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COVID-19 information sources, knowledge, attitude and control practices among community members during the pandemic in Ebonyi state, Nigeria: an analytical cross-sectional study

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ABSTRACT

Objectives After taking a heavy toll on the world population, the COVID-19 pandemic is now an endemic disease of global public health significance that requires long-term application of control measures, which will likely be influenced by people's sources of information, knowledge and attitude about COVID-19 and their previous use of control measures. This study aimed to further the understanding of COVID-19 information sources, knowledge, attitude and control practices and their predictors among community members in Ebonyi state, Nigeria during the COVID-19 pandemic.

Design Analytical cross-sectional survey.

Setting and participants We conducted a survey among all consenting/assenting community members aged 15 years and above in 28 randomly selected geographical clusters between 12 March and 9 May 2022. Data were collected through a structured, interviewer-administered questionnaire using KoBoCollect installed in Android devices.

Analysis Descriptive and inferential statistical analyses were done, including multivariate generalised estimating equations.

Results 10 825 participants were surveyed. The radio was the most common individual source of information about COVID-19 (used by 71.9% of the participants), and also the main and most trusted source of information for majority of the participants (46.1% and 44.7%, respectively). This was followed by family members/relatives/friends (61.8%) as the next most common source of information about COVID-19. Next to radio, family members/relatives/friends (13.2%) were the second main source of information, followed by health workers (13.0%). Meanwhile, health workers (15.2%) were the second most trusted source of COVID-19 information, next to radio. Traditional media was the main and also the most trusted source of information (55.6% and 54.3%, respectively), followed by interpersonal sources (36.9% and 39.7%, respectively) and internet/social media/text messages (7.5% and 6.0%, respectively). 10.1%, 51.4% and 23.7% of the participants had good knowledge, good attitude and good control practice, respectively. The strongest and most important predictor of the main and most trusted sources of information was gender. Other predictors included marital status, educational level, age and occupation. Good attitude, being married and educational level were strong predictors of good control practices.

Conclusion The evidence from this study should be used to guide subsequent policy actions on COVID-19 or other similar health emergencies in order to enhance effective emergency health information dissemination and optimal use of control measures by community members in Ebonyi state, Nigeria and in other similar settings.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study is a geographical, community-based offline study that involves the general population in both rural and urban/semiurban areas, making the findings more generalisable.
⇒ The sampling methods and the large sample size make the findings more robust.
⇒ The outcome measures and the potential covariates have been prespecified in a prospectively registered and published study protocol.
⇒ As a questionnaire-based study, the findings are prone to reporting bias.

INTRODUCTION

After taking a heavy health and economic toll on the world population, the COVID-19 pandemic is now an endemic disease of global public health significance[1 2] that requires long-term application of control measures as the risk of resurgence from new variants of SARS-CoV-2 remains.[1] Despite the

reduction and cessation of testing and reporting in most countries, particularly in Africa, including Nigeria,[1 3] over 129 000 COVID-19 cases and 1800 related deaths were confirmed during a 28-day period from 29 April to 26 May 2024.[3] The most recent report showed that over 201 000 COVID-19 cases and 3000 related deaths were confirmed during a 28-day period from 14 October to 10 November 2024.[4]

The decrease in use and the non-use of preventive public health measures (social distancing, use of face masks, frequent hand washing with soap and water, frequent use of alcohol-based hand sanitisers, etc), including COVID-19 vaccination, had been partly responsible for the persistence of the pandemic.[1] These preventive measures are among the strategies that are required for the long-term control of the endemic COVID-19 disease.[1] People's sources of health information, as well as their level of knowledge and attitude towards a disease, including an emergency disease like the COVID-19 pandemic, are important determinants of preventive health behaviours.[5–8]

The sources of COVID-19 information[5–7 9–11] and the knowledge, attitude and practices regarding COVID-19[7 8 11–18] among the general public during the pandemic have been assessed by studies around the world and in Nigeria. However, most were only online studies conducted during the initial waves of the pandemic, and there were wide variations in the reported evidence between studies in different contexts across and within countries. There were also time and context-specific trends in the use of COVID-19 information sources[19] and in COVID-19 knowledge, attitude and preventive practices.[8 20]

The use of COVID-19 preventive measures by the general population during the COVID-19 pandemic would most likely influence the subsequent use of similar preventive measures in the event of COVID-19 resurgence from new variants of SARS-CoV-2 or in any future similar health emergency. An understanding of how the community members in Ebonyi state, Nigeria were getting information about COVID-19, as well as their knowledge, attitude and control practices, along with the predictors, would inform subsequent context-specific public health (policy) interventions for long-term management and control of COVID-19 and any future pandemic of similar infectious diseases. A good understanding of community members' sources of information about COVID-19 would be of particular importance due to the unprecedented and overwhelming misinformation, disinformation and conspiracy theories circulated on the media about the pandemic. We saw the need for an exploratory study in this regard.

We conducted an extensive geographical, community-based study to evaluate the acceptance of COVID-19 vaccination and its determinants among community members in Ebonyi state.[21] A part of this study also explored COVID-19 information sources, knowledge, attitude and control practices and their predictors among community members in Ebonyi state, Nigeria during the COVID-19 pandemic, and the findings are reported in this paper.

METHODS

Study design and participants

This study, which is part of a broader study, was an analytical cross-sectional survey conducted between 12 March and 9 May 2022 among community members in geographical clusters in Ebonyi state, southeast of Nigeria. The study protocol of the broader study is described elsewhere.[21] The immediate catchment communities/villages of one primary healthcare (PHC) facility constituted a cluster. A cluster was eligible to participate in the study if it had up to 200 households or a population of 1000 people; it had a PHC facility providing basic maternal and child healthcare services, including routine childhood immunisation; it was easily accessed with a car; and if the cluster head gave verbal consent. All community members aged 15 years and above who gave verbal consent/assent were eligible. Stratified cluster sampling technique was employed for participant selection. Eligible clusters were selected from the list of clusters obtained from the Ebonyi State Ministry of Health. The list of eligible clusters was the sampling frame consisting of rural and urban/semi-urban strata. Random samples of 21 and 7 clusters were, respectively, selected from the rural and urban/semi-urban strata using the 'sample' command in Stata. In each of the selected clusters, all the household members who were eligible during a population-based household survey were selected by the interviewers to participate in the survey. A sample size of 28 clusters with 15 032 community members were estimated for the broader study,[21] and 28 clusters and 10 825 (72.0%) community members participated in the survey.

Data collection

A structured, interviewer-administered questionnaire[21] was used for data collection in the population-based household survey. The sections in the questionnaire included sociodemographic characteristics, COVID-19 experiences and perceptions, basic knowledge of COVID-19, attitude towards COVID-19 and COVID-19 vaccination, and COVID-19 control practices. The electronic version of the questionnaire was programmed with the KoBoToolbox software and pretested in clusters that were not included in the study. The electronic questionnaire was administered (to all eligible household members) using KoBoCollect installed in Android phones and tablet devices by interviewers who were trained for this purpose. Completed questionnaires were transmitted to the online study records daily and were reviewed for missing, incoherent and illogical data. More details about data management and quality control are provided in the study protocol.[21]

Independent factors and outcome measures

Sociodemographic characteristics were the independent factors. The outcome measures were the main and the most trusted sources of information about COVID-19, the level of knowledge of COVID-19, the level of attitude towards COVID-19 and COVID-19 vaccination, and the level of COVID-19 control practice. For assessment of predictors of the level of COVID-19 control practice, the main and the most trusted sources of information about COVID-19, the level of knowledge of COVID-19, the level of attitude towards COVID-19 and COVID-19 vaccination, and the extent of COVID-19 experience and perceptions were additional independent factors.

