Community-level survey of coronavirus disease 2019 (COVID-19) preventive measures in Kwara State, Nigeria : good knowledge vs poor attitude

Elelu, Nusirat

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RESEARCH ARTICLE

Community-level survey of coronavirus disease 2019 (COVID-19) preventive measures in Kwara State, Nigeria: good knowledge vs poor attitude

Nusirat Elelu [a], Olaolu Bilewu [b], Fatima Sanusi [c], Ahmad Ibrahim Al-Mustapha [d,e,f,*]

[a] Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Ilorin, Ilorin, Kwara State 240003, Nigeria
[b] Department of Public Health Sciences, Faculty of Basic Sciences, Kwara State University, Malete, Kwara State 241104, Nigeria
[c] Department of Veterinary Physiology and Biochemistry, Faculty of Veterinary Medicine, University of Ilorin, Ilorin, Kwara State 240003, Nigeria
[d] Department of Veterinary Sciences, Kwara State Ministry of Agriculture and Rural Development, Ilorin, Kwara State 240103, Nigeria
[e] Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Ibadan, Ibadan, Oyo State 200005, Nigeria
[f] Department of Food Hygiene and Environmental Health, Faculty of Veterinary Medicine, University of Helsinki, Helsinki 00710, Finland

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ABSTRACT

Background: The public knowledge and adherence to the established coronavirus disease 2019 (COVID-19) precautionary measures are crucial to Nigeria's war against the pandemic. Public health education on its preventive practices at the grassroots level was initially crucial to achieving a lower COVID-19 incidence in Kwara State, Nigeria.

Methods: We assessed the knowledge of, and adherence to COVID-19 precautionary measures at the community level among 795 respondents from the three senatorial zones of Kwara State.

Results: 54.5% (433/795) of the respondents were aged between 21 and 40 years, and 45.9% (365/795) of the respondents had a bachelor's degree or higher. Study participants had a good knowledge of COVID-19, its symptoms, and its mode of transmission. 91.8% of the respondents (730/795) had a positive perception of the COVID-19 preventive measures while 96.1% (763/795) of the respondents agreed that maintaining social distance was important in curbing the COVID-19 pandemic. However, only 38% (302/795) of them used face masks and only 25.7% (204/795) of the respondents used hand sanitizers. In addition, only 31.9% (253/795) of the respondents isolated themselves when they were ill. Multi-variable logistic regression analysis revealed that education, occupation, gender, and ethnicity were significantly associated with positive COVID-19 preventive practices among residents of Kwara State. Civil servants were more likely (*AOR*: 3.14; 95% confidence interval [*CI*]: 0.67 to 14.82; *P* = 0.034) to have positive preventive attitudes than other respondents. Study participants with tertiary education and those that were Yoruba (ethnicity) were 14.81 times more likely (95% *CI*: 4.29 to 51.05; *P* = 0.001) and 5.19 times more likely (95% *CI*: 1.82 to 14.84; *P* = 0.007) to have positive attitudes towards the laid-down COVID-19 preventive measures respectively.

Conclusion: The poor community adherence to the COVID-19 preventive practices could pre-dispose Kwara to more COVID-19 cases. More community engagement activities are needed to fully curb the spread of the COVID-19. Public health education should focus on preventive measures, vaccine acceptance, and community monitoring of COVID-19.

1. Introduction

The rapid community transmission of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has increased the global incidence of the 2019 coronavirus disease (COVID-19).[1] As of May 19, 2022, there were 525 million confirmed COVID-19 cases, and 6.29 million reported deaths globally.[2] Since Nigeria's index COVID-19 case occurred on February 27, 2020 via an Italian citizen, community transmission of the disease has resulted in its geometrical spread across all the states of the federation.[3] As of August 15, 2021, Nigeria has 255 633 confirmed cases with 3 142 deaths.[4] Kwara state has recorded 4 630 confirmed COVID-19 cases and 64 COVID-19 associated death. The state accounted for 1.8% of Nigeria's COVID-19 disease burden and 2% of Nigeria's recorded COVID-19 mortality.[4]

Nigeria's poor COVID-19 testing system, poor healthcare infrastructure, lack of sufficient doses of vaccines,[5-6] and the introduction of novel

* Corresponding author: ai.almustapha42@gmail.com.

