



Hesitancy of Covid-19 Vaccination among Health Workers (other than Doctors) in a Tertiary Hospital in South-South, Nigeria

P. C. Oriji¹, D. O. Allagoa^{1*}, T. J. Wagio¹, L. Obagah¹,
E. S. Tekenah¹ and S. E. Ozori¹

¹Department of Obstetrics and Gynaecology, Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. Author PCO conceptualized and designed the study, managed literature searches, collated data and wrote the first draft of the manuscript. Author DOA wrote the protocol of the study. Author TJW wrote the discussion and participated in literature searches. Author LO wrote the results. Author EST participated in writing the results, discussion and literature searches. Author SEO supervised data collection. All authors read and approved the final manuscript.

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ABSTRACT

Background: Coronavirus Disease 2019 (COVID-19) is a disease of the respiratory system that is caused by the Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-CoV-2). It was declared a pandemic by the World Health Organisation on the 11th of March, 2020.

Objective: To assess the reasons behind the low turnout of health workers (other than doctors) for COVID-19 vaccination in the Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria.

Materials and Methods: This study was carried out at the Federal Medical Centre, Yenagoa between 1st and 23rd April, 2021. It was a descriptive cross-sectional study. The study population consisted of 182 health workers (excluding doctors) from all departments/units in the hospital. The

*Corresponding author: E-mail: dennisallagoa@yahoo.com;

data were collected with a predesigned questionnaire, and were analysed using IBM SPSS 23.0 version.

Results: About three-quarter were females (74.7%), and close to half were aged ≤ 35 years (47.8%). The respondents were Nurses, Pharmacists, Medical laboratory scientists, and Non-clinical officers. Only 27.4% took the vaccine. Most of those who refused the vaccine did so because they wanted to see what would happen to those who received the vaccine (70.5%). Others felt the vaccine has not gone through enough clinical trials (62.1%).

Conclusion: In this study, there was very poor turnout of health workers for COVID-19 vaccination. The factors that influenced acceptance of the vaccine were mainly COVID-19 related features. These findings suggest that people who have had personal experiences with the disease have a better understanding of the gravity of the situation, and hence are more likely to accept vaccination against the disease.

Keywords: COVID-19; SARS-CoV-2; pandemic; health workers; COVID-19 vaccination; Yenagoa.

1. INTRODUCTION

COVID-19 is a disease of the respiratory system that is caused by the Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-CoV-2). It was declared a pandemic by the World Health Organisation on the 11th of March, 2020 [1]. The COVID-19 is the fifth reported pandemic in history since the 1918 Spanish flu, which is also known as the 1918 influenza pandemic [2]. It was caused by the H1N1 Influenza A virus. It was between February 1918 and April 1920. In four successive waves, about 500 million people (about 33% of the world's population at that time) were affected [3].

There was a second wave of COVID-19 worldwide, despite all the efforts and preventive measures put in by the affected Nations of the world [4,5]. The third wave is presently ongoing in France, Spain and Germany. The strain of the COVID-19 in India appears to be more virulent as it has been associated with more morbidity and mortality. To prevent a similar death toll of the 1918 flu, the world population will have to be vaccinated against COVID-19. The prevalence of COVID-19 in Nigeria is 12.2%, [6] with a recovery rate of 82%, and a case fatality rate of 1.2%. [7] Worldwide, vaccines are being produced for the prevention and control of COVID-19.

Herd immunity will be developed if most of the world's population accept and get vaccinated with the COVID-19 vaccine. Herd immunity against a particular disease is the immunity that a large population of people achieve from a previous infection by the offending organism or vaccination against the offending organism. The level of vaccination needed to achieve herd immunity against COVID-19 is estimated to be 69.6 – 90% [8,9,10].

Despite having a number of COVID-19 vaccines available and approved for public use, the uptake appears to be low. Some of the reasons for this low uptake may include: level of trust in the healthcare system, educational background, presence of conspiracy theories, social, traditional and religious beliefs, social media, fear of untoward side effects, personal risk perception, etc. [4,5] Vaccine hesitancy is widely recognised, as it was included in the list of top ten threats to global health in 2019 by the World Health Organisation [11].