The sources of information about COVID-19, including the main and the most trusted sources, were categorised into interpersonal (family members/relatives/friends, health workers, place of work, place of worship/religious forums), traditional media (radio, television, print (newspaper/magazine)), and internet, social media and short messaging services (internet sites/WhatsApp/Facebook/text messages).

Basic knowledge of COVID-19 was assessed using 44 knowledge items in the questionnaire. Each item was scored '1' for correct response and '0' for incorrect response. The highest possible score for each participant was 44 and the lowest was 0. A knowledge score of ≥75% of the highest possible score of 44 was categorised as good knowledge and <75% as poor knowledge, as prespecified in the study protocol.[21] Attitude towards COVID-19 and COVID-19 vaccination was assessed using 16 attitude items in the questionnaire, each having five options—strongly disagree, disagree, not sure, agree and strongly agree—scored from '1' to '5' or '5' to '1', as appropriate. The highest possible score was 80 and the lowest was 16. An attitude score of ≥75% of the highest possible score of 80 was categorised as good attitude and <75% as poor attitude. COVID-19 control practices were assessed using 24 practice items in the questionnaire. Each item was scored '1' for correct response and '0' for incorrect response. The highest possible score was 24 and the lowest was 0. A practice score of ≥75% of the highest possible score of 24 was categorised as good control practice and <75% as poor control practice. The specific items used in assessing COVID-19 knowledge, attitude and control practices are presented with the results.

The extent of COVID-19 experience and perceptions, measured in the broader study, was assessed with eight questionnaire items relating to COVID-19 experiences and perceptions, such as fear of COVID-19, perceived possibility of getting COVID-19, knowledge of COVID-19 cases or related deaths, etc.[21]

Statistical analyses

All statistical analyses were done with Stata/SE V.15.1. Descriptive analyses involved summarising the data with frequencies/proportions and median/IQR as appropriate. Inferential analyses were done using population-averaged models to account for clustering and at 2.5% significance level to correct for multiple comparisons. For each dichotomous/categorical independent factor, prevalence differences in the outcomes with 97.5% CI and p values were computed using binomial identity generalised estimating equation (GEE) with an exchangeable correlation matrix and robust SEs. For each continuous independent factor, coefficients in the outcomes with 97.5% CI and p values were computed using the binomial identity GEE models. For each adjusted analysis, all independent factors were added to the GEE model. Whenever any binomial identity GEE model failed to achieve convergence, a Gaussian identity GEE model was used instead.[22]

Table 1 Sociodemographic characteristics of the 10 825 study participants in Ebonyi state, Nigeria, 2022

	n	%
Gender		
Male	4749	43.9
Female	6076	56.1
Age, median (IQR), years	30 (21–45)	–
Marital status		
Married	5712	52.8
Not married*	5113	47.2
Educational level		
No formal education	1065	9.8
Primary	2211	20.4
Secondary	6083	56.2
Tertiary	1466	13.5
Main occupation		
Self-employment†	5907	54.6
Private paid work	720	6.6
Government paid work	636	5.9
Others‡	3562	32.9
Residence		
Urban/semiurban	2409	22.3
Rural	8416	77.7
Usual monthly income, Nigerian naira		
No income	2980	27.5
20 000 and less	4500	41.6
More than 20 000	3345	30.9

*Separated, divorced, widowed or never married (single).
†Farmer, trader or other self-employments.
‡Housewife, student, apprentice, youth corper or none.

Patient and public involvement

None.

RESULTS

The sociodemographic characteristics of the 10 825 study participants are presented in table 1. The median age (IQR) was 30 years (21–45), 56.1% were female, 52.8%

Table 2 Sources of information about COVID-19 among the 10 825 study participants in Ebonyi state, Nigeria, 2022

	n	%
Interpersonal		
Family members/relatives/friends	6691	61.8
Health workers	5107	47.2
Place of worship/religious forums	3914	36.2
Place of work	1503	13.9
Others*	110	1.0
Traditional media		
Radio	7786	71.9
Television	4305	39.8
Print (newspaper/magazine)	1551	14.3
Internet, social media and SMS†		
Facebook	2069	19.1
WhatsApp	1839	17.0
Internet sites	1462	13.5
Text messages†	1311	12.1
Main source of information		
Traditional media	6017	55.6
Radio	4991	46.1
Television	936	8.7
Print (newspaper/magazine)	90	0.8
Interpersonal	3995	36.9
Family members/relatives/friends	1424	13.2
Health workers	1406	13.0
Place of worship/religious forums	999	9.2
Place of work	120	1.1
Others*	46	0.4
Internet, social media and SMS†	813	7.5
Internet sites	329	3.0
Facebook	267	2.5
WhatsApp	141	1.3
Text messages†	76	0.7
Most trusted source of information		
Traditional media	5883	54.3
Radio	4843	44.7
Television	952	8.8
Print (newspaper/magazine)	88	0.8
Interpersonal	4294	39.7
Health workers	1648	15.2
Family members/relatives/friends	1361	12.6
Place of worship/religious forums	1163	10.7
Place of work	101	0.9
Others*	21	0.2
Internet, social media and SMS†	648	6.0
Internet sites	264	2.4
Facebook	211	2.0
WhatsApp	119	1.1
Text messages†	54	0.5

*Schools, markets, etc.
†Text messages or bulk SMS from the Nigerian centre for disease control, national primary healthcare development agency, banks, etc.
SMS, short messaging services.

were married, 56.2% had a secondary education, 54.6% were self-employed and 77.7% were living in rural areas. 41.6% had usual monthly income of 20 000 Nigerian naira or less, while 30.9% had usual monthly income of more than 20 000 Nigerian naira, with 27.5% of the participants having no monthly income.

Sources of information about COVID-19

The sources of information about COVID-19 among the study participants, including the main and the most trusted sources, are presented in table 2. Overall, the most common individual source of information was the radio (used by 71.9% of the participants), followed by family members/relatives/friends (61.8%), health workers (47.2%) and television (39.8%) (table 2). The main source of information for majority of the participants was traditional media (55.6% of the participants), followed by interpersonal sources (36.9%). Internet/social media/text messages were the main source of information for only 7.5% of the participants. The main individual source of information for majority of the participants was the radio (46.1% of the participants), followed by family members/relatives/friends (13.2%), health workers (13.0%), place of worship (9.2%) and television (8.7%) (table 2). The most trusted source of information for majority of the participants was traditional media (54.3% of the participants), followed by interpersonal sources (39.7%). Internet/social media/text messages were the most trusted source of information for only 6.0% of the participants (table 2). The most trusted individual source of information for majority of the participants was the radio (44.7% of the participants), followed by health workers (15.2%), family members/relatives/friends (12.6%), place of worship (10.7%) and television (8.8%) (table 2).

Knowledge about COVID-19

The knowledge of the study participants about COVID-19 is presented in table 3. Majority of the participants (71.3%) knew people get COVID-19 by staying close to infected persons when they cough/sneeze.

