



Original Article

## Assessments of Covid-19 Vaccine Awareness, Determinants of its Acceptance and Adverse Events following Immunization among Civil Servants in Lafia Nigeria

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**Background:** The COVID-19 pandemic continues to cause devastating economic and human losses. Widespread vaccination with COVID-19 vaccine remains the cornerstone of mitigating the effects of the pandemic. A prospective cross-sectional study determined the level of awareness and determinants of acceptance of COVID-19 vaccination among civil servants in Lafia Nigeria.

**Methods:** We consecutively recruited civil servants from January to July 2021. We used a structured questionnaire to collect data on knowledge and awareness of COVID-19 vaccine, adverse events and factors determining COVID-19 vaccine acceptance. Analysis was done to determine independent predictors of accepting COVID-19 vaccination. Significant p-value was < 0.05.

**Results:** Females were 120 (46.2%). A total of 253 (97.3%) were aware of COVID-19 vaccine availability in the state and 159 (61.2%) reported receipt of their first dose. Reasons for rejection of COVID-19 vaccine include lack of interest (31.7%), vaccine uncertainty (18.8%) and 12 (11.9%) reported adverse events following immunization AEFI. Majority (83.8%) of respondents believed COVID-19 is real. Determinants for accepting Covid-19 vaccine include knowing someone who was vaccinated, previous COVID-19 infection and being healthcare worker (p=0.006). Most (71.7%) of the respondents reported an AEFI with most (71.0%) being minor and resolved in few hours.

**Conclusions:** There is high awareness and acceptance of COVID-19 vaccine in this study. Determinants of receiving COVID-19 vaccine were knowing someone who was vaccinated, previous positive test to COVID-19 and being a healthcare worker. The common reasons for rejecting COVID-19 vaccine were lack of interest, uncertainty of outcome and reported adverse events. Our findings are potentially helpful for sensitization campaigns against COVID-19 vaccine hesitancy.

**Key words:** Acceptance, Adverse Events, Awareness, COVID-19, Vaccination

## INTRODUCTION

The Covid-19 disease caused by the novel SARS-CoV-2 virus was declared a pandemic on March 11 2020.<sup>1</sup> Its spectrum range from asymptomatic to severe and potentially fatal acute respiratory syndrome.<sup>2,3</sup> The disease has emerged to become a global health concern with devastating economic and human losses.<sup>4,5,6</sup> Measures put in place in curtailing its spread includes but not limited to hand hygiene with soap and water or alcohol based hand sanitizers, appropriate use of personal protective equipment (PPE) such as face masks, practicing social distancing and avoiding large gatherings.<sup>7</sup> The disease main presentation includes; fever, dry cough, body aches, dyspnea and loss of smell.<sup>8</sup>

Even though the Covid-19 vaccine has been adjudged by the global health community as the most effective tool to controlling the pandemic and restoring normalcy, the swiftness and valid urgency to deploying the vaccine has generated lots of controversies regarding its safety, efficacy and justification thereby fueling widespread vaccine hesitancy.<sup>9,10</sup> The vaccine availability is reassuring especially to the frontline health workers, as this has a great potential of averting the associated health consequences.<sup>11</sup>

So far, the Centre for Disease Control and Prevention recommend four Covid -19 vaccines namely; Pfizer-BioNTech, Moderna, Oxford-Astra Zeneca and Johnson & Johnson/Janssen. With the exception of the Johnson & Johnson's Janssen, all require two doses.<sup>12</sup> The Oxford-Astra Zeneca vectored vaccine which is more suitable to the climatic condition prevailing in sub-Saharan Africa was the first to be procured and made available by the Nigerian Government.<sup>13</sup>

One of the most important drivers of vaccine hesitancy is Adverse Events Following Immunization (AEFI); an untoward medical occurrence following immunization but which does not necessarily have causal relationship with the vaccine usage. It could be the more common minor AEFI such as fever, pain, malaise or the rare but life-threatening ones that may result in hospitalization, deformity or even death.<sup>14</sup> It is therefore germane to have a study aiming to address the impact of AEFI on Covid-19 vaccine hesitancy.

There are few studies on Covid-19 vaccination awareness and determinants of its acceptance in North Central Nigeria. Health care workers were initially prioritized and are more likely to be compelled to get vaccinated for a number of reasons; workplace requirement, fear of risk of getting infected, more likely to encounter and believe in the existence of Covid and the efficacy of the vaccines etc. Civil servants in the health sector include the healthcare workers and others like those in administration, account, audit, tailoring, laundry, transport and the security units etc. These other staff are often neglected in studies.