Some vaccines are presently available, and approved for public use. These vaccines include Oxford/AstraZeneca viral vector vaccine, Pfizer/BioNTech mRNA vaccine, Moderna RNA vaccine, Janssen/Johnson and Johnson viral vector vaccine, Sinopharm inactivated viral vaccine, Sinovac inactivated viral vaccine, Gamaleya viral vector vaccine, Bharat Biotech Inactivated viral vaccine (Covaxin) and Novavax Protein subunit vaccine [12].

To fight COVID-19, affordable vaccines will have to be developed; the world will have to be vaccinated; and to be vaccinated against COVID-19, global distribution of vaccines should be even. According to the World Health Organisation, “no one is safe until everyone is safe”. For this reason, COVAX was launched in 2020.

Previously known as COVID-19 Vaccines Global Access Facility, COVAX is a worldwide initiative with the main objective to develop, manufacture and distribute COVID-19 vaccines fairly and evenly around the world. COVAX is coordinated by the World Health Organisation in collaboration with the Vaccine Alliance (Gavi) and the Coalition for Epidemic Preparedness Innovations (CEPI)

[13]. COVAX is a part of Access to COVID-19 Tools (ACT) Accelerator. In April 2020, ACT Accelerator was launched in partnership with the European Commission and France to fight the COVID-19 pandemic [13].

Apart from enhancing the production and worldwide distribution of the COVID-19 vaccines, COVAX funds the access to the COVID-19 vaccines for under-developed countries, thereby bridging the gap between the developed and under-developed Nations of the world. The plan of COVAX is to provide two billion doses of various vaccines to 190 countries in the year 2021, ensuring vaccination of up to 20 percent of the world's population.[13] The most important objective of COVAX is to send vaccines to 92 less-wealthy countries free-of-charge [13]. Nigeria is one of these less-wealthy countries.

As of April 2021, WHO reported that 102 countries in six continents have received almost 38.4 million doses of COVID-19 vaccines through the COVAX facility.[13] Ghana was the first country in Africa to receive the Oxford/AstraZeneca COVID-19 vaccine through COVAX in February, 2021. Nigeria received 3,924,000 doses of the Oxford/AstraZeneca COVID-19 vaccine through COVAX on March 2, 2021. Vaccination commenced at the Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria on March 15, 2021. However, the turnout of hospital staff was low, necessitating extension of vaccination by three weeks. Therefore, this survey was undertaken to access the reasons behind the low turnout of health workers for COVID-19 vaccination, with a belief that the reasons can be extrapolated to what was likely in similar demography.

2. MATERIALS AND METHODS

This survey was carried out among health workers in all the departments and units of the Federal Medical Centre, Yenagoa, Bayelsa State, South-South, Nigeria between 1st and 23rd April, 2021. It was a descriptive cross-sectional study.

The participants were counselled and enrolled in the study after giving a written informed consent. An explanation of the nature of the study and the likely benefits preceded the administration of written consent. Their phone numbers and email addresses were also obtained to enhance further communication. All health workers were included in the study. Health workers that declined

consent/incompletely filled the consent form and doctors were excluded from this study. A separate survey was carried out among doctors.

The sample size for this study was calculated using the formula:

$$n = Z^2pq/d^2 \text{ [14]}$$

Where

n = minimum sample size

z = normal standard deviation set at 95% confidence limit = 1.96

p = prevalence of COVID-19 in a previous study.

q = 1 – p (complementary probability).

d = margin of error = 5% = 0.05

Prevalence of COVID-19 in a previous study is 12.2%

Therefore

$$p = 0.122$$

$$q = 1 - 0.122 = 0.878$$

$$n = (1.96)^2 \times 0.122 \times 0.878 / (0.05)^2$$

$$n = 3.8416 \times 0.122 \times 0.878 / 0.0025$$

$$n = 164.5$$

$$n \sim 165$$

Adding a non-response of 10% = 182

Therefore, 182 health workers were recruited for this study.

2.1 Data Analysis

The information in the filled questionnaire were entered into the IBM SPSS 23.0 version, which was also used for data analysis. Categorical variables are expressed in frequencies and percentages while continuous variables are summarised in mean and standard deviation. Results are presented in figures and tables as appropriate.