SARS-CoV-2 strains require health authorities to evaluate several strategies that could curb the spread of the SARS-CoV-2.[7-8] One of such strategies is the inclusion of all important stakeholders at the community level in the design of COVID-19 interventions; a strategy globally termed risk communication and community engagement (RCCE). Globally, RCCE is a fundamental component of COVID-19 management and control strategy.[9] To standardize the RCCE strategy, the World Health Organization (WHO) released the first RCCE manual in March 2020 and a second edition of the COVID-19 RCCE strategy in December 2020.[9]

Community Engagement (CE) often enables community ownership of interventions, minimizes sabotage, and improves the outcome of the instituted control measures.[10] For example, In April 2020, the Kwara State Governor directed that all the 193 wards in the state should immediately constitute a COVID-19 committee to increase public awareness and knowledge of COVID-19 to curb the community transmission of the disease.[11] To further stem the community transmission of the SARS-CoV-2, the government identified and incorporated important stakeholders as part of its COVID-19 management strategy.

The Kwara COVID-19 CE strategy was built on the already existing community health programs and disease surveillance mechanisms. It was, therefore, essential to incorporate COVID-19 prevention strategies into broader, long-term strategies to build community resilience to COVID-19 and other infectious diseases.[12] Furthermore, CE is crucial to achieving universal health coverage through community and people-centered services.[13] CE will also support the general public's trust in government, a cardinal pillar necessary to improve uptake of preventive measures and adherence to the social measures as well as acceptance of the COVID-19 vaccines.[12-14]

An effective COVID-19 CE strategy should improve the risk perception of the general public on COVID-19 through health education on the symptoms of the disease, routes of transmission, as well as prevention and control measures. Hence, this study assessed the knowledge and attitude of the general public at the community level in Kwara State on COVID-19 preventive measures.

2. Materials and methods

2.1. Study area

Kwara State has a population of 3 709 417 inhabitants with approximately 50% living in rural areas.[15] The state located within North-Central Nigeria, has three senatorial zones which were further subdivided into 16 local government areas. The state has diverse ethnic groups with the Yoruba ethnic group being the most populous in the state.

2.2. Ethics approval and consent to participate

The ethical approval of this study was obtained from the Kwara State Ministry of Health (MOH/KS/EHC/777/502). The objective of the study was briefly explained to the participants before a written consent form was administered to each participant. Only participants that consented were included in this survey. Participants were free to withdraw from the study at any point and no personal identifying information was obtained from any of the study participants.

2.3. Survey methodology

The study was conducted as part of the COVID-19 operational research in Kwara State using a validated questionnaire administered by one-on-one interviews between May 5 to June 6, 2020. Study participants were selected using the systematic random sampling technique based on their willingness to participate and a sampling interval of three households. This was done to prevent clustering of respondents and ensure that more respondents were included in the survey. To calculate the sample size, we used the Open-Source Epidemiologic Statistics for Public Health (OpenEpi), v.3.01 (updated June 4, 2013) software with the assumption that 80% of Nigerians had prior knowledge of the COVID-19 preventive practices as previously reported.[16] Hence, at a 95% *CI* and a 5% margin of error, the required sample size was 246 respondents per senatorial zone of the state. Hence for the whole state, at least 738 respondents were needed.

2.4. Questionnaire design

The survey instrument developed for this study was designed to assess public knowledge and compliance with the COVID-19 preventive practices. The instrument was validated by two independent academic reviewers to examine its content and face validity as well as its ease of administration. The questionnaire was administered by trained data collectors in the three senatorial zones of the state. The questionnaire was translated into the local dialect of the respondents where necessary. The survey instrument had four sections: Section A focused on the demographics of the respondents whereas Sections B and C examined the participants' knowledge of COVID-19 as well as their awareness of the COVID-19 preventive practices respectively.

2.5. Statistical analysis

The data generated from this study were analyzed using Statistical Package for Social Sciences v. 26 (Armonk, New York, USA). Descriptive statistics of the data were presented as frequencies and proportions for qualitative data as well as the mean and standard deviation for quantitative data. We computed each respondent's knowledge of COVID-19 preventive practices by allotting one mark to each correctly attempted question and zero for all wrongly attempted questions. Then, each respondent's individual score was computed for the 22 questions. The public knowledge of COVID-19 preventive practices was graded based on 50% of the maximum obtainable score. Hence, study participants that had a cumulative score greater than 11 (50% of the maximum obtainable score) were considered to have a good knowledge of the COVID-19 preventive practices as previously described.[16] On the contrary, respondents with a cumulative score of ≤ 11 were considered to have poor adherence to the COVID-19 preventive practices.

