



Original Article

Acceptance, Knowledge and Attitudes toward COVID-19 Vaccines: A Cross-Sectional Study from Jigawa State, Nigeria.

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Vaccination is one of the strategies to contain a pandemic such as coronavirus disease 2019. Nigeria with the highest number of people in Africa has fully vaccinated only 3.69% of its citizens as of February 2022. This study aims to assess the level of Covid-19 vaccine acceptance. A cross-sectional survey was carried out by adopting a systematic random sampling sum of 220 primary school teachers in Dutse municipal (the capital of Jigawa state, Nigeria). Data was gathered between August 2021 and September 2021 through a self-administered questionnaire. A total of 220 primary school teachers participated in this survey, majority of them are married (85.9%) and are above the age of 36 (40.5%). Most of the respondents (47.3%) possessed national certificate of education (N.C.E) or national diploma (N.D). 85.5% of the general participants believed that; physical distancing, wearing of face mask and use of hand sanitizers can reduce the spread of the virus. Only 25.5% of the respondents are ready and willing to be vaccinated if it is available for them while the highest percentages of the participants (57.3) are not willing to take the vaccine and the remaining percentage are yet to decide. Similarly, 64.1% of the respondents believed that fear of side effect is one of the reasons why they are not willing to be vaccinated against the virus. Though, participants' awareness about the pandemic is moderate but the low level of the vaccine acceptability is worrisome to the Jigawa state health authorities as well as Nigeria at large and should stir more efforts on the sensitization campaigns and strict measures.

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INTRODUCTION

The adverse effect of coronavirus disease 2019 (COVID-19) which is caused by SARS-CoV-2 is manifesting in almost every region and countries around the globe (Lu et al., 2021). COVID-19 cases in the world have surpassed 130 million as of 4 April, 2021 with death rate of 2.8 million. The policies adopted for the control of the pandemic became necessary due to the devastating impact of the disease (Flaxman et al., 2020). Reducing the transmissibility of the disease was the ground measure and strategy adopted by most countries around the globe, often by interventions which are usually non-pharmaceutical including enforcing hand sanitization, mask policies, travel restrictions, social distancing, shutting down of academic activities in schools as well as complete or partial lockdowns (Cucinotta et al., 2020). So far, non-pharmaceutical interventions were able to reduce the spread of the disease, even though the most promising measure to contain the spread of the virus and reducing the mortality and morbidity cases remain within the area of medical advancement or technology. Effective, affordable, and safe vaccines and antiviral agents are some of the medical technology products. Vaccines are one of the most, effective, reliable as well as cost-effective interventions in public health ever used that are saving hundreds of thousands to millions lives every

year (Phua et al., 2020). Following the breakthrough of the sequencing of SARS-CoV-2 genome in early 2020 and the pronouncement of the pandemic in March 2020 by the world health organization, scientists and researchers are competing against time in trying to develop vaccines (Yoda & Katsuyama, 2021). About 85 vaccines were in preclinical trials in animals as of December 22, 2020 and about 63 are in clinical trials in humans, of which are in different phases with 43 in phase 1, 21 in phase 2 and 18 in phase 3 respectively, six have been accepted for early and limited consumption, two have been accepted for full consumption and one vaccine has been discarded (Ekwebelem et al., 2021). Moderna (mRNA-1273) mRNA vaccines and Pfizer-BioTech's (BNT162b2) vaccines have been approved and accepted (Seale et al., 2021).

With the inspiring news regarding the SARS-CoV-2 vaccines approval and production, hope is increasing to witness an end of the pandemic via herd immunity (Ekwebelem et al., 2021). One major challenge facing the realization of such mission is thought to be hesitancy and scepticism of the vaccine within the general population in the world (Nicola et al., 2021). Confidence is regarded as the safety and vaccine effectiveness trust, policy makers' trust as well as trust in the delivery system as the system of the healthcare (García et al., 2020).

A lot of people have doubts regarding the safety of the vaccines, and this will be a great challenge which is expected to be resolved by the policymakers, healthcare providers, and leaders of the community (García et al., 2020). Furthermore, vaccination convenience is defined as the relative ease to the vaccine access that comprised of affordability, availability, and accessibility (Wong et al., 2020). Vaccine complacency is connected with more negative attitudes about the vaccine and low realized risk of the vaccine-preventable disease.