Table 3 Knowledge about COVID-19 among the 10 825 study participants in Ebonyi state, Nigeria, 2022

	n	%
How do people get COVID-19?		
By staying close to infected persons when they cough or sneeze	7722	71.3
Do not know	2662	24.6
Other ways*	441	4.1
What are the symptoms of COVID-19?†		
Fever	7421	68.6
Cough	6463	59.7
Difficulty breathing	5031	46.5
Tiredness	4878	45.1
Body aches/pain	4457	41.2
Sore throat	4142	38.3
Headache	2630	24.3
Chest pain	2342	21.6
Loss of taste or smell	1307	12.1
Nausea or vomiting	1001	9.3
Diarrhoea	767	7.1
Do not know	2069	19.1
Are there vaccines for COVID-19?		
Yes	7028	64.9
Do not know	3513	32.5
No	284	2.6
Who are more at risk of having severe COVID-19?†		
Elderly people	6264	57.9
Young adults	3778	34.9
Children	3372	31.2
People with chronic illness	3115	28.8
Obese people	1891	17.5
People who smoke	1857	17.2
Pregnant women	1422	13.1
Slim people	1416	13.1
Do not know	3223	29.8
How can one prevent COVID-19?†		
Wearing of face masks	8962	82.8
Maintaining distance of at least 1–2 m away from people who are coughing or sneezing	8409	77.7
Frequent hand washing with soap and water	8393	77.5
Avoiding crowds	8070	74.6
Frequent hand cleaning with alcohol-based sanitisers	7135	65.9
Avoiding touching the face (eyes, nose and mouth)	5353	49.5
COVID-19 vaccination	3743	34.6
Taking chloroquine	848	7.8
Use of ginger or garlic	663	6.1
Use of herbs or roots (native medicines)	398	3.7
Taking hot drinks or 'ogogoro'‡	233	2.2
Do not know	850	7.9

*From rat, spiritual attack, bat, dirt/poor personal hygiene, etc.
†Multiple response.
‡Local gin.

The most commonly reported symptom of COVID-19 was fever (according to 68.6% of the participants), followed by cough (59.7%), difficulty breathing (46.5%) and tiredness (45.1%) (table 3). According to 57.9% of the participants, elderly people were more at risk of having severe COVID-19, 34.9% of the participants said young adults, 31.2% said children and 28.8% said people with chronic illnesses (table 3). Regarding COVID-19 preventive measures, 82.8% said COVID-19 could be prevented by wearing face masks, 77.7% said by maintaining distance of at least 1–2 m away from people who are coughing or sneezing, 77.5% said by frequently washing hands with soap and water and 74.6% said by avoiding crowds (table 3).

Attitude towards COVID-19 and COVID-19 vaccination

The attitude of the study participants towards COVID-19 and COVID-19 vaccination is presented in table 4. There were more participants (37.7%) who agreed that COVID-19 was real, while 29.2% strongly agreed. There were also more participants (47.1%) who agreed that the risk of getting COVID-19 could be reduced by wearing face masks, while 27.0% strongly agreed. There were more participants (41.7%) who were not sure about the risk of getting COVID-19 being reduced by taking chloroquine, while 22.9% disagreed (table 4).

COVID-19 control practices

The COVID-19 control practices of the study participants are presented in table 5. The most ever practised preventive measure was wearing face masks (81.5% of the participants), followed by frequent washing of hands with soap and water (77.6%). The most currently practised (in the 2 weeks preceding the survey) preventive measure was frequent washing of hands with soap and water (57.6% of the participants), followed by wearing face masks (53.2%). Taking chloroquine was the most ever practised COVID-19 treatment or preventive measure by 18.7% of the participants and was the most currently practised by 15.7%, followed by use of ginger and garlic (18.6% and 13.7%, respectively). Majority of the participants (69.8%) had never practised these treatment or preventive measures, and majority (75.7%) were not currently practising (table 5).

Level of knowledge, attitude and control practice about COVID-19

Overall, of the 10 825 participants, 10.1% had good knowledge about COVID-19, while 89.9% had poor knowledge; 51.4% had good attitude towards COVID-19 and COVID-19 vaccination, while 48.6% had poor attitude; and 23.7% had good COVID-19 control practice, while 76.3% had poor practice (figure 1).

Predictors of the main and most trusted sources of information about COVID-19

The associations between the main and most trusted sources of information about COVID-19 and sociodemographic factors are presented in two parts in table 6. The first part shows the associated factors or predictors of having traditional media as the main and most trusted source of information about COVID-19, with the other sources (interpersonal and internet/social media/text message) as reference. The second part shows the associated factors or predictors of having interpersonal sources as the main and most trusted source of information about COVID-19, with the other sources (traditional media and internet/social media/text message) as reference (table 6).

The adjusted results showed that the predictors of having traditional media as the main source of information about COVID-19 were male gender (adjusted prevalence difference (aPD) 7.6%, 97.5% CI 3.9 to 11.3, p<0.0001) and being married (aPD 7.5%, 97.5% CI 3.2 to 11.8, p=0.0001). The predictors of having traditional media as the most trusted source of information about COVID-19 were male gender (aPD 8.1%, 97.5% CI 4.3 to 11.8, p<0.0001) and being married (aPD 4.9%, 97.5% 0.2 to 9.7, p=0.0200). The predictors of having an interpersonal source as the main source of information about COVID-19 were female gender (aPD 10.5%, 97.5% 5.4 to 15.6, p<0.0001), educational level (adjusted p value of overall effect=0.0197) and age, with a 1-year increase in age increasing the probability of having an interpersonal source as the main source of information about COVID-19 by 0.3% (adjusted coefficient 0.3%, 97.5% CI 0.1 to 0.5, p=0.0029). The predictors of having an interpersonal source as the most trusted source of information

Table 4 Attitude towards COVID-19 and COVID-19 vaccination among the 10 825 study participants in Ebonyi state, Nigeria, 2022

