Assessment of Perceptions of COVID-19 Infection and Vaccination among Health Care Workers in Kano State, Nigeria

Abduljaleel A*, Zever I, Bello Z and Olatunji LK

¹*Department of Community Medicine, Bayero University Kano, Nigeria*

²*Department of Community Medicine, Federal University Dutsinma, Nigeria*

³*Ministry of Health, Kaduna State, Nigeria*

⁴*Department of Community Medicine, Usmanu Dan Fodiyo University Sokoto, Nigeria*

Abstract

Coronavirus is an ongoing global viral disease firstly identified in Wuhan, China in December 2019, hence its name COVID-19. The disease is caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). The World Health Organization (WHO) declared COVID-19 as a pandemic with Public Health Emergency of International Concern (PHEIC). People get infected when they inhale small airborne particles or droplets exhaled by a COVID-19 infected person. Some of the recommended preventive measures include social or physical distancing, covering the mouth when sneezing or coughing, wearing of face masks, hand-washing regularly among others. To limit its fatalities, vaccines have been recently developed and shared across the world. However, there have been different opinions and misunderstandings about the infection and its vaccination. In Nigeria, particularly Kano State such negative perceptions have been suspected even among the forefront healthcare workers in whom such misconceptions are least expected. This prompted the need to conduct a study to assess the perceptions of COVID-19 vaccinations among the healthcare workers in Kano State, Nigeria.

A multi-stage sampling method was used to select; the study locations, hospitals, healthcare departments and survey groups. A mixed of quantitative and qualitative method using structured questionnaire and in-depth interview guide were used respectively. Quantitative responses were analyzed using statistical package for social science version 26 while qualitative responses were tape-recorded, later transcribed and reported accordingly. In-depth interview was conducted among 18 top health officials of secondary and tertiary health facilities. The participants were given enough time to respond to the questions individually and responses were recorded accordingly. This created opportunities for more opinions and honest answers, thus reducing bias associated with closed ended questionnaire. Perceptions of COVID - 19 is poor, 24.3%.

A perception of COVID-19 infection and vaccination is poor (23.6%) among the health care workers in Kano state, Nigeria. Several myth and misconceptions were recorded during the in-depth interview. There is need for health care workers to change their mindset on the pandemic as this will have implication in controlling the spread of the infection.

Keywords: COVID-19; Acute respiratory syndrome; Yellow fever; Lassa fever

*Correspondence:
Abduljaleel A, Department of Community Medicine, Bayero University Kano, Nigeria, Tel: +2347033879475; E-mail: abdullahiabduljaleel27@gmail.com

Introduction

Coronavirus is a viral infectious disease affecting the respiratory tract. It has been reported to first start in Wuhan, China, in December 2019, hence the name COVID-19 [1]. The virus spread from Wuhan throughout the globe affecting millions of people with more than 177 million cases, 3.8 million deaths and 161 million recovered worldwide, making it one of the deadliest pandemics in history [2]. The infection was declared a pandemic of public health emergency by World Health Organization (WHO) on January 30th, 2020 and its official name 'Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)' was also declared [3].

The first case of COVID-19 in Africa was reported in Egypt on February 14th, 2020 [4]. Other African countries follow suites with so far all the 55 African Union Member States infected.

Mortality is not as high as it is in America and Europe. In Europe, there are more than 4,695,132 confirmed cases with about 126,394 deaths [5]. In Nigeria, COVID-19 was first reported on February 27th, 2020 from a 44-year-old Italian [6]. The index case ultimately results in the spread of the virus in Nigeria. Despite vigorous community transmission, decaying health sector, lack of preparedness for public health emergencies, the country had recorded a relatively small number of cases with about 167,095 confirmed cases, 2,117 deaths and 163,483 recovered as of June 16th, 2021 [7].

