voluntarily for COVID-19. Among persons who were not willing to be tested for COVID-19, more than half of healthcare workers, 35 (56.5%) cited personal reasons as the main barrier to voluntary COVID-19 testing while one-fifth, 13 (21.0%) stated that sampling discomfort was the reason for non-willingness to test.

Table 4 shows the association between sociodemographic factors and willingness to test. Only marital status was significantly associated with willingness to test ( $p=0.024$ ). Among occupational characteristics assessed, "currently showing symptoms suggestive of COVID-19" ( $p<0.001$ ) and "previous COVID-19 vaccination" ( $p=0.03$ ) were significantly associated with willingness to test (Table 5).

Table 6 shows the predictors of willingness to test for COVID-19. Being married or in a union (OR: 0.32, 95% CI: 0.13-0.76;  $p=0.011$ ), compared to being single/not in a union had significantly lower odds of willingness to test for COVID-19 while those currently showing symptoms suggestive of COVID-19 (OR: 7.51, 95% CI: 2.11-26.7;  $p=0.002$ ) and those with previous COVID-19 vaccination (OR: 3.35, 95% CI: 1.58-7.20;  $p=0.002$ ), had significantly higher odds of willingness to test for COVID-19.

**Table 4: Association between sociodemographic characteristics and willingness to test**

Variable	Yes Freq. (%)	No Freq. (%)	Chi-square	P-Value
Age group				
Less than 45 years	124(71.68)	49(28.32)	1.14	0.29
45 years and above	48(78.69)	13(21.31)		
Gender				
Male	78(72.22)	30(27.78)	0.17	0.68
Female	94(74.60)	32(25.40)		
Marital Status				
Single/not in a union	50(84.75)	9(15.25)	5.12	0.024
Married/in a union	122(69.71)	53(30.29)		
Educational Status				
Primary/Secondary/Diploma	34(65.38)	18(34.62)	2.26	0.13
Degree/Postgraduate	138(75.82)	44(24.18)		
Job Cadre				
Doctor/Nurse/Pharmacist	110 (73.83)	39(26.17)	0.022	0.88
Others	62(72.94)	23(27.06)		

**Table 5. Association between occupational characteristics and willingness to test**

Variable	Yes Freq. (%)	No Freq. (%)	Chi-square	P-Value
<b>Perception of Elevated risk of acquiring COVID-19</b>				
Yes	122(76.7)	37(23.3)	2.65	0.10
No/Don't know	50(66.7)	25(33.3)		
<b>Any Co-morbid condition</b>				
Yes	26(83.9)	5(16.1)	1.97	0.16
No	146(71.9)	57(28.1)		
<b>Taking Any Prophylaxis for COVID-19</b>				
Yes	8 (72.7)	3(27.3)	0.0036	0.95
No	164(73.5)	59(26.5)		
<b>Involvement in caring for COVID-19 patients</b>				
Yes	65 (80.3)	16(19.8)	2.89	0.089
No	107(69.9)	46(30.1)		
<b>Contact with COVID19 patient not wearing facemask</b>				
Yes	39(73.6)	14(26.4)	0.001	0.998
No	133 (73.5)	48(26.5)		
<b>Ever had a Previous COVID-19 PCR test</b>				
Yes	53(76.8)	16(23.2)	0.55	0.46
No	119(72.12)	46(27.88)		
<b>Previously diagnosed COVID-19 Positive</b>				
Yes	15(78.9)	4(21.1)	0.31	0.57
No	157 (73.0)	58(27.0)		
<b>Currently showing symptoms suggestive of COVID-19</b>				
Yes	44 (93.6)	3(6.4)	12.22	<0.001
No	128 (68.5)	59(31.6)		
<b>Previous COVID-19 vaccination</b>				
Yes	135(77.4)	40(22.9)	4.72	0.03
No	37(62.7)	22(37.3)		

**Table 6: Logistic Regression analysis of the predictors of willingness to test for COVID-19**

Variable	Odds ratio	95% CI	P-value
<b>Marital status</b>			
Single/not in a union (Ref)	1		
Married/in a union	0.32	0.13 - 0.76	0.011*
<b>Perception of Elevated risk</b>			
No/Don't know (Ref)	1		
Yes	1.47	0.72 - 3.00	0.295
<b>Involvement in caring for COVID-19 patients</b>			
No (Ref)	1		
Yes	1.10	0.51 - 2.36	0.82
<b>Currently showing symptoms suggestive of COVID19</b>			
No (Ref)	1		
Yes	7.51	2.11 - 26.7	0.002
<b>Previous COVID-19 vaccination</b>			
No (Ref)	1		
Yes	3.35	1.58 - 7.20	0.002
<b>Educational Status</b>			
Primary/Secondary/Diploma (Ref)	1		
Degree/Postgraduate	1.1	0.50-2.34	0.834
<b>Any Co-morbid condition</b>			
No (Ref)	1		
Yes	2.06	0.70-6.00	0.187

## DISCUSSION

The study revealed that most health workers were willing to have a COVID-19 PCR test conducted on them. This finding agrees with results from other studies indicating that health workers have higher rates of voluntary COVID-19 testing compared to the general population.<sup>18-20</sup> Health workers occupy critical roles in the management of any given illness and this often places them at increased risk of infection.<sup>19</sup> They are also expected to demonstrate greater knowledge of disease causes and transmission which may translate to a perceived higher infection risk and better infection prevention practices.