Such scepticism and doubt were established in a survey that was carried out in the United State of America, where 50% of the American people said they are ready to be vaccinated, 30% are not sure, while the remaining 20% are refusing to take the vaccine (Wong et al., 2020). In another poll of adult American citizens, 58% are willing to take the vaccine, 32% are not sure while the remaining 11% are not willing to be vaccinated (Malik et al., 2020). Nevertheless, one more finding reported 67% of Americans are ready to take COVID-19 vaccine if it is suggested and recommended for them, even though there were considerable demographic differences in the acceptance of the vaccine. To the best of our knowledge, this study is the first of its kind from Jigawa state, Nigeria and is aimed at assessing the level of awareness, acceptance, and attitudes toward Covid-19 vaccines.

MATERIALS AND METHODS

Participants and Survey Design

A cross-sectional survey was carried out by adopting a systematic random sampling sum of 220 primary school teachers in Dutse municipal (the capital city of Jigawa state, Nigeria). Data was gathered between August 2021 and September 2021. All participants were informed that their participation is going to be voluntary and no consent form was obtained because the data were generated and analysed anonymously. The participants were met at their respective place of work where the structured questionnaire was handed over to each one of them to fill.

Study Instrument

The questionnaire was designed and developed based on a literature review. A group of experts affirmed the validity of the questionnaire content. In order to minimize the potential bias introduced by self-reported information, respondents were given certainty regarding the privacy and confidentiality of their responses. The questionnaire was divided into four parts. The final version of the structured questionnaire required an estimated time of 5-10 minutes to finish. The questionnaire was originally written in English language.

Socio-Demographic Characteristics and Knowledge about COVID-19 Pandemic

The data regarding the socio-demographic characteristics of the participants include; age, gender, marital status, educational or academic level, place of primary assignment, religion, and tribe. Additionally in section two of the structured questionnaire, participants were asked to indicate if taking vitamin c, garlic, or rinsing nose with normal saline can protect them against COVID-19. Another significant question was dedicated to assessing respondents who think that Covid-19 is a conspiracy. Participants were asked to point out whether physical distancing, wearing of face mask, and use of hand sanitizers can reduce the spread of the virus. In addition, respondents were asked if it is true that COVID-19 can spread through close contact.

COVID-19 Vaccines Acceptance

Respondents were asked if they will agree to be vaccinated against the virus when it is available and provided for them with 3 response levels (yes, not sure, and no). Variables that were studied as potential predictors of the acceptability of COVID-19 vaccine were: gender, age, marital status, educational/qualification level, place of residence, and place of work location. Participants were asked if religious or cultural reasons will stop them from getting COVID-19 vaccine. Participants fear about COVID-19 vaccine side effects was also evaluated.

Attitudes toward COVID-19 Vaccines

There are about five statements under section D with a four-point Likert scale (Agree, strongly agree, disagree agree, strongly disagree).

Statistical Analysis

Cross tabulation analysis was done to examine the distribution of intention to uptake COVID-19 with respondents' socio-demographic characteristics using chi-squared tests. The main outcome of the study was the public acceptance of COVID-19 vaccines. All the analyses were performed using SPSS version 20.0.

RESULTS

Demographic

Majority of the participants are above the age of 36 (40.5%). Muslims constitute the highest percentage (99.5) in this survey. Only 14.1% are unmarried while 85.9% are married. National certificate of education (N.C.E) or national diploma (N.D) is the highest academic qualification possessed by most of the respondents (47.3), followed by grade II holders (38.2).

Table 1: Demographic Characteristics of the Participants

Characteristics (n = 220)		Frequency (%)
Age	18-25	26 (11.8)
	26-30	27 (12.3)
	31-35	78 (35.5)
	36-older	89 (40.5)
Religion	Islam	219 (99.5)
	Christianity	1 (0.5)
Tribe	Hausa/Fulani	204 (92.7)
	Yoruba	15 (6.8)
	Igbo	1 (0.5)
Marital Status	Married	189 (85.9)
	Single	31 (14.1)
Place of residence	Urban	147 (66.8)
	Rural	73 (32.2)
Educational Level	Sec. School/Grade II	84 (38.2)
	Diploma/N. C. E	104 (47.3)
	Bachelor's Degree	31 (14.1)
	Postgraduate	1 (0.5)
Primary School Location	Within Dutse Metropolis	171 (77.7)
	Outside Dutse Metropolis	49 (22.3)

Awareness of Covid-19 Pandemic

Less than 20% of the respondents believed that coronavirus was engineered in the laboratory as part biological weapon while the highest percentage of the participants (82.7%) falsified this statement. Covid-19 is not a conspiracy as reported by most of the respondents (82.7%). Fewer participants

(14.1%) believed that; physical distancing, wearing of facemask, and use of hand sanitizers cannot reduce the virus spread. 53.6% of the respondents stated that taking vitamin c, garlic, or rinsing nose with normal saline cannot protect them against Covid-19. There is a moderate level of knowledge about the Covid-19 pandemic among the participants.