A vaccine is a biochemical agent that stimulates the body's natural defense mechanism against infectious agents when introduced to the body. Thus, any attempt towards the development of a safe and effective COVID-19 vaccine is a public health necessity with a global concern [8]. Finding a safe and effective vaccine against COVID-19 will create a serious breakthrough in the fight against the pandemic. Scientists all over the world are working tirelessly on this with some level of success recorded. COVID-19 vaccines are already available since February 18th, 2021 all over the world, the vaccine is now targeted at vulnerable population (elderly people) and prioritize those at the highest risk (healthcare workers) [9]. At least seven different vaccines under three different platforms have been rolled out with more than 200 types of vaccines on the way. The COVID-19 Vaccines Global Access Facility (COVAX) is one of the three major backbones of the access to COVID-19 Tools (ACT) accelerator, launched in April 2021 by the WHO, the European Commission and France as a response to the ongoing COVID-19 pandemic [10]. COVAX was aimed at clearing the acute phase of the infection by speeding up the process of development and distribution of safe and effective vaccines against COVID-19 in addition to support the building of manufacturing capabilities and work with government and manufacturers to ensure fair and equitable allocation of the vaccines globally [11].

There is no doubt that vaccines are one of the effective preventive tools against COVID-19, although several other preventive measures including social or physical distancing, covering the mouth when sneezing or coughing, wearing face masks, hand washing regularly among others have been recommended by the WHO. Millions of doses of COVID-19 vaccine are being produced and distributed globally, Africa and Nigeria, in particular, is not left out. On the March 2nd, 2021, Nigeria received nearly 4 million doses of COVID-19 vaccines, shipped *via* the COVAX facility, a partnership between CEPI, Gavi, UNICEF and WHO [11]. Both the frontline healthcare workers and other people particularly elderly ones have started receiving the first doses and some few received the second dose of the vaccine though with a lot of myths and misconceptions about the integrity of the vaccine. Such healthcare workers' misconception about the COVID-19 vaccine might disrupt the efforts of the authorities toward the containing of the pandemic. It is, therefore, essential to conduct an exploratory study to assess the perception of COVID-19 vaccination among frontline healthcare workers in Kano State, Nigeria. Part of the aims of this study is to identify the causes of misconceptions therein and inform relevant policy-makers to take appropriate action.

Materials and Methods

This section presents the methodology that was employed in this study. The following aspects of the research were briefly presented (and will be reported in detail later): Research study location; research philosophy and paradigm; research planning and implementation; research design and methods of data collection; research strategy and sampling methods; method of data analysis. The adopted methodology is mixed (quantitative and qualitative).

The research was conducted in Kano State, in the Federal Republic of Nigeria. Kano State is one of the 36 States in Nigeria and was created on May 27th, 1967 from the part of the then northern region. Kano State borders Katsina State to the northwest, Kaduna State to the southwest, Bauchi State to the southeast and Jigawa State (which was initially part of Kano State until 1991) to the northeast. The historic and ancient city of Kano is the capital of Kano State. Kano State is for long been known as the centre of commerce since during trans-Sahara trade and is the most industrialized State in northern Nigeria and the second-largest commercial centre nationwide. Agricultural activities at both subsistence and commercial capacities and during the rainy and dry (irrigation) seasons are being practiced in the State. The official language like in other parts of the country is English, although Hausa and Fulani are the predominant tribes in the State.

Kano State has a total land mass of 20,760 km², 44 Local Government Areas and 484 wards. The state is also enriched with numerous healthcare institutions including three Teaching hospitals, namely: Aminu Kano Teaching Hospital, Muhammad Abdullahi Wase Teaching Hospital and Yusuf Maitama Sule University Teaching Hospital. Kano State, like other States in Nigeria has had a history of epidemics and pandemics diseases including Influenza, Yellow fever, Lassa fever, and presently experiencing the COVID-19 outbreak like the rest parts of the world [12]. Industrialization and urbanization have posed unique challenges to the waste management in Kano city and these among other reasons resulted in water, air and soil pollution [13]. Kano State, like other parts of Nigeria, has a poor healthcare system with a poor average life expectancy of 47 years [14].

Respondents were given either a web-based or paper based validated and refined structured questionnaire. The questions were developed using simple and unambiguous statements or terms for easy understanding. The questionnaires were refined to facilitate a better understanding before the survey was shared among the respondents. The developed questionnaires were distributed to 1004 randomly selected healthcare workers of the randomly selected hospitals of the randomly selected LGAs. The survey instrument comprises of 60 questions and required about 15 min to participate. The questions were divided into 3 parts, 15 questions each. The first part contained the introductory aspects including the title of the study, the aim of the study and options for respondents to indicate their consent to participate in the survey and demographic questions. The remaining parts were made to assess the healthcare workers' perceptions and predictors of perceptions of COVID-19 infection and vaccination.