To evaluate the factors associated with good knowledge as well as a positive attitude toward COVID-19 preventive measures, we conducted a univariable logistic regression analysis. This was computed to evaluate the effect of the socio-demographic variables (independent variables) such as age, level of education, gender, family status, etc on the adherence to the COVID-19 preventive measures (outcome variable). All the significant variables at $P < 0.05$ were retained and included in the final model of the multivariable logistic regression analysis to determine the adjusted odds ratio (*AOR*) using the logit function and α at 0.25.

3. Results

3.1. Study participants

A total of 795 participants from the 16 local government areas of the state were recruited for this study. They were of diverse age groups and half of them were aged between 21 and 40 years (Table 1). Almost half (45.9%, 365/795) of the respondents had tertiary education whereas 82.3% (654/795) were married. Socially, 58.5% (485/795) of the study participants had average income, lived in flats, and mostly commuted using motorcycles (51.7%, 411/795).

3.2. Knowledge of COVID-19

There was a high awareness rate of COVID-19 among the study participants. Most of the study participants had a good knowledge of

Table 1
Structure of study participants (*n* = 795).

Variable	*n* (%)
Age	
< 21	31 (3.9)
21–< 41	433 (54.5)
41–< 61	308 (38.7)
≥ 61	23 (2.9)
Level of education	
Formal	2 (0.3)
No formal	73 (9.2)
Primary	57 (7.2)
Quranic	36 (4.5)
Secondary	262 (33.0)
Tertiary	365 (45.9)
Gender	
Female	429 (54.0)
Male	366 (46.0)
Occupation	
Artisan	272 (34.2)
Health worker	334 (42)
Civil servant	189 (23.8)
Ethnicity	
Baruba	78 (9.8)
Hausa/Fulani	211 (26.6)
Nupe	159 (20)
Yoruba	336 (42.2)
Others	11 (1.4)
Marital status	
Divorced	2 (0.3)
Married	654 (82.3)
Single	135 (17.0)
Widowed	4 (0.5)
Type of building	
Bungalow	47 (5.9)
Flat	465 (58.5)
Single room	207 (26.0)
Others△	76 (9.6)
Means of transportation	
Bus	54 (6.8)
Tricycle	34 (4.3)
Motorcycle	411 (51.7)
Private car	121 (15.2)
Taxi	160 (20.1)
Others	15 (1.9)

△ Other types of building include single detached, duplex, or movable dwellings.

Table 2
Awareness and knowledge of COVID-19 among study participants (*n* = 795).

Variable	*n* (%)
Source of information about COVID-19	
Radio	771 (97.0)
Television	710 (89.3)
Family and friends	444 (55.8)
Health professionals	536 (67.4)
Government agencies	590 (74.2)
Which of the following are symptoms of COVID-19?	
Fever	748 (94.1)
Cough	788 (99.1)
Sore throat	712 (89.6)
Shortness of breath	589 (74.0)
Who can be infected?	
Adult	789 (99.2)
Children	714 (89.8)
Aged	745 (93.7)
Poor	687 (86.4)
Rich	711 (89.4)
How can someone be infected with COVID-19?	
Touching infected surfaces or objects like doors, tables	693 (87.2)
Close contact with an infected person	750 (94.3)
Through food	353 (44.4)
Mosquito bites	309 (38.9)
Human faeces	396 (6.4)
Is COVID-19 treatable?	
I don't know	24 (3.1)
No	125 (15.6)
Yes	646 (81.3)
Is COVID-19 possible in both humid and hot climates?†	
I do not know	94 (11.9)
No	204 (25.7)
Yes	495 (62.4)
Are you aware of the COVID-19 isolation centre in the state?‡	
I do not know	29 (3.7)
No	81 (10.2)
Yes	684 (86.1)

† Two responses were missing, so *n* = 793; ‡ One response is missing, so *n* = 794.

of the respondents had some wrong perceptions of the COVID-19 preventive practices. For instance, some respondents thought that drinking alcohol, eating garlic, or taking a hot bath could protect against the SARS-CoV-2.