	Strongly disagree n (%)	Disagree n (%)	Not sure n (%)	Agree n (%)	Strongly agree n (%)
COVID-19 is real.	829 (7.6)	766 (7.1)	1988 (18.4)	4082 (37.7)	3160 (29.2)
COVID-19 is a serious illness that can kill.	662 (6.1)	907 (8.4)	2127 (19.6)	4067 (37.6)	3062 (28.3)
Everybody is susceptible to COVID-19 infection.	748 (6.9)	1166 (10.8)	2580 (23.8)	4065 (37.6)	2266 (20.9)
The risk of getting COVID-19 can be reduced:					
By avoiding crowds.	397 (3.7)	751 (7.0)	1942 (17.9)	4950 (45.7)	2785 (25.7)
By maintaining distance of at least 1–2 m away from people who are coughing or sneezing.	449 (4.1)	854 (7.9)	1784 (16.5)	5206 (48.1)	2532 (23.4)
If everybody covers their mouth and nose (with handkerchief or bent elbow) when coughing or sneezing.	437 (4.0)	908 (8.4)	1681 (15.5)	5386 (49.8)	2413 (22.3)
By wearing face masks.	356 (3.3)	744 (6.9)	1701 (15.7)	5105 (47.1)	2919 (27.0)
By washing hands with soap and water frequently.	350 (3.2)	764 (7.1)	1692 (15.6)	5278 (48.8)	2741 (25.3)
By cleaning hands with alcohol-based sanitisers frequently.	300 (2.8)	639 (5.9)	1841 (17.0)	4981 (46.0)	3064 (28.3)
Chloroquine is effective for treatment/prevention of COVID-19.	1484 (13.7)	2481 (22.9)	4509 (41.7)	1472 (13.6)	879 (8.1)
Herbs and roots (native medicine) are effective for treatment/prevention of COVID-19.	1834 (17.0)	2992 (27.6)	4206 (38.9)	1172 (10.8)	621 (5.7)
Ginger and garlic are effective for treatment/prevention of COVID-19.	1801 (16.6)	2698 (24.9)	4145 (38.3)	1613 (14.9)	568 (5.3)
Hot drinks or 'ogogoro'* is effective for treatment/prevention of COVID-19.	2688 (24.8)	2820 (26.0)	3724 (34.4)	1014 (9.4)	579 (5.4)
COVID-19 vaccines are safe for people to receive.	406 (3.7)	908 (8.4)	3095 (28.6)	4380 (40.5)	2036 (18.8)
The risk of COVID-19 can be reduced by taking COVID-19 vaccination.	414 (3.8)	871 (8.0)	2748 (25.4)	4759 (44.0)	2033 (18.8)
Everybody should receive the recommended COVID-19 vaccination.	455 (4.2)	1157 (10.7)	2629 (24.3)	4541 (41.9)	2043 (18.9)

*Local gin.

Table 5 COVID-19 control practices among the 10825 study participants in Ebonyi state, Nigeria, 2022

	n	%
Positive COVID-19 control practices		
Ever practised the following to prevent COVID-19?		
Wearing of face masks	8821	81.5
Frequent hand washing with soap and water	8400	77.6
Maintaining distance of at least 1–2 m away from people who are coughing or sneezing	7916	73.1
Avoiding crowds	7665	70.8
Frequent hand cleaning with alcohol-based sanitisers	6404	59.2
Avoiding touching the face (eyes, nose, mouth)	4922	45.5
Covering the mouth/nose (with handkerchief or bent elbow) when coughing or sneezing	4335	40.1
Use of bleach/alcohol to clean surfaces	1970	18.2
None of the above was ever practised	652	6.0
Practising the following to prevent COVID-19?*		
Frequent hand washing with soap and water	6231	57.6
Wearing of face mask	5755	53.2
Maintaining distance of at least 1–2 m away from people who are coughing or sneezing	4954	45.8
Avoiding crowds	4251	39.3
Frequent hand cleaning with alcohol-based sanitisers	3474	32.1
Avoiding touching the face (eyes, nose, mouth)	2650	24.5
Covering the mouth/nose (with handkerchief or bent elbow) when coughing or sneezing	2409	22.3
Use of bleach/alcohol to clean surfaces	974	9.0
Not practising any of the above	1817	16.8
Negative COVID-19 control practices		
Ever practised the following to treat or prevent COVID-19?		
Taking chloroquine	2024	18.7
Using ginger or garlic	2010	18.6
Using herbs or roots (native medicine)	1497	13.8
Using hot drinks or 'ogogoro'†	1127	10.4
None of the above was ever practised	7558	69.8
Practising the following to treat or prevent COVID-19?*		
Taking chloroquine	1694	15.7
Using ginger or garlic	1481	13.7
Using herbs or roots (native medicine)	1219	11.3
Using hot drinks or 'ogogoro'†	892	8.2
Not practising any of the above	8191	75.7

*Practising in the 2 weeks preceding the survey.
†Local gin.

about COVID-19 were female gender (aPD 10.7%, 97.5% CI 5.5 to 16.0, p<0.0001) and main occupation (adjusted p value of overall effect=0.0177).

Predictors of the level of COVID-19 control practice

The associations between the level of COVID-19 control practice and sociodemographic and background factors are shown in table 7. The adjusted results showed that the predictors of good COVID-19 control practice were good attitude towards COVID-19 and COVID-19 vaccination (aPD 8.7%, 97.5% CI 3.3 to 16.3, p=0.0024), being married (aPD 3.5%, 97.5% CI 0.6 to 6.5, p=0.0072) and educational level (adjusted p value of overall effect=0.0007).

DISCUSSION

This study explored the COVID-19 information sources, knowledge, attitude and control practices and their predictors among community members in Ebonyi state, Nigeria during the COVID-19 pandemic. Important findings of the study included the most common source of information and the main and most trusted source of information about COVID-19, as well as the level of knowledge, attitude and control practices about COVID-19 and their predictors. In our study, the radio was the most common source of information about COVID-19, and this finding is consistent with a study in Nigeria showing radio as the most common source of information about the hypothetical COVID-19 vaccine.[23] However, in other studies in Nigeria, the most common sources of information about COVID-19 were the internet and social media[10 18] and television.[17] Meanwhile, television was the most common source of information about COVID-19 according to studies conducted in Japan[6 9] and Switzerland,[11] internet sites (government websites) in the USA,[19] government-owned television in Ethiopia[24] and the Ministry of Health (a government source) in Malaysia.[8] In our study, traditional media such as the radio was the main and most trusted source of information about COVID-19 for majority of the participants. In comparison, in a study in Bangladesh,[7] the main source of information was television, while in Saudi Arabia it was the social media.[5] The most trusted source of information in the USA was government sources (eg, government websites),[19 25] similar to Ethiopia (government-owned health and social media),[24] while in Japan[9] and Switzerland[11] the most trusted source was the health professionals.

One of the government sources of information in Ebonyi state is the radio, and unlike other media channels the information from the radio is mostly from the state government. The radio is also more accessible and affordable and has wider coverage across the study setting, including remote and rural areas, compared with other media channels, and is a major channel used by the Ebonyi state government for information dissemination to the general public. Thus, the radio was the most common source of COVID-19 information in our study, as opposed to other media channels like television, internet sites and social media, as shown by other studies, which were online surveys and/or were conducted among urban populations which could more easily access or afford to use these other channels. Also, the radio being used by

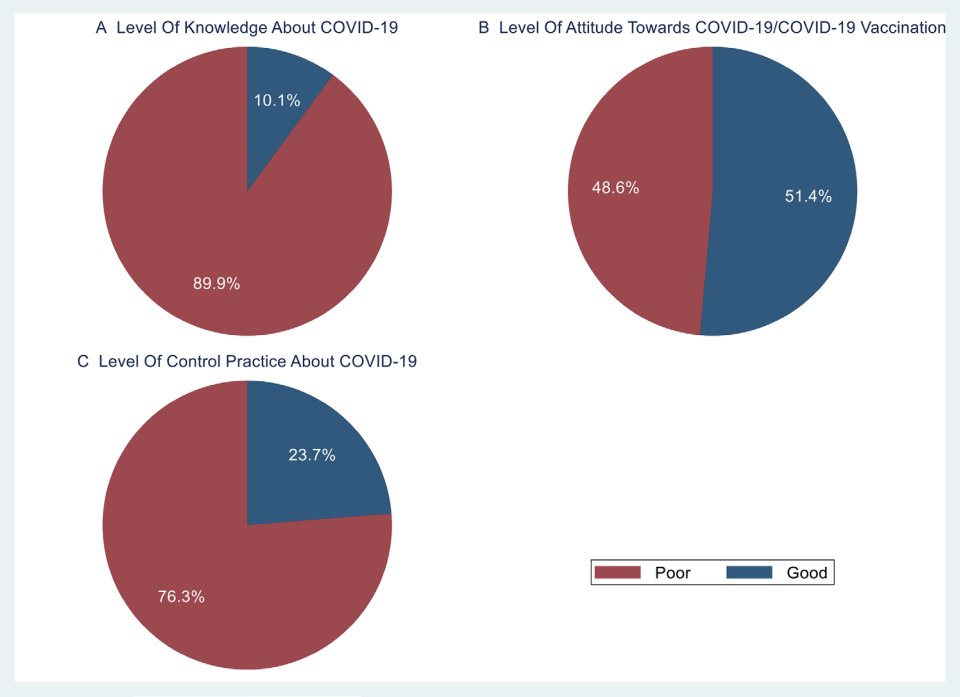

Figure 1 Level of (A) knowledge, (B) attitude and (C) control practice about COVID-19 among the 10 825 study participants.