A multi-stage sampling method was used to select the study subjects. One (1) Local Government Area (LGA) was selected each from the three senatorial zones (Kano Central, Kano North and Kano South) of Kano State making a total of three (3) LGAs. The selection of the LGA was conducted randomly from the list of 15, 13 and 16 LGAs of Kano Central, Kano North and Kano South senatorial zones respectively. The list of hospitals from the 3 selected local governments served as the sampling frame for the second stage. Two (2) hospitals were selected randomly from each of the LGA by drawing lots; the list of hospitals in each of the LGA were written separately on small pieces of paper, then folded and mixed-up on a table, a random selection was then made. Depending on the population of each of the selected LGAs and hospitals, sampling was done proportionately. In addition, three (3) tertiary health centers in Kano city (Aminu Kano Teaching Hospital, Murtala Mohammed Specialist Hospital and Muhammad

Abdullahi Wase Teaching Hospital) were also selected totaling 3 × 2 + 3 = 9 hospitals. Another multi-stage sampling technique was done where all the health departments or units were listed and a random selection was made to identify the survey groups. The identified departments or units in such health centers were surveyed.

Only frontline healthcare workers that consent to participate in the study and work in the selected hospitals and departments were allowed to participate in the survey. While healthcare workers that refused to consent to participate in the study even if they are working in the selected hospitals and departments were excluded, administrative staffs were also excluded.

The validity and reliability of the study depend largely on the nature of the research problem at hand, the general methodology and the nature of the data that was collected [15]. Some of the validity and reliability strategy that were used in this study include;

- A quantitative method using structured questionnaires was used.

- To further test the validity and reliability of research instruments, a pilot study was also conducted to refine the questionnaire so that respondents will have no problems in answering the questions and the researcher will have no problems in recording the data.

Results

Quantitative

A total of 1,004 participants were surveyed, 864 healthcare workers responded accordingly putting the response rate at 86.4%. Majority of the respondents were male 510 (59%) and the age group of 18 to 25 years account for the highest, 308, 35.6%. Most of the respondents 423 (49.0%) have 1 to 5 years in service.

Forty-seven (5.4%) of the respondents have a postgraduate degree and there were 57 (6.6%) medical doctors and nurses and midwives were 275 (31.8%), there were more respondents from the secondary healthcare facilities which amounted to 438 (50.7%), and the majority of them were adherents of the Islamic religion 829 (95.9%). Further details are found in Table 1.

Table 2 shows association between socio-demographic data and the perceptions of COVID-19 infection and vaccination among healthcare workers in Kano State. Perceptions are generally poor and there is statistically significant association between male gender, designated work and perceptions of COVID-19 infections Table 3.

Table 4 shows independent predictors of the perceptions of COVID-19 infection and vaccination among healthcare workers in Kano State. There is statistically significant association between gender, designated work and perceptions of COVID-19 infections.

Qualitative result

Respondents were also interviewed on their perceptions of the infection. Most of them believed it's in existence and that they even had symptoms related to it. A respondent quoted "at some point I was coughing with loss of taste and smell for objects I believed its COVID" Another respondent quoted "I had so many symptoms during the lockdown but I don't want to express myself so that people will not run away from me" On the availability of vaccine for it; they explained that there is vaccine for COVID-19 and that some have taken it while others are still awaiting their turn. On the question "how do you feel when people talk about COVID-19 and

Table 1: Shows demographic characteristic of the respondents, male respondents were 510 (56%) while female 354 (41%). The age group 18 to 25 years accounted for the highest 308 (35.6%), followed by 26 to 35years which were 280 (32.4%). Majority of the respondents, 423 (49%) have 1 to 5 years in service.