3.4. Analysis of factors associated with positive COVID-19 preventive practices among residents of Kwara State

Our findings from the multivariable logistic regression analysis showed that the socio-demographic factors: occupation, gender, ethnicity, and level of education were significantly associated with positive COVID-19 preventive practices among residents of Kwara State. Civil servants were more likely (*AOR*: 3.14; 95% *CI*: 0.67 to 14.82) to have positive preventive attitudes than other respondents. Study participants with tertiary education and those that were Yoruba (ethnicity) were 14.81 times (95% *CI*: 4.29 to 51.05) and 5.19 times (95% *CI*: 1.82 to 14.84; *P* = 0.007) more likely to have positive attitudes towards the laid-down COVID-19 preventive measures respectively. Similarly, female respondents were more likely to have positive preventive measures than male respondents (Table 4).

4. Discussion

The COVID-19 pandemic has caused a serious global health crisis that has public health, economic, and socio-political implications for Nigeria.[17-18] The public knowledge and adherence to the established non-pharmaceutical interventions against COVID-19 are crucial to beating the COVID-19 pandemic in Nigeria.[14] Public health education on COVID-19 preventive practices at the grassroots level was crucial to achieving a lower COVID-19 incidence in Kwara State.

COVID-19, its symptoms, its mode of transmission, as well as its epidemiology. Most of the respondents knew that all age groups could be affected (Table 2). However, there were knowledge gaps in the mode of transmission as some respondents believed that COVID-19 could be transmitted via mosquito bites, human faeces, or even through food. Similarly, some respondents (10.2%, 81/795) were not aware of a COVID-19 isolation center in the state and some others (15.6%, 125/795) were not aware that COVID-19 was treatable.

3.3. Perception and practices associated with COVID-19 preventive measures

Most of the study participants (91.8%, 730/795) had a positive perception of the COVID-19 preventive measures. The majority of the study participants believed that the established non-pharmaceutical interventions (NPIs) such as face masks, isolation of sick persons, social distancing, and frequent handwashing were important and effective means to curb the spread of the SARS-CoV-2 (Table 3). Similarly, our findings showed that study participants were aware of the various ways of maintaining social distance in their communities such as staying at home, avoiding crowds and gatherings, as well as staying at least 6m from others in public places such as banks and malls.

However, only 38% (302/795) of them used face masks and only 25.7% (204/795) of the respondents used hand sanitizers. In addition, only 31.9% (253/795) isolated themselves when they were ill. Some

Table 3

Perception of COVID-19 preventive measures at the community level in Kwara State, Nigeria (n = 795).

Variable	n (%)
Do you use face masks?	
Yes	302 (38)
No	493 (62)
Do you isolate yourself when you feel sick?	
Yes	253 (31.9)
No	542 (68.1)
Does consumption of alcohol protect against COVID-19?	
No	602 (75.7)
Yes	193 (24.3)
Can taking a hot bath protect against the new coronavirus disease?	
Yes	423 (53.2)
No	372 (46.8)
Can eating garlic help protect against the coronavirus disease?	
Yes	462 (58.1)
No	333 (41.9)
Do you think handwashing is important in preventing COVID-19?	
Yes	756 (95.1)
No	39 (4.9)
How often do you wash your hands with soap and water?	
Once	23 (2.9)
Twice	521 (65.5)
More than twice	251 (31.6)
Do you use alcohol-based hand sanitizers?	
Yes	204 (25.7)
No	591 (74.3)
Where do you visit, when you are sick?	
Health facility	779 (98.0)
Traditionalist/Herbalist	16 (2.0)
What is social distancing?	
Avoiding social gathering	746 (93.8)
Stay at home	753 (94.7)
Avoid crowds	734 (92.3)
Sitting at least 2M (6 ft) from others	690 (86.8)
Contacting loved ones electronically rather than physically	313 (39.4)
Is social distancing important in curbing the spread of COVID-19?	
I don't know	8 (1.0)
No	23 (2.9)
Yes	764 (96.1)

In March 2020, Nigeria enacted the "Quarantine Act" which prescribed movement restrictions in certain parts of the country and encouraged citizens to observe physical distance to prevent community transmission of the virus.[19] Furthermore, in January 2021, President Muhammadu Buhari signed the "COVID-19 Health Protection Regulation" which restricted public gatherings, prescribed a code of conduct for public places such as banks, and provides penalties for offenders and violators of this law.[20] These two laws are the key COVID-19 preventive policies in Nigeria. However, adherence to these policies has differed across the country.[21-24] These laws were based on the WHO global advisory which emphasized the importance of NPI measures in the control of COVID-19.