Slightly more than half of the respondents were females and this aligns with findings from similar studies where female participants had more representation and also had higher odds of receiving a SARS-CoV-2 test.<sup>10, 15,18,20</sup> Only a small proportion reported co-morbidity, this may be due to the fact that majority of the participants were young people. Hypertension and diabetes which are more common with advancing age are important risk factors for COVID-19

morbidity and mortality. Studies have also indicated that conditions such as hypertension, asthma, and diabetes may increase susceptibility to SARS-CoV-2 infection.<sup>19,21,22</sup>

Interestingly, most health workers in this study had not been directly exposed to COVID-19 patients or involved in their care, which contrasts with other research that showed a higher exposure rate.<sup>23</sup> This difference might be attributed to the study being conducted during the later stages of the pandemic when the risk of exposure had significantly reduced. For instance, at the time of the study, only two COVID-19 cases were admitted, while a few others were managed on an outpatient basis. Furthermore, infection prevention and control practices such as use of facemasks, routine handwashing and social distancing had been well established in the facility by this time and this may have contributed to this observation.

Almost all of the health workers were not on any presumptive prophylaxis and a large number had never had a COVID-19 PCR test done, although most had been previously



vaccinated for COVID-19. Voluntary testing has often not been effective as a means of getting people tested for a disease, even among health workers.<sup>23–25</sup> In this study, personal reasons and sampling discomfort were the major barriers to having a COVID-19 PCR test. One major personal reason as noted in two separate studies, was that health workers were worried about the consequences should they test positive,<sup>18,24</sup> as well as fears of the nasopharyngeal swab test.<sup>18,19</sup>

The high vaccination status among respondents in this study differs from that seen in the study by Iliyasu et al. which reported that more than half of health workers were unvaccinated.<sup>7</sup> During the early stages of the pandemic, perceptions about the COVID-19 vaccine were mixed, with more experienced health workers generally more willing to take the vaccine, while less experienced health workers were hesitant.<sup>7,12</sup> However, over time, these perceptions changed, and more health workers displayed a greater willingness to get vaccinated.<sup>12</sup> This shift in perception may have contributed to the high vaccination rate observed in this study.

Among the sociodemographic variables, only marital status was significantly associated with willingness to be tested. A study by Vandrevalla et al. in the United Kingdom showed that perceptions about the overall impact of the disease on participants, and their immediate family, strongly influenced willingness to test.<sup>26</sup> Marital status was however not included as a sociodemographic characteristic in this particular study. In another study, gender was significantly associated with SARS-CoV-2 testing however, this finding was not evident in our study.<sup>20</sup>

The study found a significant association between willingness to test for COVID-19 and two factors: "currently showing symptoms" and "previous COVID-19 vaccination." This aligns with a study conducted among the general population in the UK demonstrating that perceptions and ideas about vulnerability played a crucial role

in predicting willingness to get tested.<sup>26</sup> In our study, key predictors of willingness to test were closely related to individual perceptions of risk. Variables such as "currently showing symptoms," "previous COVID-19 vaccination," "perception of elevated risk," and "involvement in the care of COVID-19 patients" can be used as indicators of an individual's level of vulnerability and risk. These findings suggest that individual perceptions and awareness of potential risks strongly influenced their willingness to undergo COVID-19 PCR testing.

### **Study Limitations**

This was a cross-sectional study; hence, causality cannot be determined. Also, the study's modest sample size may have limited the statistical power to detect smaller or more subtle effects. Finally, the use of self-administered questionnaires especially on a health-related subject may have introduced a social desirability bias particularly among health workers. However, the researchers took steps to minimize this bias by implementing a strict and rigorous data preparation process before and after data collection. These precautions likely helped mitigate the potential impact of the bias on the study's results.

### **CONCLUSION**

The study findings indicated that a majority of health workers were willing to undergo COVID-19 PCR testing. The identified predictors of voluntary testing include being married, symptoms suggestive of COVID-19 or prior COVID-19 vaccination. The main barriers to taking the test were personal reasons and sampling discomfort. We propose other sample collection methods such as pooled saliva-based testing by PCR, which has shown remarkable promise and acceptance in the general population as an alternative. In addition, establishing on-site testing centers close to healthcare workers can make testing more accessible and convenient. These measures could potentially lead to higher testing rates and better disease surveillance among healthcare staff.



**Funding:** This research received no funding.

**Conflict of Interest:** The authors declared no conflict of interest.

**Authors' contributions:** **TOO:** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Original draft and visualisation,; **OF:** Methodology, Formal analysis, Investigation, Data curation, Original draft and visualization; **OJO:** Conceptualization, Methodology, Investigation, Data curation, Original draft; **BOA:** Formal analysis, Investigation, Data curation, Original draft; **TAA:** Conceptualization, Investigation, Original draft; **OSS:** Methodology, Investigation, Original draft; **OAJ:** Methodology, Investigation, Original draft; **TSO:** Investigation, Original draft; **WFS:** Methodology, Investigation, Original draft; **SBA:** Methodology, Investigation, Original draft, Supervision; **RAB:** Conceptualization, Investigation, Data curation, Original draft, Supervision, Project administration.

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