3. RESULTS

3.1 Sociodemographic Characteristics of Health Workers

From Table 1, it was revealed that out of the 182 respondents, about three-quarter were females (74.7%), and close to half were aged ≤ 35 years (47.8%). Most of the respondents were married (62.1%), had tertiary education (75.8%) and were all Christians (100.0%). Nurses, pharmacists, medical laboratory scientists, and non-clinical officers that took part in the study were 44.5%,

14.8%, 16.5% and 24.2% of the respondents, respectively (Table 1). The non-clinical officers include the administrative officers, medical record officers, desk officers, information officers and orderlies.

3.2 Chronic Illnesses and COVID-19 Related Features among Health Workers

Hypertension in 12 respondents (6.6%) was the most common chronic illness among the health workers (Table 2). Few of the respondents had diabetes mellitus (2.7%) and bronchial Asthma (2.2%).

History of loss of taste and smell was present in 29.7% of respondents, while close to a tenth of respondents (8.2%) had lost someone to the COVID-19 pandemic, only 3.8% had tested positive to the COVID-19 (Table 2).

3.3 Acceptance of COVID-19 Vaccination and Number of Doses Preferred by Health Workers

Only 50 health workers – less than a third of them (27.4%) accepted the COVID-19 vaccination (Fig. 1). Most of those who received the vaccine indicated their preference for a 'one-dose' vaccine (78.0%).

Table 1. Sociodemographic Characteristics of Health Workers

Characteristics	Frequency N =182	Percent (%)
Sex		
Male	46	25.3
Female	136	74.7
Age group		
≤ 35years	87	47.8
36 – 45years	72	39.6
>45years	23	12.6
Marital status		
Single	63	34.6
Married	113	62.1
Separated/Divorced/Widowed	6	3.2
Level of Education		
Secondary	10	5.5
Tertiary	138	75.8
Post tertiary	34	18.7
Religion		
Christian	182	100.0
Occupation		
Nurses	81	44.5
Pharmacists	27	14.8
Medical Laboratory Scientist	30	16.5
Non-clinical officers*	44	24.2

*Include administrative officers, medical record officers, desk officers, information officers and orderlies

Table 2. Chronic illnesses and COVID-19 related features among health workers

Characteristics	Frequency N = 182	Percent (%)
Chronic Illnesses		
Hypertension	12	6.6
Diabetes mellitus	5	2.7
Bronchial Asthma	4	2.2
COVID-19 related features		
Respondents have tested positive for COVID-19	7	3.8
Possibly infected with COVID 19 without testing	39	21.4
History of Loss of taste and smell	54	29.7
History of contact with someone diagnosed of COVID 19	44	24.2
Has lost someone due to COVID-19 infection	15	8.2

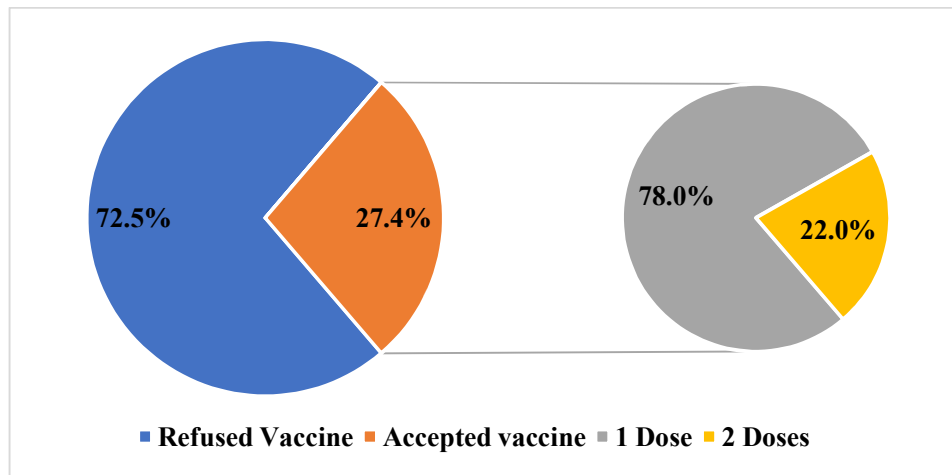


Fig. 1. Acceptance of COVID-19 vaccination and number of doses preferred by health workers

3.4 Reasons for COVID-19 Vaccine Hesitancy among Health Workers

Most health workers who refused the vaccine, did so because they wanted to see what would happen to those who received the vaccine (70.5%). Others felt that the vaccine has not gone through enough clinical trials (62.1%), it would be associated with side effects (60.6%) and it is unsafe (47.7%). Lack of trust in government and manufacturers of the vaccine were other issues of concern that prevented respondents from taking the vaccine (Table 3). Eighteen respondents (13.6%) did not take it because it contains the 'mark of the beast' (Table 3). Furthermore, about a fifth (22.7%) refused the vaccine because they believed that there are other alternative drugs for COVID-19 other than the vaccine (Table 3).