Our findings revealed that information on COVID-19 was received at the community level from multiple mass advocacy sources such as television and radio, as well as from healthcare workers and government agencies. This has provided the masses with good information on the disease, its route of transmission, and precautionary preventive measures.

We also recorded a high level of awareness and knowledge of COVID-19 and its preventive measures among the general population in Kwara state. This is similar to previous reports in Kwara state.[21-22] Across Nigeria, other studies have also reported a high awareness and knowledge of COVID-19 and its preventive measures.[23-26] This high COVID-19 knowledge could be mostly due to the aggressive RCCE strategy implemented by the Kwara State Government through the state COVID-19 Taskforce as well as the frequent mass media publicity using jingles, radio announcements, and programs.

Similarly, our findings showed that some of our study participants believe in several myths and misinformation about COVID-19. For instance, some respondents thought that consumption of alcohol, garlic, or taking hot baths could protect against the SARS-CoV-2 while others thought COVID-19 could be transmitted via mosquito bites or food. Some respondents were not even aware that COVID-19 is treatable. These and other COVID-19-associated misinformation have been previously reported.[27-30] Such misconceptions need to be addressed through continuous health education via community meetings and via mass ad-

Table 4

Univariable and multivariable logistic regression analysis of the factors associated with the adherence to the COVID-19 preventive practices among residents of Kwara State, Nigeria.

Variable	Univariable analysis			Multivariable analysis		
	OR	95% CI	P	AOR	95% CI	P
Age (years)						
< 21	REF	REF	REF	REF	REF	REF
21–< 41	0.43	0.10 to 1.83	0.444	-	-	-
41–< 61	0.35	0.07 to 1.52	0.524	-	-	-
≥ 61	0.39	0.05 to 2.94	0.459	-	-	-
Occupation						
Artisan	REF	REF	REF	REF	REF	REF
Civil Servant	12.74	3.03 to 53.53	0.001	3.14	0.67 to 14.82	0.031
Health worker	5.39	3.04 to 9.56	0.001	2.22	1.14 to 4.33	0.034
Ethnicity						
Baruba	REF	REF	REF	REF	REF	REF
Hausa/Fulani	0.56	0.20 to 1.58	0.0049	1.67	0.52 to 5.37	0.0007
Nupe	2.60	0.93 to 7.3	0.0001	3.46	1.09 to 10.91	0.0008
Yoruba	5.69	2.26 to 14.30	0.0001	5.19	1.82 to 14.84	0.0007
Gender						
Male	REF	REF	REF	REF	REF	REF
Female	1.85	1.10 to 3.10	0.0019	1.61	0.98 to 2.89	0.032
Level of education						
No formal education	REF	REF	REF	REF	REF	REF
Primary	4.78	1.69 to 13.56	0.0019	3.35	1.08 to 10.32	0.001
Quranic	2.03	0.78 to 5.31	0.0011	2.25	0.82 to 6.17	0.001
Secondary	4.18	2.20 to 7.90	0.0024	1.90	0.89 to 4.04	0.0001
Tertiary or above	41.52	13.79 to 124.99	0.0001	14.81	4.29 to 51.05	0.0002
Marital status						
Married	REF	REF	REF	REF	REF	REF
Single	1.50	0.70 to 3.22	0.277	-	-	-

OR: Odd's ratio; AOR: Adjusted odd's ratio; CI: Confidence interval. -: Not applicable.

vocacy campaigns such as radio programs.[12] This will ensure that accurate information gets to the public. Generally, community education is key to addressing the challenges of non-compliance with the use of face masks, physical distancing, and frequent hand washing, all key NPIs crucial to curb the spread of the SARS-CoV-2.[12-13] Furthermore, WHO recommended that to achieve rapid and effective control of the global COVID-19 pandemic, four major objectives of RCCE must be considered. These are that every RCCE strategy must be community-driven, be data-driven, should reinforce local solutions, and be collaborative.[9] When properly implemented, the "pandemic fatigue" could be reduced, and states across Nigeria could effectively control the pandemic.