Table 2: Participants' level of awareness on Covid-19 pandemic

Items		N (%)
The virus was engineered in the laboratory as a biological weapon	True	38 (17.3)
	False	182 (82.7)
Covid-19 is a conspiracy	True	13 (5.9)
	False	207 (94.1)
The virus that causes common cold can also cause Covid-19	True	132 (60.0)
	False	88 (40)
Physical distancing, wearing of face mask, and use of hand sanitizers can reduce the spread of the virus	True	189 (85.9)
	False	31 (14.1)
Taking vitamin C, garlic, or rinsing nose with normal saline can protect you against Covid-19	True	101 (45.9)
	False	118 (53.6)
Letters and packages can spread the virus	True	164 (74.5)
	False	56 (25.5)
Covid-19 has killed more than 2,000 people in Nigeria	True	(85.5)
	False	(14.5)
There is no specific treatment for Covid-19	True	
	False	
Government and NGOs are doing everything possible to contain the situation	True	186 (84.5)
	False	34 (15.5)

Covid-19 Vaccine Acceptance

In the present research, 25.5% of the participants are willing to be vaccinated, 57.3% are not. A detailed written review must be shared with public on how

the vaccines were produced and what it contains as reported by 60.9% of the respondents. Fear of side effect is the reason behind the vaccine rejection by 64.1% of the participants as shown in table 3.

Table 3: Acceptance of Covid-19 vaccine

Acceptance of Covid-19 vaccine		N (%)
Receive vaccine for the influenza this year	No	181 (82.3)
	Not sure	36 (16.4)
	Yes	3 (1.4)
Vaccines are safe	No	59 (26.8)
	Not sure	105 (47.7)
	Yes	56 (25.5)
Ready to receive Covid-19 vaccine this year	No	126 (57.3)
	Not sure	38 (17.3)
	Yes	56 (25.5)
A detailed written review must be shared with public how the vaccines were produced and what it contains	No	37 (16.8)
	Not sure	49 (22.3)
	Yes	134 (60.9)
You want wait for the period to observe how other people react to the vaccine	No	45 (20.5)
	Not sure	34 (15.5)
	Yes	141 (64.1)
You do not want be vaccinated due religious and cultural reasons	No	87(39.5)
	Not sure	85 (38.6)
	Yes	48 (21.8)
Not trust any information about Covid-19 vaccine	No	84 (38.2)

Acceptance of Covid-19 vaccine	N (%)
Not sure	122 (55.5)
Yes	14 (6.4)

Attitudes about Covid-19 Vaccines

Almost half of the participants (53.2%) agreed that is beneficial to be vaccinated against the virus while 46.8 have expressed doubt about its efficacy.

Besides, more than (45%) of the respondents disagree that Covid-19 vaccine made in the United State of America and European Union countries are much safer than those manufactured in other countries.

Table 4: Attitudes toward Covid-19 vaccines

Items		N (%)
It is good to get Covid-19 vaccine as prevention against the virus	Strongly agree	37 (16.8)
	Agree	80 (36.4)
	Disagree	90 (40.9)
	Strongly disagree	13 (5.9)
Covid-19 vaccine made in the U.S and Europe are safer than those produced in other countries	Strongly agree	33 (15.0)
	Agree	44 (20.0)
	Disagree	119 (54.1)
	Strongly disagree	24 (10.9)
Side effects will stop me from being vaccinated against Covid-19	Strongly agree	30 (13.6)
	Agree	106 (48.2)
	Disagree	72 (32.7)
	Strongly disagree	12 (5.5)
I will receive Covid-19 vaccine if my healthcare workers recommend it for me	Strongly agree	45 (20.5)
	Agree	66 (30.0)
	Disagree	108 (49.1)
	Strongly disagree	1 (0.5)
Government and NGOs will ensure free availability/distribution of the vaccine for all citizens	Strongly agree	47 (21.4)
	Agree	109 (49.50)
	Disagree	64 (29.1)

Furthermore, about 61.8% of the respondents indicated that fear of side effects will stop them getting the vaccine. More than half (50.5%) of the participants believed that they will agree to be vaccinated if their healthcare workers recommend it for them.