3.5 Perception about Some Drugs Seen as Alternatives to COVID-19 Vaccine among Health Workers

Table 4 revealed the drugs considered by health workers as alternative medications to the vaccine. Hydroxychloroquine (66.5%), Azithromycin (55.5%) and Ivermectin are the leading drugs seen as being effective against COVID-19 infection (Table 4). About 31 respondents have actually taken hydroxychloroquine and Azithromycin as prophylaxis/treatment for COVID-19 (Table 4).

3.6 Factors Influencing the Acceptance of the COVID-19 Vaccination

It was only the occupation of the respondents that was a significant sociodemographic factor

that determined acceptance of the COVID-19 vaccine. Nurses (OR – 2.64; p-0.041) and medical laboratory scientists (OR – 3.52; p-0.023) had a significantly higher odd of accepting the vaccine when compared with administrative officers (Table 5).

Table 5 further showed that none of the chronic illnesses observed in the study influenced the acceptance or refusal of the vaccine (p>0.05). Contrary to the trend with chronic illnesses, all the COVID-19 related features significantly influenced the acceptance of the vaccine. Respondents who had tested positive to COVID-19 were 7 times more likely to take the vaccine than those that did not test positive (OR – 7.01; p-0.023). History of loss of sense of smell and taste (OR – 6.31; p-0.001), suspected infection (OR – 6.25; p-0.001), contact with a COVID-19 positive person (OR – 4.30; p-0.001) and loss of relative to COVID-19 infection (OR – 4.46; p-0.007) significantly increased the likelihood of taking the vaccine (Table 5).

4. DISCUSSION

Vaccination has always been the most effective method of prevention of disease. However, hesitancy to vaccination can markedly undermine it [15]. The effectiveness of vaccination in prevention of COVID-19 significantly depends on the level of uptake in the population. A significantly high level of vaccination protects those that received the vaccine, and subsequently leads to herd immunity [16].

Three-quarter (74.7%) of the respondents in this study were females. This does not necessarily mean that more females gave consent for the

Table 3. Reasons for COVID-19 vaccine hesitancy among health workers

Reasons for vaccine hesitancy*	Frequency N = 132	Percent (%)
I want to observe what happens to those who have received it for now.	93	70.5
The vaccine has not gone through enough clinical trials.	82	62.1
The vaccines will have side effects.	80	60.6
The vaccine can make one sick.	63	47.7
The vaccine is unsafe.	56	42.4
I do not trust the manufacturers.	54	40.9
I do not trust the government.	53	40.2
There are other alternative treatments, so a vaccine is not needed.	30	22.7
The vaccine is designed to reduce the world population.	27	20.5
The vaccine will not work.	25	18.9
The vaccines we are taking are already too much.	20	15.2
The vaccine is not needed because the infection is harmless.	19	14.4
Vaccine contains 'mark of the beast'	18	13.6
My religion is against vaccination.	16	12.1
I have other medical condition(s) that would not allow me to take it.	13	9.8
I do not have time to take any vaccine.	11	8.3
I was not around when the vaccine came.	9	6.8
Vaccine is designed only for children	8	6.1
I may not be able to pay for the vaccine.	7	5.3
I will take it if I am paid for it.	6	4.5
I am a breastfeeding mother	1	0.8

**More than one option applies*

Table 4. Perception about some drugs seen as alternatives to COVID-19 vaccine among health workers*