To enable effective implementation of vaccine, roll out, it is important to have an insight into the level of awareness of Covid-19 vaccine availability, level of acceptance of the vaccine and its determinants as well as the prevalence of AEFIs. A prospective cross-sectional study was done among civil servants working at some health sectors in Lafia Nasarawa State to determine the level of awareness of the availability, level of acceptance and the determinants of acceptability of Covid-19 vaccine as well as the impact of AEFIs on the above.

## MATERIALS AND METHODS

### *Study Design*

A prospective analytical cross-sectional study of civil servants in Lafia Nasarawa State from 1<sup>st</sup> January 2021 to the 31<sup>st</sup> July 2021

### *Study Site*

The study was conducted in Lafia, the capital of Nasarawa State located in the North-Central zone of Nigeria. Nasarawa State has boundaries with the Federal Capital Territory (FCT) Abuja in the West, Kaduna State in the North, Plateau and Taraba States in the East, and then Benue and Kogi States in the South. The state is made up of thirteen Local Government Areas (LGA) and Development Areas (DA) with a total landmass of 27,117km<sup>2</sup> (10,470 sq m) and a population of 1,869,377.

### *Study Population*

The study was conducted among civil servants of the Nasarawa State Ministry of Health, Nasarawa State Primary Health Care Development Agency, Comprehensive Primary Health Care Kwandare and the Dalhatu Araf Specialist Hospital all in Lafia Nasarawa State. These consisted of clinical healthcare workers (Doctors, Nurses, Pharmacist, Laboratory Scientists and Medical Record staff etc), and other staff working within the health sectors (non-clinical healthcare workers) such as the administrative staff, Drivers, Health Attendants, Compound Laborer's and Security men as well as others (who are probably visiting as patients and patients' relatives) who consented to the study by answering the questionnaire.

### *Sample Size Determination*

Sample size was calculated using

$$N = \frac{Z^2 pq}{e^2}$$

N = sample size calculated.

Z = standard deviate at 95% confidence interval, which is 1.96

P = prevalence from an earlier study,<sup>15</sup> 58.2% i.e 0.58

q = 1 - p

e = degree of precision set at 5% i.e 0.05

The minimum sample size calculated for this study is 37

### *Sampling technique*

A convenience sampling technique was used.

### Procedure for Recruitment

An interviewer administered questionnaire was used to determine the awareness on availability and prevalence of accepting the vaccine. Adverse Events Following Immunization (AEFI) and determinants of covid-19 vaccine acceptance were also determined. The questionnaire was administered by two trained research assistants after a pilot study to test the understanding of the questionnaire.

### Ethical Considerations

Ethical approval was sought and obtained from the State Research Ethics Committee. Approval was also sought from the leadership of the respective ministry, agency and the Hospital. The participants were recruited once the study was explained to them and they consented. A detailed explanation on the study was provided and a written informed consent taken. The study was voluntary without threat or coercion. Privacy and confidentiality were ensured through use of de-identifiers and codes to ensure no one (except the principal investigator) can identify the participants' information. This was further stored in a pass-warded computer for the use of the researchers only.

### Data Analyses

We used Statistical Package for Social Sciences (SPSS) version 20 for data analyses. Categorical variables were presented using frequencies and percentages, while continuous variables were presented as mean and standard deviation, bivariate analyses were done to determine independent predictors of accepting covid-19 vaccination. We considered  $p < 0.05$  as significant.

## RESULTS

### Socio-demographic Characteristics of the Study Population

Of the 260 participants in this study, a total of 140 (53.8%) were males. The mean  $\pm$  SD of participants were  $35.56 \pm 9.27$  years. Majority of the participants 163 (62.7%) were married and 114 (43.8%) were aged 36 – 50 years with 227 (87.3%) residing in the urban area (Table1).

### Distribution of Participants on Awareness of Covid – 19 Vaccines

We documented 253 (97.3%) participants that are aware of Covid-19 vaccine availability. Of the available vaccines, Astra-Zeneca vaccine was the most known by 144 (55.5%) while Pfizer with 22 (8.5%) respondents was the least known. On the prevalence of Covid-19 vaccination, 159 (61.2%) had been vaccinated with the first dose of either the Astra-Zeneca or Moderna vaccines (the two available as at the time of the study). Of those who had not been vaccinated, lack of interest was found among 32 (31.7%), uncertainty about the vaccine for 19 (18.8%) and AEFIs reported by those who had received the vaccines was the reason for 12 (11.9%) of the respondents. Of those who have had the first dose of the vaccines, 119 (74.8%) showed their readiness to receive the second dose and completing the vaccination while 40 (25.2%) said they won't receive the second dose based on their experience from the first dose (see Table 2).