DISCUSSION

To the best of our knowledge, this is the first finding from Jigawa State, Nigeria investigating and assessing the people acceptance of the vaccine for coronavirus disease 2019. Nigeria with highest population in Africa has fully vaccinated only 3.69% of its citizens as of February 2022 despite of the vaccine availability (WHO). A study that has to do with public acceptance of Covid-19 in Nigeria is

very low compared with other developing countries as well as developed nations [19]. Majority of the participants responded correctly to the question regarding the use of hand sanitizers, face mask, and physical distancing as preventive measures against the virus (85.9%), role of letters and packages in the virus transmission (74.5%), and number of deaths as a result of Covid-19 in Nigeria (85.5%). The relative awareness and knowledge expressed by most of the respondents as shown in the current study may be connected with high level of campaign on the precautionary measures against the virus via radio, television, and social media by both government and non-governmental organizations. Though some few participants have the belief that Covid-19 is a conspiracy (5.9%) and agreed that the virus was

manufactured in the laboratory as part of biological weapon (17.3%).

From our finding, it showed that most of the participants (57.3%) were not willing to be vaccinated against Covid-19, with (17.3%) undecided, and 25.5% were willing to be vaccinated. In a similar survey on the knowledge and acceptance of Covid-19 vaccine among Jordanian population showed that 49% of the respondents would refuse to be vaccinated against the virus (Malik et al., 2020). Meanwhile, another finding conducted in the United States of America indicated 67 – 69% acceptance of the vaccine. The low-level acceptance of Covid-19 vaccine demonstrated by most of the respondents in the current survey may be associated with numerous factors such as fear of side effects and lack of awareness/knowledge regarding the vaccine (Ciardi et al., 2021). If healthcare workers are properly trained and engaged, most of the people will change their decision to receive the vaccine as reported by 50.5% of the respondents in the current study. This demonstrate the significance of not only thorough human vaccine testing but at the same time informing the society about the side effects of the vaccine (if there is any), as this will have a great impact on the people decision making about the vaccine. As shown by finding from the H1N1 campaign team for the vaccine in Indiana as evaluated by Jones et al. (2015), the vaccination campaign focuses on only 2 issues: susceptibility and severity. In disparity, Fournet et al., 2018 reported that concern regarding the side effects was a significant issue adopted by the anti-vaccine groups in most of the European countries. Consequently, the strategy of health advocacy and sensitization for coronavirus disease 2019 vaccine must look and consider all issues not focus on a single one only. The issues to be considered should have to do with individual's beliefs about the effect of hesitancy reduction or reducing the rejection probability (Peretti-Watel et al., 2020).

CONCLUSION

Factors and elements such as fear of side effects, uncertainty about what the vaccines contains, and lack of consistent sensitization that influence the will for Covid-19 vaccine acceptance are identified; this can be used for future public health awareness

interventions which should focus to strengthen knowledge of coronavirus disease 2019 as well as the vaccine.

Conflict of Interest

The authors declare that they have no conflict of interest for this research

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REFERENCES

- Ciardi, F., Menon, V., Jensen, J. L., Shariff, M. A., Pillai, A., Venugopal, U., Kasubhai, M., Dimitrov, V., Kanna, B., & Poole, B. D. (2021). Knowledge, Attitudes and Perceptions of COVID-19 Vaccination among Healthcare Workers of an Inner-City Hospital in New York. *Vaccines*, 9(5), 516. <https://doi.org/10.3390/vaccines9050516>
- Cucinotta, D., & Vanelli, M. (2020). WHO Declares COVID-19 a Pandemic. *Acta bio-medica: Atenei Parmensis*, 91(1), 157– 160. <https://doi.org/10.23750/abm.v91i1.9397>
- Ekwebelem, O. C., Yunusa, I., Onyeaka, H., Ekwebelem, N. C., & Nnorom-Dike, O. (2021). COVID-19 vaccine rollout: will it affect the rates of vaccine hesitancy in Africa? *Public health*, 197, e18– e19. <https://doi.org/10.1016/j.puhe.2021.01.010>
- El-Elimat, T., AbuAlSamen, M. M., Almomani, B. A., Al-Sawalha, N. A., & Alali, F. Q. (2021). Acceptance and attitudes toward COVID-19 vaccines: A cross-sectional study from Jordan. *PloS one*, 16(4), e0250555. <https://doi.org/10.1371/journal.pone.0250555>
- Flaxman, S., Mishra, S., Gandy, A., Unwin, H. J. T., Mellan, T. A., Coupland, H., & Bhatt, S. (2020). Estimating the effects of non-pharmaceutical interventions on COVID- 19 in Europe. *Nature*, 584(7820), 257- 261. <https://doi.org/10.1038/s41586-020-2405-7>