Drugs	Perception about Drugs N = 182, Frequency (%)			
	Heard about the effectiveness of the drug against COVID-19	Drug was taken as prophylaxis/treatment for COVID-19	Drug is a safe alternative to COVID-19 vaccine	Drug is preferred to COVID-19 vaccine
Ivermectin	74 (40.7)	11 (6.0)	27 (14.8)	20 (11.0)
Colchicine	31 (17.0)	4 (2.2)	10 (5.5)	6 (3.3)
Septin	70 (38.5)	12 (6.6)	15 (8.2)	13 (7.1)
Hydroxychloroquine	121 (66.5)	31 (17.0)	44 (24.2)	44 (24.2)
Azithromycin	101 (55.5)	31 (17.0)	43 (23.6)	42 (23.1)
Remdesivir	51 (28.0)	4 (2.2)	15 (8.2)	15 (8.2)
Bamlanivimab	27 (14.8)	1 (0.5)	10 (5.5)	10 (5.5)
Lopinavir	31 (17.0)	1 (0.5)	9 (4.9)	9 (4.9)
Ulinastatin	48 (26.4)	1 (0.5)	32 (17.6)	32 (17.6)

**More than one option applies*

Table 5. Factor influencing acceptance of the COVID-19 vaccination

Characteristics (Reference group)	B	OR	95%CI		p-Value
			Min	Max	
Sex (Female)					
Male	-0.09	0.91	0.43	1.94	0.808
Age group (≤35years)					
36 – 45 years	0.01	1.01	0.50	2.03	0.979
>45 years	0.14	1.15	0.42	3.14	0.787
Marital Status (Separated)					
Single	-0.15	0.86	0.15	5.12	0.872
Married	-0.37	0.69	0.12	3.97	0.678
Education (Secondary)					
Tertiary	1.38	3.98	0.49	32.14	0.195
Post-tertiary	1.57	4.78	0.54	42.20	0.159
Occupation (Non-clinical officers)					
Nurses	0.97	2.64	1.04	6.70	0.041*
Pharmacists	0.18	1.20	0.34	4.25	0.776
Medical laboratory Scientist	1.26	3.52	1.19	10.47	0.023*
Hypertension (Absent)					
Present	0.71	2.03	0.43	9.58	0.374
Diabetes (Absent)					
Present	0.56	1.74	0.28	10.74	0.550
Bronchial Asthma (Absent)					
Present	0.16	1.17	0.12	11.53	0.892
Positive for COVID-19 (No)					
Yes	1.95	7.01	1.31	37.39	0.023*
Possible infection (No)					
Yes	1.83	6.25	2.87	13.57	0.001*
Loss smell and taste (No)					
Yes	1.84	6.31	3.10	12.86	0.001*
Contact with COVID positive persons (No)					
Yes	1.50	4.30	2.09	8.86	0.001*
Lost a relative to COVID-19 (No)					
Yes	1.49	4.46	1.50	13.28	0.007*

*Statistically significant

survey; it was rather due to the fact that nurses constitute the largest number of health workers in our facility, of which almost all of them are females.

The results from this study show that only an abysmal 27.4% of the study population (50 out of 182 health workers) accepted the COVID-19 vaccine. This result is in keeping with an earlier study carried out in this facility among patients to assess their willingness to accept a COVID-19 vaccine, and only 24.6% of the studied population indicated willingness to accept the vaccine.[5] This result is however low compared to other studies, both local and international that reported that 54 – 88% of the study population were willing to accept a COVID-19 vaccine.[17,18,19] The main reason for this low turnout is vaccine safety concerns as evidenced by the 70.5% of the health workers who wanted

to wait to see what happens to those who received the vaccine, 62.1% who felt that the vaccine had not gone through enough clinical trials, 60.6% who thought that it would be associated with side effects and 47.7% who thought the vaccine to be unsafe. This is similar to the findings in the study carried out by Thunstrom [20] where 20% of the population of US declined COVID-19 vaccination. Thunstrom reported that trust issues in the safety of the vaccine and its novelty are parts of the most important rate-limiting factors that affect successful vaccination.[20]

Other reasons for the poor acceptance of the vaccine include lack of trust in the government and manufacturers of the vaccine. Some thought that the vaccine contains the ‘mark of the beast’, while others believed that there are other alternative drugs for COVID-19 other than the

vaccines. This is similar to the findings in a previous study carried out in Nigeria, where about one-fifth of the participants were not willing to take the vaccine, which appears to be due to doubts about the safety of the COVID-19 vaccine.[19] It was reported that majority of the study participants were not sure if the vaccine contained the 'mark of the beast' or if the motive is 'to reduce the world population'. [19] These findings clearly show the effect of lack of proper scientific knowledge, the spread and acceptance of conspiracy theories about the COVID-19 vaccine on successful vaccination and achievement of herd immunity against the virus.