To curb the spread of the disease, Kwara state invited and involved key stakeholders such as market leaders, traditional title holders, and religious leaders to improve the community acceptance and uptake of the COVID-19 NPIs. Furthermore, social media platforms were used to disseminate information among targeted groups such as health officers.

Most of the study participants believed that the established NPIs were important and effective in curbing the spread of the SARS-CoV-2. This high-risk perception of COVID-19 NPIs could be attributed to the good public knowledge of COVID-19. Several other studies had reported similar high COVID-19 risk perception across several other states in Nigeria.[14,31-34]

Physical distancing is an important NPI against COVID-19.[35] Our community survey revealed that Kwarans had an in-depth knowledge of social distancing, which they perceived to revolve around: staying at home, avoiding crowds and gatherings, as well as staying at least 6m from others in public places such as banks and malls.

However, the respondents have a very poor attitude and adherence to the preventive measures. The poor attitude could result in an increased incidence of COVID-19 in the state. As of April 2021, the state ranks 11 in Nigeria's COVID-19 burden.[4] Therefore, the government must immediately use CE and other available means to enforce the COVID-19 NPIs to fully curb the spread of the SARS-CoV-2. Furthermore, the government should provide face masks to students in schools and higher institutions, and enforce their use in public places.

The findings from this study revealed that the perception of, and compliance with the COVID-19 preventive practices among residents of Kwara State were influenced by the level of education of the respondents. This finding supports our hypothesis and is consistent with previous reports.[14,33] Logically, respondents with higher levels of education would have access to more information on COVID-19, have a good perception of the preventive measures, and practice the COVID-19 precautionary preventive measures. Similarly, gender differences were noticed in the compliance with the COVID-19 precautionary and preventive measures. Female respondents were more likely to have positive preventive measures than their male counterparts. This is consistent with the report that gender differences may indicate female gender perceives themselves as more susceptible to adverse conditions than the male gender.[14]

The main strengths of this study included its large sample size and the diversity of the respondents across the state. The main limitation is the possibility of social desirability bias and the result might not be representative of the country.

In Conclusion, our study showed that there was ample information on COVID-19 at the community level in Kwara state. However, the public attitude towards the preventive measures was sub-optimal. Hence, an improved RCCE strategy is urgently needed in the state to improve adherence to the COVID-19 preventive practices and to prevent another wave of the COVID-19 pandemic. Furthermore, the government must improve the public trust in them, and increase the vaccine acceptance to reduce the community spread of the SARS-CoV-2.

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CRediT author statement

Nusirat Elelu: Visualization, Supervision, Project management, Methodology, Data collection, Data Analysis, Writing—Original draft, Writing—Review & Editing. **Olaolu Bilewu**: Conceptualization, Data curation, Visualization, Project administration, Supervision. **Fatima Sanusi**: Methodology, Visualization, Project administration. **Ahmad Ibrahim Al-Mustapha**: Data Analysis, Validation, Methodology, Writing—Review & Editing. All authors reviewed and approved the final version for publication.

Ethics approval and consent to participate

The ethical approval of this study was obtained from the Kwara State Ministry of Health (MOH/KS/EHC/777/502). Written informed consent was obtained from each of the study participants and no personal identifying information was obtained from any of the study participants. Only participants that consented were included in this survey. Participants were free to withdraw from the study at any point.

Availability of data and materials

The dataset generated during the community survey is available on reasonable request.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