**Table 1: Socio-demographic characteristics of the study population**

Socio-demographic variables	Frequency n (%)
Age (years)	
18 – 25	41 (15.8)
26 – 35	88 (33.8)
36 – 50	114 (43.8)
51 – 60	17 (6.6)
Gender	
Male	140 (53.8)
Female	120 (46.2)
Marital status	
Single	90 (34.6)
Married	163 (62.7)
Divorced	1 (0.4)
Separated	2 (0.8)
Widowed	4 (1.5)
Religion	
Christianity	147 (56.5)
Islam	111 (42.7)
Others	2 (0.8)
Educational level	
None	4 (1.5)
Primary	9 (3.5)
Secondary	24 (9.2)
Tertiary	223 (85.8)
Place of residence	
Urban	227 (87.3)
Rural	33 (12.7)
Occupation	
Healthcare workers	211 (81.2)
Non-healthcare workers	49 (18.8)
Occupation type for the healthcare workers (211)	
Clinical	94 (44.5)
Non-clinical	117 (55.5)
<b>Mean <math>\pm</math> SD = 35.56 <math>\pm</math> 9.27</b>	

**Table 2: Distribution of participants on awareness of Covid – 19 vaccine**

Variables	Frequency n (%)
Awareness of Covid – 19 vaccine availability?	
Yes	253 (97.3)
No	7 (2.7)
Which of these vaccines are you aware of?	
Moderna	70 (26.9)
Astra-Zeneca	144 (55.4)
Pfizer	22 (8.5)
Johnson and Johnson	24 (9.2)
Have you been vaccinated against Covid-19?	
Yes	159 (61.2)
No	101 (38.8)
Reasons for non – vaccination? (101)	
Pregnancy	5 (5.0)
Ill Health	8 (7.9)
Not interested	32 (31.7)
No access	6 (5.9)
Do not believe in the vaccine	9 (8.9)
Absent during the first dose	6 (5.9)
Side effects from those that have received it	12 (11.9)
Uncertainty about the vaccine	19 (18.8)
Use of other medications as prevention	4 (4.0)
Would you receive the second dose? (159)	
Yes	119 (74.8)
No	40 (25.2)

*Knowledge and Personal Experience of Participants on Covid – 19*

Regarding participants experience with Covid-19 133 (51.2%) had a test done with 25 (18.8%) testing positive to the virus, and 47 (35.3%) had the test done more than once. Regarding death from Covid-19, 98 (37.7%) know at-least a person who died from Covid – 19. Those who died, were either; community leaders, colleagues, family members or neighbours. Of those that died whose occupation was known, medical doctors topped the list with 17 (17.3%) followed by 3 (3.1%) among nurses (Table 3).

**Table 3: Knowledge and personal experience of participants on Covid – 19**

Variables	Frequency n (%)
Have you had Covid – 19 test done on you before?	
Yes	133 (51.2)
No	127 (48.8)
Number (s) of Covid – 19 test you have had before (133)	
Once	86 (64.7)
More than once	47 (35.3)
Have you tested positive to Covid – 19 test before? (133)	
Yes	25 (18.8)
No	108 (81.2)
Do you know anyone who had died of Covid – 19 before?	
Yes	98 (37.7)
No	162 (62.3)
Relationship with the person that died of Covid -19 (98)	
Family	15 (15.3)
Friend	8 (8.2)
Class mates	17 (17.3)
Colleagues	16 (16.3)
Neighbor	14 (14.3)
Patients	7 (7.2)
Community leader	21 (21.4)
Occupation of the deceased? (98)	
Doctor	17 (17.3)
Nurse	3 (3.1)
Laboratory scientist	1 (1.0)
Pharmacists	1 (1.0)
Hospital attendants	1 (1.0)
Politician	2 (2.0)
Don't know	70 (71.5)
Civil servants	3 (3.1)

*Perception on Covid – 19 and its Vaccine*

A total number of 218 (83.8%) of the participants in this study believed that Covid – 19 is real; the remaining either think it's a way of siphoning money 10 (23.8%), a scam 7 (16.7%), a means of destabilizing religions 5 (11.9%), an artificial infectious agent 8 (19.0%) and a chemical weapon 8 (19.0%) etc. Most 219 (84.2%) of the responders believed it's a viral infection and that it's predominantly 209 (80.4%) affects the respiratory system. A good number 114 (43.8%) of the participants have concerns about Covid – 19 vaccines, the concerns are mostly on the genuineness of the vaccine and the confusions for and against the vaccines. Majority, 138 (53.1%) of the participants were encouraged seeing someone close to them receiving vaccination and despite the confusion, 178 (68.5%) will still allow their love ones to be vaccinated once the vaccine is made available for all (Table 4).