the state government as information channel and being the most common and most trusted source of information about COVID-19 in our study is similar to the findings of the aforementioned studies in the USA, Ethiopia and Malaysia, where government sources (websites, television, Ministry of Health) were the most common and most trusted (for USA and Ethiopia) sources of information.[8 19 24 25] This evidence underscores the importance of government information channels during health emergencies and the need for the government to be proactive in information dissemination during health emergency situations such as the COVID-19 pandemic, which was beset with misinformation/disinformation and conspiracy theories. Qualitative studies on the determinants of public trust in government as a source of health information during health emergencies are necessary.

In our study, 10.1% had good knowledge about COVID-19, 51.4% had good attitude towards COVID-19 and COVID-19 vaccination, and 23.7% had good COVID-19 control practice. In comparison, a higher prevalence of 78.7% for good knowledge, about 90.0% for good attitude and 75.6% for good practice was reported by one study[18] while a prevalence of 80.0% for good knowledge and 41.6% for good practice was reported by another study in Nigeria.[17] A higher prevalence was also reported by most foreign studies (37.2%–58.6% for good knowledge, 49.0%–62.1% for good attitude and 46.5%–80.8% for good practice). Specifically, in a study in Saudi Arabia, 61.9% had an optimistic attitude and 53.7% had positive preventive practice[5]; in Ethiopia, 37.2% had good knowledge, 60.7% had good attitude and 59.8% had good preventive practice[24]; in Bangladesh, 44.5% had good knowledge and 46.5% had good preventive practice (although a similar proportion of 49.0% had positive attitude)[7]; in India, 58.6% had high knowledge, 62.1% had positive attitude and 50.5% had good preventive practice[12]; in Malaysia, 52.6% had good knowledge and 57.1% had frequent preventive practice (although a similar proportion of 51.8% had positive attitude)[8]; and in Thailand, 52.2% had more accurate COVID-19 knowledge, 58.9% had more positive attitude and 80.8% had more frequent practices.[13]

The above contrasting findings and comparatively higher values could perhaps be due to contextual differences between study settings and different timing of study implementation. For example, most of the previous studies were conducted online and among urban populations (some were conducted only in cities/towns) with access to the internet, in contrast to our study which was geographical, community-based and offline and conducted among both urban/semiurban and remote rural populations, which largely had limited access or no access to the internet. As a result, the higher socioeconomic and educational status of the participants in the other studies could have partly accounted for the higher values. Settings with lower socioeconomic and educational status had relatively lower COVID-19 knowledge, attitude and preventive practices.[20] Another reason could be time trends and context-specific trends such as differences in the severity of the COVID-19 pandemic and in the experiences and perceptions of the public across the study settings. Most of these studies were conducted much earlier than our study and during the initial waves of the pandemic, while some were conducted in settings with higher severity of the pandemic. Even within a particular setting, experiences, perceptions and behaviours

Table 6 Association between sociodemographic factors and the main and the most trusted sources of information about COVID-19 among the 10 825 study participants in Ebonyi state, Nigeria, 2022

Traditional media vs non-traditional media* as sources of information						
	Traditional media	Non-traditional media*	Crude results†		Adjusted results‡	
	n (%)	n (%)	cPD (%) (97.5% CI) or cCoef (%) (97.5% CI)	P value	aPD (%) (97.5% CI) or aCoef (%) (97.5% CI)	P value
Main source of information about COVID-19						
Gender						
Female	3199 (52.7)	2877 (47.3)	0	–	0	–
Male	2818 (59.3)	1931 (40.7)	8.8 (5.0 to 12.7)	<0.0001	7.6 (3.9 to 11.3)	<0.0001
Age, years (coefficient)	–	–	0.09 (–0.1 to 0.3)	0.3316	–0.08 (–0.3 to 0.2)	0.4799
Marital status						
Not married§	2647 (51.8)	2466 (48.2)	0	–	0	–
Married	3370 (59.0)	2342 (41.0)	9.5 (4.5 to 14.6)	<0.0001	7.5 (3.2 to 11.8)	0.0001
Educational level				0.1017¶		0.4570¶
No formal education	492 (46.2)	573 (53.8)	0	–	0	–
Primary	1303 (58.9)	908 (41.1)	9.6 (0.8 to 18.4)	0.014	7.3 (–4.0 to 18.7)	0.1478
Secondary	3462 (56.9)	2621 (43.1)	7.6 (–0.4 to 15.7)	0.0325	6.9 (–4.3 to 18.1)	0.1689
Tertiary	760 (51.8)	706 (48.2)	8.9 (–0.6 to 18.4)	0.0368	5.7 (–6.0 to 17.4)	0.2785
Main occupation				0.0032¶		0.5346¶
Self-employment**	3392 (57.4)	2515 (42.6)	0	–	0	–
Private paid work	387 (53.8)	333 (46.2)	–2.9 (–8.7 to 2.9)	0.2572	–3.8 (–9.7 to 2.1)	0.1512
Government paid work	353 (55.5)	283 (44.5)	2.0 (–3.6 to 7.5)	0.4257	–2.1 (–7.4 to 3.1)	0.3649
Others††	1885 (52.9)	1677 (47.1)	–7.8 (–13.2 to –2.4)	0.0013	–3.7 (–11.9 to 4.5)	0.3072
Residence						
Urban or semiurban	1316 (54.6)	1093 (45.4)	0	–	0	–
Rural	4701 (55.9)	3715 (44.1)	1.4 (–21.4 to 24.3)	0.887	1.9 (–21.3 to 25.1)	0.8561
Usual monthly income, Nigerian naira				0.0045¶		0.5997¶
No income	1616 (54.2)	1364 (45.8)	0	–	0	–
20 000 and less	2466 (54.8)	2034 (45.2)	4.0 (–0.7 to 8.6)	0.0567	–0.4 (–7.7 to 7.0)	0.9135
More than 20 000	1935 (57.9)	1410 (42.1)	10.8 (3.3 to 18.3)	0.0012	3.2 (–8.3 to 14.7)	0.5368
Most trusted source of information about COVID-19						
Gender						
Female	3103 (51.1)	2973 (48.9)	0	–	0	–
Male	2780 (58.5)	1969 (41.5)	9.4 (5.2 to 13.6)	<0.0001	8.1 (4.3 to 11.8)	<0.0001
Age, years (coefficient)	–	–	0.09 (–0.1 to 0.3)	0.3373	–0.04 (–0.3 to 0.2)	0.692
Marital status						
Not married§	2636 (51.6)	2477 (48.4)	0	–	0	–
Married	3247 (56.9)	2465 (43.1)	7.9 (2.9 to 12.9)	0.0004	4.9 (0.2 to 9.7)	0.02
Educational level				0.0763¶		0.3204¶
No formal education	465 (43.7)	600 (56.3)	0	–	0	–
Primary	1318 (59.6)	893 (40.4)	10.0 (1.1 to 18.8)	0.012	8.6 (–2.9 to 20.1)	0.0943
Secondary	3350 (55.1)	2733 (44.9)	8.4 (–0.5 to 17.3)	0.034	8.6 (–3.1 to 20.3)	0.0997
Tertiary	750 (51.2)	716 (48.8)	8.9 (–1.8 to 19.6)	0.0611	6.9 (–5.6 to 19.5)	0.2145
Main occupation				0.0078¶		0.1632¶
Self-employment**	3324 (56.3)	2583 (43.7)	0	–	0	–
Private paid work	391 (54.3)	329 (45.7)	–3.1 (–8.1 to 1.9)	0.1663	–4.4 (–9.5 to 0.8)	0.0594
Government paid work	347 (54.6)	289 (45.4)	1.2 (–4.5 to 7.0)	0.6323	–3.0 (–9.4 to 3.3)	0.2849
Others††	1821 (51.1)	1741 (48.9)	–7.8 (–13.0 to –2.6)	0.0008	–5.6 (–13.5 to 2.4)	0.1179
Residence						