1. Responding to community spread of COVID-19. World Health Organization website. https://apps.who.int/iris/bitstream/handle/10665/331421/WHO-COVID-19-Community_Transmission-2020.1-eng.pdf. Accessed April 16, 2022.
2. COVID-19 map dashboard. John Hopkins University & Medicine Coronavirus Resource Center website. https://coronavirus.jhu.edu/map.html. Accessed April 16, 2022.
3. First case of corona virus disease confirmed in Nigeria. Nigeria Centre for Disease Control website. https://ncdc.gov.ng/news/227/first-case-of-corona-virus-disease-confirmed-in-nigeria. Accessed April 16, 2022.
4. COVID-19 Nigeria. The Nigeria Centre for Disease Control website. http://covid19.ncdc.gov.ng/. Accessed April 16, 2022.
5. How well has Nigeria responded to COVID-19? The Center for Policy Impact in Global Health website. https://centerforpolicyimpact.org/2020/07/28/how-well-has-nigeria-responded-to-covid-19/. Accessed April 16, 2022.
6. Oyadiran OT, Usman SA, Osoba ME, Olukorode SO, Lucero-Prisno III DE. Towards effective and efficient COVID-19 vaccination in Nigeria. *J Glob Health Rep*. 2021;5:e2021023. doi:10.29392/001c.21404.
7. Indian COVID-19 strain surfaces in Nigeria, diseases centre alerts NCDC. Punch website. https://punchng.com/indian-covid-19-strain-surfaces-in-nigeria-diseases-centre-alerts-ncdc/. Accessed April 16, 2022.
8. Statement on variants of SARS-CoV-2 in Nigeria. The Nigeria Centre for Disease Control website. https://covid19.ncdc.gov.ng/media/files/STATEMENT_ON_VARIANTS_OF_SARS-COV-2_IN_NIGERIA_ZyRAI48.pdf. Accessed April 16, 2022.
9. COVID-19 Global Risk Communication and Community Engagement Strategy—interim guidance. World Health Organization website. https://www.who.int/publications-detail-redirect/covid-19-global-risk-communication-and-community-engagement-strategy. Accessed April 16, 2022.
10. Rapid review of community engagement and social mobilization strategies for COVID-19 response. Population Council website. https://www.popcouncil.org/research/rapid-review-of-community-engagement-and-social-mobilization-strategie. Accessed April 16, 2022.
11. Nigeria: Kwara Governor directs 193 wards to form Committees. All Africa website. https://allafrica.com/stories/202004210364.html. Accessed April 16, 2022.
12. Mboya IB, Ngocho JS, Mgongo M, et al. Community engagement in COVID-19 prevention: experiences from Kilimanjaro region, Northern Tanzania. *Pan Afr Med J*. 2020;35(Suppl 2):146. doi:10.11604/pamj.supp.2020.35.146.24473.
13. Tambo E, Djuikoue I, Tazemda G, Fotsing M, Zhou X. Early stage risk communication and community engagement (RCCE) strategies and measures against the coronavirus disease 2019 (COVID-19) pandemic crisis. *Glob Health J*. 2021;5(1):44-50. doi:10.1016/j.glohj.2021.02.009.