Variable	Frequency (N)	Percent (%)
Gender		
Male	510	59
Female	354	41
Age group (years)		
18-25	308	35.6
26-35	280	32.4
36-45	175	20.3
46-55	82	9.5
>55	19	2.2
Number of years in service		
1-5	423	49
6-10	153	17.7
11-15	122	14.1
16-20	89	10.3
>20	76	8.8
Marital status		
Single	370	42.8
Married	466	53.9
Divorced/separated	18	2.1
Widow	9	1
Number of children		
0	389	45.1
1-3	241	27.9
4-6	138	16
7-9	61	7.1
>9	34	3.9
Level of education		
Certificate	103	11,9
Diploma	461	53.4
Higher diploma	92	10.6
Bachelor's degree	161	18.6
Postgraduate	47	5.4
Designated work		
Medical doctor	57	6.6
Pharmacist	87	10.1
Radiographer	37	4.3
Medical laboratory scientist	9	1
Nurse and midwife	275	31.8
Medical laboratory technician	85	9.8
Community health practitioner	7	0.8
Community health extension worker	112	13
Community health officer	15	1.7
Public health	3	0.3
Environmental health officer	20	2.3

Environmental health technician	10	1.2
Health educator	10	1.2
Junior community health extension worker	6	0.7
Physiotherapist	8	0.9
Medical record officer	13	1.5
Dental technologist	9	1
Dental surgery technician	7	8
X-ray technician	7	0.8
Nutrition and dietetic officer	4	0.5
Others	83	9.6
Type of medical facility		
Primary healthcare	222	25.7
Secondary healthcare	438	50.7
Tertiary healthcare	204	23.6
Religion		
Christianity	25	2.9
Islam	829	95.9
Others	10	1.2
Total for each variable	864	100%

Source: Field data

Table 2: Shows association between socio-demographic data and the perceptions of COVID-19 infection and vaccination among healthcare workers in Kano State. Perceptions are generally poor and there is statistically significant association between male gender, designated work and perceptions of COVID-19 infections.

Variables	Good perception, n (%)	Poor perception, n (%)	p-value
Gender			
Male	133 (15.4)	376 (43.6)	.039*
Female	71 (8.2)	283 (32.8)	
Age group (years)			
18-25	64 (7.4)	244 (28.2)	
26-35	78 (9.0)	202 (23.4)	
36-45	38 (4.4)	137 (15.9)	0.254
46-55	21 (2.4)	61 (7.1)	
>55	3 (0.3)	16 (1.9)	
Number of years in service			
1-5	90 (10.4)	333 (38.6)	
6-10	41 (4.8)	112 (13.0)	
11-15	34 (3.9)	88 (10.2)	0.422
16-20	23 (2.7)	66 (7.6)	
>20	16 (1.9)	60 (7.0)	
Marital status			
Single	74 (8.6)	296 (34.3)	
Married	122 (14.1)	344 (39.8)	0.088
Divorced/separated	4 (0.5)	14 (1.6)	
Widow	3 (0.3)	6 (0.7)	
Number of children			
0	78 (9.0)	311 (36.0)	
1-3	72 (8.3)	169 (19.6)	
4-6	32 (3.7)	106 (12.3)	0.085
7-9	13 (1.5)	48 (5.6)	
>9	8 (0.9)	26 (3.0)	
Level of education			
Certificate	29 (3.4)	74 (8.6)	
Diploma	118 (13.7)	343 (39.7)	
Higher diploma	20 (2.3)	72 (8.3)	0.129
Bachelor's degree	31 (3.6)	130 (15.0)	
Postgraduate	6 (0.7)	41 (4.7)	
Designated work			
Medical doctor	5 (0.6)	52 (6.0)	
Pharmacist	21 (2.4)	66 (7.6)	
Radiographer	11 (1.3)	26 (3.0)	
Medical laboratory scientist	2 (0.2)	7 (0.8)	
Nurse and midwife	54 (6.2)	221 (25.6)	
Medical laboratory technician	16 (1.9)	69 (8.0)	
Community health practitioner	1 (0.1)	6 (0.7)	
Community health extension worker	33 (3.8)	79 (9.1)	
Community health officer	2 (0.2)	13 (1.5)	
Public health	0 (0.0.)	3 (0.3)	
Environmental health officer	8 (0.9)	12 (1.4)	0.010*
Environmental health technician	5 (0.6)	5 (.6)	
Health educator	3 (0.3)	7 (0.8)	
Junior community health extension worker	3 (0.3)	3 (0.3)	
Physiotherapist	4 (0.5)	4 (0.5)	
Medical record officer	5 (0.6)	8 (0.9)	
Dental technologist	5 (0.6)	4 (0.5)	
Dental surgery technician	2 (0.2)	5 (0.6)	
X-ray technician	3 (0.3)	4 (0.5)	
Nutrition and dietetic officer	0 (0.0)	4 (0.5)	
Others	21 (2.4)	62 (7.2)	
Type of medical facility			
Primary healthcare	62 (7.2)	160 (18.5)	0.214
Secondary healthcare	97 (11.2)	341 (39.5)	
Tertiary healthcare	45 (5.2)	159 (18.4)	
Religion			
Christianity	6 (0.7)	632 (73.1)	
Islam	197 (22.8)	19 (2.2)	0.595
Others	1 (0.1)	9 (1.0)	