Continued

Table 6 Continued

Traditional media vs non-traditional media* as sources of information						
	Traditional media	Non-traditional media*	Crude results†		Adjusted results‡	
	n (%)	n (%)	cPD (%) (97.5% CI) or cCoef (%) (97.5% CI)	P value	aPD (%) (97.5% CI) or aCoef (%) (97.5% CI)	P value
Urban or semiurban	1222 (50.7)	1187 (49.3)	0	–	0	–
Rural	4661 (55.4)	3755 (44.6)	4.0 (–18.3 to 26.3)	0.6894	4.3 (–18.1 to 26.7)	0.6677
Usual monthly income, Nigerian naira				0.0160¶		0.4966¶
No income	1549 (52.0)	1431 (48.0)	0	–	0	–
20 000 and less	2448 (54.4)	2052 (45.6)	3.3 (–2.3 to 8.8)	0.1885	–1.4 (–9.9 to 7.1)	0.7149
More than 20 000	1886 (56.4)	1459 (43.6)	10.4 (2.3 to 18.6)	0.004	2.5 (–9.8 to 14.7)	0.6529
Interpersonal vs non-interpersonal‡‡ sources of information						
	Interpersonal	Non-interpersonal‡‡	Crude results†		Adjusted results‡	
	n (%)	n (%)	cPD (%) (97.5% CI) or cCoef (%) (97.5% CI)	P value	aPD (%) (97.5% CI) or aCoef (%) (97.5% CI)	P value
Main source of information about COVID-19						
Gender						
Male	1495 (31.5)	3254 (68.5)	0	–	0	–
Female	2500 (41.2)	3576 (58.8)	11.3 (5.9 to 16.6)	<0.0001	10.5 (5.4 to 15.6)	<0.0001
Age, years (coefficient)	–	–	0.2 (0.05 to 0.4)	0.0025	0.3 (0.1 to 0.5)	0.0029
Marital status						
Not married§	1833 (35.9)	3280 (64.1)	0	–	0	–
Married	2162 (37.9)	3550 (62.1)	–1.3 (–4.9 to 2.3)	0.4282	–2.0 (–6.3 to 2.2)	0.2889
Educational level				0.0004¶		0.0197¶
No formal education	570 (53.5)	495 (46.5)	19.6 (8.3 to 30.8)	0.0001	13.7 (1.4 to 26.1)	0.0128
Primary	882 (39.9)	1329 (60.1)	9.3 (2.3 to 16.3)	0.0028	7.7 (1.5 to 13.9)	0.0051
Secondary	1986 (32.7)	4097 (67.3)	2.8 (–2.8 to 8.4)	0.2571	3.7 (–1.9 to 9.2)	0.1395
Tertiary	557 (38.0)	909 (62.0)	0	–	0	–
Main occupation				0.5751¶		0.1492¶
Self-employment**	2233 (37.8)	3674 (62.2)	0	–	0	–
Private paid work	270 (37.5)	450 (62.5)	–0.7 (–6.2 to 4.7)	0.764	5.2 (–1.1 to 11.6)	0.0659
Government paid work	258 (40.6)	378 (59.4)	–3.0 (–8.8 to 2.9)	0.2537	5.5 (–0.6 to 11.5)	0.0426
Others††	1234 (34.6)	2328 (65.4)	0.3 (–4.6 to 5.2)	0.9022	4.1 (–4.7 to 12.8)	0.2968
Residence						
Rural	3093 (36.8)	5323 (63.2)	0	–	0	–
Urban or semiurban	902 (37.4)	1507 (62.6)	0.4 (–22.5 to 23.3)	0.968	2.7 (–19.8 to 25.1)	0.7905
Usual monthly income, Nigerian naira				0.0460¶		0.6670¶
No income	1065 (35.7)	1915 (64.3)	6.9 (0.3 to 13.5)	0.0183	3.4 (–8.2 to 15.1)	0.5089
20 000 and less	1765 (39.2)	2735 (60.8)	6.7 (–0.3 to 13.8)	0.0324	3.1 (–4.7 to 11.0)	0.3739
More than 20 000	1165 (34.8)	2180 (65.2)	0	–	0	–
Most trusted source of information about COVID-19						
Gender						
Male	1614 (34.0)	3135 (66.0)	0	–	0	–
Female	2680 (44.1)	3396 (55.9)	11.7 (6.1 to 17.3)	<0.0001	10.7 (5.5 to 16.0)	<0.0001
Age, years (coefficient)	–	–	0.2 (–0.02 to 0.3)	0.0418	0.2 (–0.03 to 0.4)	0.0555
Marital status						
Not married§	1969 (38.5)	3144 (61.5)	0	–	0	–
Married	2325 (40.7)	3387 (59.3)	–1.1 (–4.8 to 2.7)	0.5337	–0.8 (–5.4 to 3.7)	0.6828
Educational level				0.0055¶		0.0706¶