**Table 4: Perception on Covid – 19 and its vaccine**

Variables	Frequency n (%)
Do you believe Covid – 19 is real?	
Yes	218 (83.8)
No	42 (16.2)
If no, why? (42)	
It is a scam	7 (16.7)
It is a means of siphoning money	10 (23.8)
It is a means of destabilizing religion	5 (11.9)
An artificial infectious agent	8 (19.0)
A chemical weapon	8 (19.0)
Others	4 (9.6)
Covid – 19 is caused by?	
Viral infection	219 (84.2)
Bacterial infection	23 (8.9)
Parasitic infection	10 (3.8)
Fungal infection	8 (3.1)
Covid – 19 affects mainly the	
Respiratory system	209 (80.4)
Dermatologic	13 (5.0)
Cardiovascular	0 (0.0)
Gastro-intestinal	10 (3.8)
Haematological	28 (10.8)
Do you have concerns about the vaccine?	
Yes	114 (43.8)
No	146 (56.2)
What are your concerns? (114)	
The genuineness of the vaccine	36 (31.6)
Possible side effects	23 (20.2)
Confusion on the vaccine	39 (34.2)
Needle prick anxiety	16 (14.0)
Are you encouraged seeing someone close to you vaccinated?	
Yes	138 (53.1)
No	122 (46.9)
Would you allow your family / loved ones to get vaccinated?	
Yes	178 (68.5)
No	82 (31.5)

*Determinants of Covid-19 Vaccination Acceptability*

Determinants of Covid-19 vaccination acceptability in Lafia revealed that persons who had concerns about Covid-19 vaccine were less likely to accept vaccination for Covid-19 with AOR= 0.8, CI = 33.86 – 37.26 and p = **0.006**. In contrast, knowing someone who has been vaccinated was found to be a good predictor of vaccination acceptance with AOR = 1.0, CI = 34.01 – 37.11 and p = **0.009**. Similarly, those who believed Covid-19 is real were two times more likely to accept Covid-19 vaccine than those who did not with AOR = 2.9, CI = 34.33 – 36.79 and p = **0.005**. In addition, persons who had tested positive to Covid-19 were four times more likely to accept Covid-19 vaccine with an AOR = 4.4, CI = 31.93 – 39.19 and p = **0.026**. While healthcare workers were three times more likely to accept Covid-19 vaccine than non-healthcare workers (AOR = 3.2, CI = 34.31 – 36.81, p=**0.006**) Table 5

**Table 5: Determinants of Covid-19 vaccination acceptability**

Determinants of Covid-19 vaccination acceptance	AOR	95% CI	p value
Concerned about the vaccine	0.8	33.86 – 37.26	<b>0.006</b>
Knowing a vaccinated person	1.0	34.01 – 37.11	<b>0.009</b>
Belief that Covid – 19 is real	2.9	34.33 – 36.79	<b>0.005</b>
Previous positive Covid-19 test	4.4	31.93 – 39.19	<b>0.026</b>
Being a healthcare worker	3.2	34.31 – 36.81	<b>0.016</b>

*Adverse Events Following Immunization (AEFI) with Covid-19 Vaccine*

A total of 114 (71.7%) of the study participants had AEFI after Covid-19 vaccine, with 49 (43.0%) having one AEFI and 65 (57.0%) having more than one AEFIs. Regarding resolution of AEFIs, 35 (30.7%) had their AEFIs resolved in less than a day, while 14 (12.3%) had their AEFISs lasting for at least five days. The commonest AEFI was pain at the injection site found among 58 (50.9%) respondents, followed by headache and weakness among 23 (20.1%) and 18 (15.8%) responders respectively. Leg swelling was limited to two (1.8%) participants who reported taking the Astra – Zeneca Covid-19 vaccine (Table 6).

**Table 6: Adverse Events Following Immunization (AEFI) with Covid-19 vaccine**

Variables	Frequency n (%)
Number of persons with AEFIs (159)	
Yes	114 (71.7)
No	45 (28.3)
Numbers of AEFIs (114)	
One	49 (43.0)
Two	34 (29.8)
Three or more	31 (27.2)
Duration before resolution of the AEFIs (114)	
Less than a day	35 (30.7)
1 – 2 days	49 (43.0)
3 – 4 days	16 (14.0)
5 – 6 days	11 (9.7)
≥ 7 days	3 (2.6)
What were the AEFIs?	
Headache	23 (20.1)
Pain at injection site	58 (50.9)
Flu	1 (0.9)
Fever	8 (7.0)
Chills	4 (3.5)
Weakness	18 (15.8)
Leg swelling	2 (1.8)