- Fournet, N., Mollema, L., Ruijs, W. L., Harmsen, I. A., Keck, F., Durand, J. Y., Cunha, M. P., Wamsiedel, M., Reis, R., French, J., Smit, E. G., Kitching, A., & van Steenberg, J. E. (2018). Under-vaccinated groups in Europe and their beliefs, attitudes and reasons for non-vaccination; two systematic reviews. *BMC public health*, *18*(1), 196. <https://doi.org/10.1186/s12889-018-5103-8>
- Garcia, L. Y., & Cerda, A. A. (2020). Contingent assessment of the COVID-19 vaccine. *Vaccine*, *38*(34), 5424–5429. <https://doi.org/10.1016/j.vaccine.2020.06.068>
- Hessami, A., Shamshirian, A., Heydari, K., Pourali, F., Alizadeh-Navaei, R., Moosazadeh, M., Abrotan, S., Shojaie, L., Sedighi, S., Shamshirian, D., & Rezaei, N. (2021). Cardiovascular diseases burden in COVID-19: Systematic review and meta-analysis. *The American Journal of Emergency Medicine*, *46*, 382–391. <https://doi.org/10.1016/j.ajem.2020.10.022>
- Jones, C. L., Jensen, J. D., Scherr, C. L., Brown, N. R., Christy, K., & Weaver, J. (2015). The Health Belief Model as an explanatory framework in communication research: exploring parallel, serial, and moderated mediation. *Health communication*, *30*(6), 566–576. <https://doi.org/10.1080/10410236.2013.873363>
- Lu, L., Xiong, W., Mu, J., Zhang, Q., Zhang, H., Zou, L., Li, W., He, L., Sander, J. W., & Zhou, D. (2021). The potential neurological effect of the COVID-19 vaccines: A review. *Acta Neurologica Scandinavica*, *144*(1), 3–12. <https://doi.org/10.1111/ane.13417>
- Malik, A. A., McFadden, S. M., Elharake, J., & Omer, S. B. (2020). Determinants of COVID-19 vaccine acceptance in the US. *Eclinical Medicine*, *26*, 100495. <https://doi.org/10.1016/j.eclinm.2020.100495>
- Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, M., & Agha, R. (2020). The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *International Journal of Surgery (London, England)*, *78*, 185–193. <https://doi.org/10.1016/j.ijvsu.2020.04.018>
- Peretti-Watel, P., Seror, V., Cortaredona, S., Launay, O., Raude, J., Verger, P., Fressard, L., François, B., Legleye, S., L'Haridon, O., Leger, D., & Ward, J. K. (2020). A future vaccination campaign against COVID-19 at risk of vaccine hesitancy and politicisation. *The Lancet Infectious Diseases*, *20*(7), 769–770
- Phua, J., Weng, L., Ling, L., Egi, M., Lim, C. M., Divatia, J. V., Shrestha, B. R., Arabi, Y. M., Ng, J., Gomersall, C. D., Nishimura, M., Koh, Y., Du, B., & Asian Critical Care Clinical Trials Group (2020). Intensive care management of coronavirus disease 2019 (COVID-19): challenges and recommendations. *The Lancet. Respiratory medicine*, *8*(5), 506–517. [https://doi.org/10.1016/S2213-2600\(20\)30161-2](https://doi.org/10.1016/S2213-2600(20)30161-2)
- Seale, H., Heywood, A. E., Leask, J., Sheel, M., Durrheim, D. N., Bolsewicz, K., & Kaur, R. (2021). Examining Australian public perceptions and behaviors towards a future COVID-19 vaccine. *BMC Infectious Diseases*, *21*(1), 1–9. <https://doi.org/10.1186/s12879-021-05833-1>
- Uzochukwu, I. C., Eleje, G. U., Nwankwo, C. H., Chukwuma, G. O., Uzuke, C. A., Uzochukwu, C. E., & Esimone, C. O. (2021). COVID-19 vaccine hesitancy among staff and students in a Nigerian tertiary educational institution. *Therapeutic Advances in Infectious Disease*, *8*, 204993612111054923
- Wong, L. P., Alias, H., Wong, P. F., Lee, H. Y., & AbuBakar, S. (2020). The use of the health belief model to assess predictors of intent to receive the COVID-19 vaccine and willingness to pay. *Human vaccines & immunotherapeutics*, *16*(9), 2204–2214. <https://doi.org/10.1080/21645515.2020.1790279>
- World Health Organization. WHO Coronavirus Disease (COVID-19) Dashboard: World Health Organization; 2022 [cited 2022 February]. Available from: <https://covid19.who.int/table>
- Yoda, T., & Katsuyama, H. (2021). Willingness to Receive COVID-19 Vaccination in Japan. *Vaccines*, *9*(1), 48. <https://doi.org/10.3390/vaccines9010048>