*Statistical significance, p<0.05
Source: Field data

its vaccination?" responses varied with a number of respondents claiming that you will hear different kind of opinion; some people described it as just a propaganda from the Europeans trying to force people home so they can't even perform their normal daily activities like worship, travelling, schooling and social gatherings. Some even believed it's a man – made thing to reduce African population and rendered them infertile through the vaccines. When asked, what will be your responses when called upon to receive the vaccination? Many claimed they have taken the vaccine already.

Discussion

In this Mix study; perception was found to be poor with only 204 (23.6%) respondents demonstrating good perception of COVID-19 infection and vaccination. it was discovered that respondents do not have adequate knowledge of the infection and hence the poor perception, however vaccine acceptance was high, 74.2%. This

Table 3: Perception of COVID-19 Infection and vaccination among healthcare workers in Kano State.

Variables	Perception of COVID-19		p-value
	Good perception, n (%)	Poor perception, n (%)	
Have you received the COVID-19 vaccine?			
Yes	178 (20.6)	463 (53.6)	<0.001
No	26 (3.0%)	197 (22.8)	
Knowledge on COVID-19			
Good knowledge	10 (1.2)	200 (23.1)	<0.001
Poor knowledge	194 (22.5)	460 (53.2)	

Source: Field data

Table 4: Independent predictors of the perceptions of COVID-19 infection and vaccination among healthcare workers in Kano State.

Variables	B	aOR	95% CI	p-value
Gender	-0.355	0.701	0.477, 1.031	0.039*
Age group (years)	0.093	1.098	0.220, 5.479	0.254
Number of years in service	-0.03	0.971	0.402, 2.343	0.422
Marital status	0.706	2.026	0.389, 10.559	0.088
Number of children	0.029	1.029	0.307, 3.456	0.085
Level of education	-1.123	0.325	0.113, 0.938	0.129
Designated work	1.356	3.881	1.195, 12.604	0.010*
Type of medical facility	0.199	1.221	0.721, 2.067	0.214
Religion	-1.237	0.29	0.032, 2.640	0.595

Dependent variable: Perceptions of COVID-19 infection and vaccination; aOR: adjusted Odd Ratios; CI: Confidence Interval; *p<0.05

is probably because healthcare workers are more at risk of being infected with COVID-19 infection, and therefore needs protection against it. More so, it is easily accessible to them as their vaccination was prioritized by the National Primary Healthcare Development Agency, the agency responsible for the distribution of the vaccines. Important predictors of perceptions were gender and designated work; gender and medical doctors in tertiary institution tends to have good perception of the infection. This could be because of the reasons mentioned earlier. In a multi-center cross sectional survey conducted among health care workers in southwestern Nigeria, positive perception of COVID-19 vaccine was a little above half, 53.5% and this is the main predictor of willingness to take the vaccination [15]. Both study were conducted among healthcare workers and cut across major tertiary health institutions in the regions. Finding of this study is also in contrast to a study carried out among healthcare workers in Tigray, North Ethiopia, where 87.9% had positive perception about COVID-19 infections [16]. The poor perceptions in our study could be attributed to the fact that most of the respondents are not directly involved in patient care and have attained only diploma level of education 461 (53.4%). Similarly, most of the respondents work in secondary health care facilities, 438 (50.7%) and primary healthcare facilities, 222 (25.7%), where the workers are less enlightened. Accordingly, tertiary healthcare facilities, with purportedly better equipment in addition to highly skilled clinicians serve as referral centre for COVID-19 management and this was found to be statically significant. In another study conducted in Ethiopia, perception of COVID-19 infection and vaccination was 60.5%, also higher than the finding of this study. Although both studies were conducted among health care workers, the sample size in this survey was quit higher (1004) compare to the 404 health care workers reported in the study