Continued

Table 6 Continued

Interpersonal vs non-interpersonal‡‡ sources of information						
	Interpersonal	Non-interpersonal‡‡	Crude results†		Adjusted results‡	
	n (%)	n (%)	cPD (%) (97.5% CI) or cCoef (%) (97.5% CI)	P value	aPD (%) (97.5% CI) or aCoef (%) (97.5% CI)	P value
No formal education	598 (56.2)	467 (43.8)	18.3 (6.4 to 30.3)	0.0006	14.0 (1.3 to 26.7)	0.0135
Primary	869 (39.3)	1342 (60.7)	7.6 (0.2 to 15.0)	0.0216	6.4 (–0.5 to 13.2)	0.0367
Secondary	2242 (36.9)	3841 (63.1)	2.5 (–2.8 to 7.7)	0.2941	3.2 (–2.2 to 8.6)	0.1901
Tertiary	585 (39.9)	881 (60.1)	0	–	0	–
Main occupation				0.6011¶		0.0177¶
Self-employment**	2373 (40.2)	3534 (59.8)	0	–	0	–
Private paid work	291 (40.4)	429 (59.6)	1.6 (–3.5 to 6.7)	0.4828	7.1 (1.3 to 12.8)	0.0058
Government paid work	267 (42.0)	369 (58.0)	–2.2 (–8.1 to 3.7)	0.4049	6.4 (0.2 to 12.5)	0.0214
Others††	1363 (38.3)	2199 (61.7)	0.8 (–4.4 to 6.0)	0.7301	4.0 (–4.3 to 12.3)	0.2816
Residence						
Rural	3254 (38.7)	5162 (61.3)	0	–	0	–
Urban or semiurban	1040 (43.2)	1369 (56.8)	3.1 (–18.9 to 25.1)	0.7537	5.0 (–16.6 to 26.5)	0.6059
Usual monthly income, Nigerian naira				0.0506¶		0.5078¶
No income	1187 (39.8)	1793 (60.2)	7.0 (–0.5 to 14.5)	0.0357	3.7 (–8.9 to 16.2)	0.513
20 000 and less	1841 (40.9)	2659 (59.1)	7.2 (0.3 to 14.1)	0.0188	3.9 (–3.7 to 11.4)	0.2486
More than 20 000	1266 (37.9)	2079 (62.1)	0	–	0	–

*Interpersonal or internet, social media and SMS information sources.
†Adjusted for clustering.
‡Adjusted for clustering, gender, age, marital status, educational level, occupation, residence (rural vs urban or semiurban) and monthly income.
§Separated, divorced, widowed or never married (single).
¶P value of overall effect.
**Farmer, trader or other self-employments.
††Housewife, student, apprentice, youth corper or none.
‡‡Traditional media or internet, social media and SMS information sources.
aCoef, adjusted coefficient; aPD, adjusted prevalence difference; cCoef, crude coefficient; cPD, crude prevalence difference; SMS, short messaging services.

regarding the COVID-19 pandemic could change over time depending on changes in the (perceived) severity of the pandemic or other contextual factors. Qualitative studies are needed for more insights. Differences in the use of and trust in COVID-19 information sources could have also added to the contrasting findings in knowledge, attitude and practices. There were time and context-specific trends in COVID-19 risk perception,[26] the use of and trust in COVID-19 information sources,[19 27] and COVID-19 knowledge, attitude and preventive practices.[8 20]

Our study identified male gender and being married as predictors of having traditional media as the main source of information about COVID-19 and also of having traditional media as the most trusted source. Also, female gender, educational level and increase in age were predictors of having an interpersonal source as the main source of information about COVID-19. Female gender and main occupation were also predictors of having an interpersonal source as the most trusted source of information about COVID-19. We did not identify relevant studies with similar outcomes for most appropriate comparisons. However, gender, age group and educational level were significantly associated with the type of COVID-19 information sources, and gender and age group had significant associations with trust in government websites in a study in the USA.[19] These findings emphasise the evidence that sociodemographic characteristics were important determinants of the general public's use of and trust in COVID-19 information sources, and underscore the need to consider sociodemographic factors in the design and delivery of targeted health information in subsequent COVID-19/health emergencies.

In our study, the predictors of good COVID-19 control practice were good attitude towards COVID-19 and COVID-19 vaccination, being married and (higher) educational level, and it is worth noting that the main and the most trusted sources of information about COVID-19 were not predictors. Similarly, a good/positive attitude towards COVID-19 was shown to be a predictor in other studies in Bangladesh,[7] India,[12] Malaysia[8] and Indonesia,[14] while educational level was shown to be a predictor in studies in Bangladesh,[7] Indonesia[14] and Nepal.[15] However, in contrast to our findings, good knowledge or knowledge was a predictor of preventive practices according to studies in Bangladesh, Malaysia, Nepal and Nigeria,[7 8 15 17] as well as occupation and monthly income (Bangladesh),[7] male gender (India),[12] female gender (Malaysia, Indonesia, Nepal and Ethiopia)[8 14–16] and age (Nepal).[15]

Table 7 Association between sociodemographic and background factors and the level of COVID-19 control practice among the 10 825 study participants in Ebonyi state, Nigeria, 2022

	Level of COVID-19 control practices*		Crude results†		Adjusted results‡	
	Good n (%)	Poor n (%)	cPD (%) (97.5% CI) or cCoef (%) (97.5% CI)	P value	aPD (%) (97.5% CI) or aCoef (%) (97.5% CI)	P value
Gender						
Male	1121 (23.6)	3628 (76.4)	0	–	0	–
Female	1447 (23.8)	4629 (76.2)	−0.2 (−2.5 to 2.0)	0.8170	0.7 (−1.9 to 3.3)	0.5684
Age, years (coefficient)	–	–	−0.2 (−0.3 to −0.1)	0.0002	−0.05 (−0.2 to 0.1)	0.4903
Marital status						
Not married§	1221 (23.9)	3892 (76.1)	0	–	0	–
Married	1347 (23.6)	4365 (76.4)	1.1 (−1.8 to 4.0)	0.4000	3.5 (0.6 to 6.5)	0.0072
Educational level				<0.0001¶		0.0007¶
No formal education	142 (13.3)	923 (86.7)	0	–	0	–
Primary	403 (18.2)	1808 (81.8)	5.8 (0.1 to 11.5)	0.0226	4.0 (−4.1 to 12.1)	0.2680
Secondary	1500 (24.7)	4583 (75.3)	12.5 (7.8 to 17.2)	<0.0001	10.0 (2.4 to 17.7)	0.0033
Tertiary	523 (35.7)	943 (64.3)	22.5 (12.2 to 32.7)	<0.0001	17.5 (6.1 to 29.0)	0.0006
Main occupation				0.0003¶		0.2980¶
Self-employment**	1256 (21.4)	4642 (78.6)	0	–	0	–
Private paid work	194 (26.9)	526 (73.1)	6.7 (1.1 to 12.2)	0.0071	1.2 (−3.4 to 5.9)	0.5515
Government paid work	224 (35.2)	412 (64.8)	13.9 (5.4 to 22.4)	0.0003	3.0 (−3.1 to 9.1)	0.2691
Others††	885 (24.9)	2677 (75.1)	3.8 (0.4 to 7.2)	0.0115	−1.8 (−7.0 to 3.3)	0.4207
Residence						
Rural	1888 (22.4)	6528 (77.6)	0	–	0	–
Urban or semiurban	680 (28.2)	1729 (71.8)	5.4 (−9.8 to 20.5)	0.4256	3.8 (−10.3 to 18.0)	0.5449
Usual monthly income, Nigerian naira				0.2696¶		0.1549¶
No income	807 (27.1)	2173 (72.9)	0	–	0	–
20 000 and less	904 (20.1)	3596 (79.9)	−4.1 (−10.4 to 2.1)	0.1393	−5.7 (−14.0 to 2.6)	0.1217
More than 20 000	857 (25.6)	2488 (74.4)	0.8 (−4.0 to 5.6)	0.7158	−6.1 (−13.5 to 1.2)	0.0598
Main source of information about COVID-19				0.3226¶		0.5319¶
Internet, social media (WhatsApp, Facebook) and short messaging services	245 (30.1)	568 (69.9)	0	–	0	–
Traditional media (television, radio, print)	1317 (21.9)	4700 (78.1)	−5.1 (−13.2 to 2.9)	0.1539	−1.1 (−7.7 to 5.6)	0.7170
Interpersonal‡‡	1006 (25.2)	2989 (74.8)	−4.0 (−14.0 to 5.9)	0.3619	1.6 (−8.4 to 11.7)	0.7169
Most trusted source of information about COVID-19				0.3856¶		0.5858¶
Internet, social media (WhatsApp, Facebook) and short messaging services	208 (32.1)	440 (67.9)	0	–	0	–
Traditional media (television, radio, print)	1302 (22.1)	4581 (77.9)	−5.3 (−14.0 to 3.4)	0.1703	−3.0 (−10.1 to 4.1)	0.3488
Interpersonal‡‡	1058 (24.6)	3236 (75.4)	−5.0 (−14.3 to 4.3)	0.2268	−3.3 (−10.7 to 4.2)	0.3245