14. Iorfa SK, Ottu IFA, Oguntayo R, et al. COVID-19 knowledge, risk perception, and precautionary behavior among Nigerians: a moderated mediation approach. *Front Psychol*. 2020;11:566773. doi:10.3389/fpsyg.2020.566773.
15. Kwara population. Population City website. http://population.city/nigeria/adm/kwara/. Accessed April 16, 2022.
16. Hager E, Odetokun I, Bolarinwa O, Zainab A, Okechukwu O, Al-Mustapha A. Knowledge, attitude, and perceptions towards the 2019 coronavirus pandemic: a bi-national survey in Africa. *PLoS One*. 2020;15(7):e0236918. doi:10.1371/journal.pone.0236918.
17. Monitoring COVID-19 impact on Nigerian households. World Bank website. https://www.worldbank.org/en/country/nigeria/brief/monitoring-covid-19-impact-on-nigerian-households. Accessed April 16, 2022.
18. Ajibo H. Effect of COVID-19 on Nigerian socio-economic well-being, health sector pandemic preparedness and the role of Nigerian social workers in the war against COVID-19. *Soc Work Public Health*. 2020;35(7):511-522. doi:10.1080/19371918.2020.1806168.
19. The quarantine act. The Nigeria Centre for Disease Control website. https://covid19.ncdc.gov.ng/media/archives/COVID19_REGULATIONS_2020_20200330214102_KOhShnx.pdf. Accessed April 16, 2022.
20. COVID-19 Health Promotion Regulation 2021. The Nigeria Centre for Disease Control website. https://covid19.ncdc.gov.ng/media/files/Coronavirus_Disease_COVID19_Health_Protection_Regulations_2021.pdf. Accessed April 16, 2022.
21. Reuben R, Danladi M, Saleh D, Ejembi P. Knowledge, attitudes and practices towards COVID-19: an epidemiological survey in North-Central Nigeria. *J Community Health*. 2020;46(3):457-470. doi:10.1007/s10900-020-00881-1.
22. Ilesanmi O, Afolabi A, Akande A, Raji T, Mohammed A. Infection prevention and control during COVID-19 pandemic: realities from health care workers in a north central state in Nigeria. *Epidemiol Infect*. 2021;149:e15. doi:10.1017/s0950268821000017.
23. Nnama-Okechukwu C, Chukwu N, Nkechukwu C. COVID-19 in Nigeria: knowledge and compliance with preventive measures. *Soc Work Public Health*. 2020;35(7):590-602. doi:10.1080/19371918.2020.1806985.
24. Adedokun M, Kolawole A, Adeyemo C, Kayode G, Bolarinwa O. COVID-19 and compliance with awareness programmes/preventive measures: a case study of Ibadan North Local Government, Oyo State, Nigeria. *J Manag Sustain*. 2020;10(2):70. doi:10.5539/jms.v10n2p70.
25. Olapegba P, Iorfa S, Kolawole S, et al. Survey data of COVID-19-related knowledge, risk perceptions and precautionary behavior among Nigerians. *Data Brief*. 2020;30:e105685. doi:10.1016/j.dib.2020.105685.
26. Nwonwu EU, Ossai EN, Umeokonkwo CD, Ituma IB. Knowledge and preventive practice to COVID-19 among household heads in Enugu metropolis, South-East Nigeria. *Pan Afr Med J*. 2020;37:63. doi:10.11604/pamj.2020.37.63.23986.
27. Ahinkorah B, Ameyaw E, Hagan J, Seidu A, Schack T. Rising above misinformation or fake news in Africa: another strategy to control COVID-19 spread. *Front Commun (Lausanne)*. 2020;5:e00045. doi:10.3389/fcomm.2020.00045.
28. Ahmed W, Vidal-Alaball J, Downing J. López Seguí F. COVID-19 and the 5G conspiracy theory: social network analysis of Twitter data. *J Med Internet Res*. 2020;22(5):e19458. doi:10.2196/19458.
29. Trevors G, Duffy M. Correcting COVID-19 misconceptions requires caution. *Educ Res*. 2020;49(7):538-542. doi:10.3102/0013189x20953825.
30. Isah M, Abdulsalam M, Bello A, et al. Coronavirus disease 2019 (COVID-19): a cross-sectional survey of the knowledge, attitudes, practices COVID-19 and misconceptions in the general population of Katsina State, Nigeria. *UMYU J Microbiol Res*. 2021;6(1):24-37. doi:10.47430/ujmr.2161.004.
31. Izekor E, Okpuzor V, Morka E, Nnaji P. A review of COVID-19 pandemic: myths, misconceptions, and role of media education in Nigeria. *Asian J Res Infect Dis*. 2020:10-19. doi:10.9734/ajrid/2020/v5i430172.
32. Oleribe O, Ezechi O, Osita-Oleribe P, et al. Public perception of COVID-19 management and response in Nigeria: a cross-sectional survey. *BMJ Open*. 2020;10(10):e041936. doi:10.1136/bmjopen-2020-041936.
33. Okon UA, Onche C, Ajisegiri SW, et al. Knowledge, risk perception and adherence to COVID-19 prevention advisory among police officers in Makurdi Metropolis Benue State, 2020. *Pan Afr Med J*. 2021;38:199. doi:10.11604/pamj.2021.38.199.25664.
34. Oyetunji TP, Ogunmola OA, Oyelakin TT, Olorunsogbon OF, Ajayi FO. COVID-19-related risk perception, anxiety and protective behaviours among Nigerian adults: a cross-sectional study. *Z Gesundh Wiss*. 2021;1-9. doi:10.1007/s10389-021-01502-4.
35. Samuel IT, Ende DT, Iornyagh BT, Evelyn NM, Vincent Y. COVID-19 prevention guidelines and assessment of its application and adherence among people of Ushongo LGA of Benue State, Nigeria. *Int J Adv Res (Indore)*. 2020;8(7):753-761. doi:10.21474/ijar01/11335.