## DISCUSSION

This study reported awareness, prevalence of acceptance, of occurrence of adverse events and the determinants of accepting Covid-19 vaccination among civil servants in Lafia North-Central Nigeria. It revealed almost all respondents having awareness of the availability of Covid-19 vaccines and almost two-third have had their first dose with low level of AEFIs reported in the State. The mean age of responders reflected the productive population often employed in the formal sector. This is not surprising given that the vaccination was initially targeted at risk population such as the middle age group and the frontline healthcare workers and later to those aged 18 years and above. It is similar to reported mean age in a Malaysian study with similar socio-demographics.<sup>16</sup>

The high level of Covid-19 awareness in this study can be attributed to the study settings - healthcare workers and allied healthcare workers, mostly from the non-clinical departments and at the urban area of the State with good proximity to the Federal Capital Territory. The finding might also reflect the robust risk communication provided by the Nigeria Centre for Disease Control (NCDC), Ministries of Health and Information (MOH & MOI), The National and State Primary Healthcare Development Agencies (NPHDAC), National Orientation Agencies (NOA), Media houses, religious groups and the Non - Governmental Organizations (NGOs) etc. Oxford Astra-Zeneca was not surprising the most known of the Covid-19 vaccine in this study, because it was the first of the two vaccines (with Moderna) brought into the country by the Nigerian Government.

Ladiwala *et al*<sup>17</sup> (2021) reported similar findings from an online survey conducted in Pakistan. Our finding might have been influenced by the fact that given the study settings, half of the responders have had reasons to be tested for the disease (Covid-19) with one out of every six tested found to be positive. Furthermore, at least a third of the responders know someone who had died from the disease with doctors and or Nurses topping the list of the deceased.

Our study revealed that majority of the responders have received at least the first dose of the Covid-19 vaccines among which most were ready and willing to complete their vaccination by receiving the second dose once at the designated time. This finding is comparable to that of Luodan *et al*<sup>18</sup> from the United States who reported that at least two – thirds of the responders were favourably disposed to the vaccines.

As with earlier studies by Kumar in 2020, and Joshi in 2021, key reasons for the unwillingness to get the second dose include; lack of interest, vaccine uncertainty and reported AEFIs by those that have received the vaccines, concerns about the vaccine genuineness and other ongoing controversies surrounding the vaccines.<sup>4,19</sup>

The fact that a section of the respondents believed that Covid-19 vaccines was either a way of siphoning money, a chemical weapon, an artificially created pathogen or a way of destabilizing religion among others, goes to show the level of distrust of the general public towards public health authorities and thus the need for more intensive and targeted risk communication to address vaccine hesitancy.

More than half of the respondents that had received the Covid-19 vaccines have done so either because someone close to them had done so. The chances of being vaccinated are influenced by having the disease, being a healthcare worker, belief in the disease and knowing someone with the disease. This is understandable as seeing is believing and being an active participant in the care of those affected as in the case of the healthcare workers or participating passively in the care of loved ones, friends or neighbours who have suffered untold hardship from the disease is more than enough counseling tools to making an informed decision to accept the vaccination.

Just as with earlier reports by Efuntoye *et al*<sup>14</sup> most of the study participants who received the Covid-19 vaccination had mainly one or two minor AEFIs lasting less than 24 hours. This is in keeping with previously deployed vaccines for influenza as well as other viral or bacterial pathogens.<sup>20-22</sup>

Our study is limited by the fact that it was conducted among medical and paramedical staff, a small sub-section of those that are now eligible for the vaccine given that the study was carried out at the onset of vaccine deployment and thus excluded those working outside the health sectors or those in the informal sectors. As at the time of this study, only two Covid-19 vaccines (Astra Zeneca and Moderna) were available in the country. Also, the findings may not be generalizable to other parts of the State or the country as a whole.

In conclusion, our study revealed a high awareness and acceptance of Covid-19 vaccine in the study population. Determinants of receiving Covid-19 vaccine are knowing someone who has been vaccinated, previous positive test to Covid-19 and being a healthcare worker. The common reasons for rejecting Covid-19 vaccine are; lack of interest, uncertainty surrounding its outcome and reported adverse events. Most of the AEFI are minor and resolve shortly afterwards. The findings of our study are potentially helpful for stakeholders involved in sensitization campaigns against COVID-19 vaccine hesitancy in Nigeria.

## DECLARATIONS

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*Ethical Considerations:* Ethical approval was obtained from the Nasarawa State Research Ethics Committee. Approval was also obtained from the leadership of the respective ministry, agency and the Hospital involved in the study.

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