in Ethiopia [17].

In another cross-sectional study in Botswana, respondents demonstrate low risk perception for COVID-19 vaccines as majority, 73.4% accept the vaccine [18]. The study does not reveal the actual perception of COVID-19 vaccination; it only took cognizant of the high acceptance rate and low refusal rate. Estimation of the respondents view, myth and misconception about COVID-19 was not done.

In a cross-sectional web based survey conducted in Saudi Arabia, positive perception on COVID-19 infection and vaccination was higher, 71.3% [19]. This contrast with finding of this study probably because Saudi Arabia is a worshiping ground for Muslims and COVID-19 vaccination is a strong pre-requisite for all intending pilgrimage.

In a study conducted in Canada; factors increasing the likelihood of vaccine refusal are low level of education, financial instability, indigenous status and not being concerned about spreading the virus [20]. This also contrasts with finding of this study where gender and designated work are the most important predictors of vaccination.

Perception of COVID-19 infection and vaccination differs among countries depending on several factors like severity of the infection, level of education, economic status of a country, religious and cultural believe and trust in health authorities. Overcoming some of these factors is a crucial component in improving perception and vaccination rate.

The in-depth interview conducted in this study was aimed at retrieving participant's views, experiences, thoughts and beliefs about COVID-19 infection and its vaccination. Majority of the participants interviewed were top health management officials mostly doctors with significant number of years in service, it is believed that their knowledge and experiences in health service will have influence their believes and decision to take or reject COVID-19 vaccination. Most of them have some things in common for example majority of them are doctors, they have been in health service for a long time and most have already taken the COVID-19 vaccine. They are also mostly similar in religion and cultural background with other members of the community where they come from and in whom we have a lot of myth and misconception about COVID-19 and its vaccination, but their profession and knowledge make them stand-out. Another fact is that initially, majority of the death due to COVID-19 in Nigeria affected prominent elderly people; politicians, business men, the elite including senior health workers. This might have been responsible for the positive attitude of the respondents to COVID-19 vaccine uptake. Lastly the vaccination exercise gives emphasis to frontline health care workers among other vulnerable groups; this might have also increase acceptability of the vaccination among them.

The role of awareness campaign on COVID-19 and its vaccination cannot be overemphasized. There is need to actually educate people; though there is generally insufficient understanding of the virus even among researchers and doctors been that it's a new infection but the few available information about it will change so much among members of the society where culture, religion and their perception of the infection dominate.

Strength and Limitations

The main strength of this study is that perception of COVID-19 infection and vaccination among healthcare workers in Kano,

Nigeria has been adequately explored, resulting in important recommendations for other researchers and policymakers. Secondly, been a mix of quantitative and qualitative survey; we were able to extract respondents opinion on COVID-19 beyond capability of a structural questionnaire.

The major limitations are as follow:

First, it was a cross-sectional study and thus does not establish cause(s). Second, the study was carried out in Kano, although the country's most populated state, the results cannot be used for generalization. Third, there were no identification tools for respondents on the survey questionnaire, so health care workers might have give multiple or false submissions. Lastly; it was initially a web-based survey, but due to poor participation, print –outs were later introduced which was costlier and time consuming.

Conclusion

Healthcare workers in Kano have poor perceptions of COVID-19 infection and vaccination. Though, there was a high vaccination rate (74.2%). Gender (p-value 0.039) and the designated work (p-value 0.010) of the respondents are statistically associated with the perceptions of COVID-19 infection and vaccination among the healthcare workers.

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