Continued

Table 7 Continued

	Level of COVID-19 control practices*		Crude results†		Adjusted results‡	
	Good n (%)	Poor n (%)	cPD (%) (97.5% CI) or cCoef (%) (97.5% CI)	P value	aPD (%) (97.5% CI) or aCoef (%) (97.5% CI)	P value
Level of knowledge about COVID-19§§						
Poor	2146 (22.1)	7585 (77.9)	0	–	0	–
Good	422 (38.6)	672 (61.4)	16.7 (0.5 to 32.7)	0.0206	12.3 (–1.2 to 25.8)	0.0407
Level of attitude towards COVID-19 and COVID-19 vaccination¶¶						
Poor	874 (16.6)	4386 (83.4)	0	–	0	–
Good	1694 (30.4)	3871 (69.6)	13.2 (6.1 to 20.3)	<0.0001	8.7 (3.3 to 16.3)	0.0024
Extent of COVID-19 experience and perceptions***†††						
Not strong	1562 (21.1)	5843 (78.9)	0	–	0	–
Strong	1006 (29.4)	2414 (70.6)	8.9 (1.5 to 16.2)	0.0068	3.5 (–3.1 to 10.1)	0.2314

*A practice score of ≥75% of the highest attainable score of 24 indicates good practice and <75% poor practice.
†Adjusted for clustering.
‡Adjusted for clustering, basic knowledge of COVID-19, attitude towards COVID-19 and COVID-19 vaccination, source of information about COVID-19 (main source and most trusted source of information about COVID-19) and sociodemographic characteristics (gender, age, marital status, educational level, occupation, residence (rural vs urban or semiurban), monthly income and extent of COVID-19 experience and perceptions).
§Separated, divorced, widowed or never married (single).
¶P value of overall effect.
**Farmer, trader or other self-employments.
††Housewife, student, apprentice, youth corper or none.
‡‡Relatives/friends, health workers, place of work, place of worship, etc.
§§A knowledge score of <75% of the highest attainable score of 44 indicates poor knowledge and ≥75% good knowledge.
¶¶An attitude score of <75% of the highest attainable score of 80 indicates poor attitude and ≥75% good attitude.
***Disease risk perception.
†††A perception score of <50% of the highest attainable score of 32 indicates not a strong perception and ≥50% a strong perception.
aCoef, adjusted coefficient; aPD, adjusted prevalence difference; cCoef, crude coefficient; cPD, crude prevalence difference.

Also, the main sources of information had significant associations with positive preventive practices according to a study in Saudi Arabia,[5] and the type of information sources also had significant associations with preventive practices in Japan.[6] The differences in the identified predictors could have resulted from the aforementioned timing and context-related factors and the differences in the definitions, measurements and categorisation of independent and dependent variables. Also, perhaps the higher confidence level of 97.5% that we used to correct for multiple comparisons led to the identification of a relatively fewer number of predictors in our study. Notwithstanding, the identified predictors should inform public health policy actions for context-specific and tailored interventions in the strategies to increase the subsequent use of control measures against COVID-19 or similar health emergencies.

As a questionnaire-based study, data measurement involved participants indicating their perceptions and control practices towards COVID-19. Reporting bias was thus a potential limitation in this study. The COVID-19 pandemic was a sensitive topic due to its unprecedented nature and the national and global response and control measures. Hence, there was a tendency for some respondents to exaggerate desirable perceptions and practices and underestimate undesirable perceptions and practices. However, this bias would be minimal due to the anonymous and confidential nature of the questionnaire survey, which was duly explained and emphasised to the questionnaire respondents.

The strengths of this study include the fact that it was a geographical, community-based offline study that involved the general population, including the less privileged who had limited or no internet access, in both rural and urban/semiurban areas of Ebonyi state. Therefore, the study findings are more generalisable to the entire state and other states in Nigeria, including other poor-resource settings with no or limited internet access. The large sample size also makes the findings more generalisable. Moreover, the outcome measures and the potential covariates were prespecified in the broader study's protocol,[21] which was prospectively registered and submitted to a peer-reviewed journal.

CONCLUSION

Traditional media such as radio (with information mostly from the state government) was the most common source of information about COVID-19 and was also the main and most trusted source of information for majority of the community members in Ebonyi state, Nigeria during the COVID-19 pandemic. This was followed by interpersonal sources such as family members/relatives/friends as a common source of information; family members/relatives/friends and health workers as the main source of information; and health workers as the most trusted source of information. There was very low knowledge about COVID-19, with only a tenth having good knowledge; moderate attitude towards COVID-19 and COVID-19 vaccination, with just over half having good attitude; and poor COVID-19 control practice, with only less than a quarter having good control practice. The strongest and most important predictor of the main and most trusted sources of information about COVID-19 was gender. Marital status as well as educational level, age and main occupation were also important predictors. Good attitude towards COVID-19 and COVID-19 vaccination, being married and educational level were strong predictors of good COVID-19 control practice.

Subsequent policy actions on COVID-19 or other similar health emergencies in Ebonyi state, Nigeria and other similar settings should be guided by the most common, main and most trusted information sources and their predictors identified in this study in the strategies to enhance effective emergency health information dissemination. Such policy actions should also be guided by the predictors of good COVID-19 control practice identified in this study in the strategies to improve optimal use of control measures by the general public. Future studies should explore the extent of two-way communications, and its determinants, in the health emergency information dissemination process and also explore the effects of the two-way communicationsons on the use of control measures by community members.

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Contributors UIO is the lead author, the principal investigator, and the guarantor. UIO conceptualised and designed the study, designed the data collection tool and programmed the software, wrote the protocol and directed the implementation of the study, oversaw supervision and monitoring of the interviewers and data management, did the statistical analyses and interpretation, and wrote the manuscript. OI, RLE, CIA, OUO, VUU, ASA, COI, OON, OOU and IMO contributed to the development of the study design, data collection tool, and the first and final versions of the protocol. GEN and UIAN contributed to the development of the study design, data collection tool and the final version of the protocol. OI, OUO, VUU, ASA, COI, OON, OOU, IMO and UIAN supervised and monitored the household survey interviewers and contributed to data management. All authors revised the manuscript, and read, edited and approved the final manuscript.

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