Our study also revealed that about 78% of those who accepted the vaccine would prefer a single dose rather than a 2-dose vaccine which is presently available. About a fifth of the studied population preferred other alternatives, chiefly oral medications which include Hydroxychloroquine (66.5%), Azithromycin (55.5%) and Ivermectin as alternatives to COVID-19 vaccine, with 17% confirmed to have taken either Hydroxychloroquine and/or Azithromycin as treatment/prophylaxis for COVID-19. This finding is supported by an earlier study carried out by Olomofe and colleagues [19] which reported that there was aversion to a two-dose vaccine among those that were willing to receive the vaccine. Most of them preferred the oral route to the injectables and other routes of administration such as the intranasal route. In a previous study carried out by Allagoa and colleagues, [4] half of the studied population preferred the vaccine as injectable. These important findings should be taken into consideration since the formulation and production of these vaccines are still being worked on. A more acceptable formulation may increase the rate of uptake which will in turn improve the chances of achieving herd immunity.

The factors that influenced acceptance of the vaccine as observed in this study were mostly COVID-19 related features. Respondents who had tested positive to COVID-19 were 7 times more likely to take the vaccine than those that did not test positive. Other statistically significant factors include a history of loss of sense of smell and taste, suspected infection, contact with a COVID-19 positive person and loss of relative to COVID-19 infection. A similar finding was reported by Allagoa and colleagues in an earlier study. [4] These findings suggest that people who have had personal experiences with the disease have a better understanding of the gravity of the

situation and hence are more likely to accept vaccination against the disease.

The presence of chronic illnesses and advancing age did not statistically affect the acceptance of COVID-19 vaccine as one would expect, knowing that these are risk factors for severe morbidity and mortality from COVID-19 infection. However, these findings are contrary to the reports from previous studies carried out in this Centre [4] and in the US [21] which reported that individuals aged 65 years and above and those with pre-existing medical conditions are more likely to accept the vaccine. This may be attributed to good knowledge of the disease due to wide media coverage of the risk factors for a severe disease. It has been shown that good knowledge, attitudes and practices are key in the control of COVID-19. [22] The US study reported that the likelihood of vaccine acceptance was low among communities with the highest incidence, morbidity and mortality from the disease. [21] This may be due to distrust in medicine, science, public health and a lot of conflicting information in these environs.

Another factor that was statistically significant was the occupation which revealed that nurses and medical laboratory scientists were more inclined to accepting the vaccine when compared with the administrative staff. This may be attributed to the fact that these professionals have direct contact with these patients and their samples, and therefore have firsthand knowledge of the disease process. Their training also gives them reasonable insight into communicable diseases and the effectiveness and safety of vaccines. Sex had no influence on the rate of vaccine acceptance. This finding corresponds with two other previous studies, [19,21] but contrary to a previous study carried out among patients in this facility where males were two times more willing to accept the vaccine than females [4].

5. CONCLUSION

This study carried out in South-South, Nigeria, revealed a very poor turnout of health workers for COVID-19 vaccination, as only 27.4% received the vaccine. The factors that influenced acceptance of the vaccine in this study were mainly COVID-19 related features, as it revealed that those who had tested positive to COVID-19 were 7 times more likely to take the vaccine than those that did not test positive. History of loss of sense of smell and taste, history of suspected infection, contact with a COVID-19 positive

person and loss of relative to COVID-19 influenced the uptake of the COVID-19 vaccine positively. Health education and promotion need to be carried out in the media, schools, communities, market places, Churches, Mosques and other places of worship and gathering, as this will help change the misconceptions about the COVID-19 vaccine, as misinformation, especially conflicting information played a major role in the uptake of the vaccine even amongst health workers. If misconceptions change and the uptake of the vaccine significantly improves, then the possibility of herd immunity and subsequently, disease control and prevention will be achieved.

6. LIMITATION

The results obtained from this hospital-based study may not reflect what is obtainable in other tertiary health institutions in our sub-region and around the world.

CONSENT

Written informed consent was obtained from every health worker that participated in this study.

ETHICAL APPROVAL

The research work was examined and approved by the hospital research and ethics committee.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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