

Research Article

Knowledge and Perception of Adult Nigerians Towards COVID-19 Vaccination: A Case Study in Southwest Nigeria

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Abstract

Introduction and Aim: In the wake of the COVID-19 pandemic, the proliferation of misinformation concerning the disease and its preventative vaccines became a significant issue. To address this, this study investigated the knowledge and perceptions of adult Nigerians in Southwest Nigeria concerning COVID-19 vaccination. **Methods:** Cross-sectional online surveys, utilizing structured questionnaire distributed via Google Forms, was employed to gather data from 309 residents across Southwestern states. The collected data were then analyzed using percentages and Chi-Square tests in SPSS to determine associations between COVID-19 knowledge and various factors including sociodemographic, vaccination knowledge, perception, awareness, and exposure to misinformation. **Results:** The average age of respondents was 28.37 years, with a strong positive view towards COVID-19 vaccination (77.7% in favor). A significant majority believed in the vaccine's potential to combat the pandemic (88.3%), and 65.5% perceived it as safe based on their knowledge. **Conclusion:** Public health campaigns in Southwest Nigeria effectively reduced COVID-19 and immunization misinformation. However, continued efforts are crucial to address remaining misconceptions, particularly in rural areas and across Nigerian communities, leveraging social media and telecommunications.

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Keywords

COVID-19, Immunization, Perception, Awareness, Nigeria

1. Introduction

The Coronavirus disease (COVID-19) is a communicable respiratory disease caused by a new strain of coronavirus that causes illness in humans. The illness is caused by a novel coronavirus now called severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2; formerly called 2019-nCoV) first identified amid an outbreak on January 30, 2020, of respiratory illness cases in Wuhan City, Hubei Province, China [1-7]. The COVID-19 outbreak was declared a global health emergency and later a global pandemic, its first such designation since declaring H1N1 influenza a pandemic in 2009 [1, 7]. The disease has since spread worldwide, leading to an ongoing pandemic. There are two main routes of transmission of COVID-19: respiratory and contact. Respiratory droplets are generated when an infected person coughs or sneezes and droplets containing the virus land on nearby surfaces or objects. Other people can pick the virus by touching surfaces or objects [1-7].

Respiratory infections can be transmitted through droplets of different sizes: when the droplet particles are $>5\text{-}10\text{ }\mu\text{m}$ in diameter they are referred to as respiratory droplets, and when they are $<5\mu\text{m}$ in diameter, they are referred to as droplet nuclei [1]. According to current evidence, the COVID-19 virus is primarily transmitted between people through respiratory droplets and contact routes [2-7]. In an analysis of 75,465 COVID-19 cases in China, airborne transmission was not reported [2]. Droplet transmission occurs when a person is in close contact (within 1 m) with someone who has respiratory symptoms (e.g., coughing or sneezing) and is therefore at risk of having his/her mucosa (mouth and nose) or conjunctiva (eyes) exposed to potentially infective respiratory droplets. Transmission may also occur through vomits in the immediate environment around the infected person. Therefore, transmission of the COVID-19 virus can occur by direct contact with infected people and indirect contact with surfaces in the immediate environment or with objects used on the infected person (e.g., stethoscope or thermometer).

Airborne transmission is different from droplet transmission as it refers to the presence of microbes within droplet nuclei, which are generally considered to be particles $<5\mu\text{m}$ in diameter, can remain in the air for long periods, and be transmitted to others over distances greater than 1 m. In the context of COVID-19, airborne transmission may be possible in specific circumstances and settings in which procedures or support treatments that generate aerosols are performed; i.e., endotracheal intubation, bronchoscopy, open suctioning, administration of nebulized treatment, manual ventilation

before intubation, turning the patient to the prone position, disconnecting the patient from the ventilator, non-invasive positive-pressure ventilation, tracheostomy, and cardiopulmonary resuscitation. There is some evidence that COVID-19 infection may lead to intestinal infection and be present in feces. However, to date, only one study has cultured the COVID-19 virus from a single stool specimen [8]. There have been no reports of fecal-oral transmission of the COVID-19 virus to date. The COVID-19 vaccine necessitates the assessment of individual perceptions regarding the vaccine. The study aimed to assess the perception of community members and their willingness to pay for the prospective COVID-19 [7].

The World Health Organization (WHO) declared COVID-19 as a global public health emergency of international concern on 30 January 2020 as well as a pandemic on 11th March 2020 [1]. The latest threat to global health is the ongoing outbreak of the respiratory disease that was recently given the name Coronavirus Disease 2019 (COVID-19). COVID-19 was recognized in December 2019 [1]. The highly contagious severe acute respiratory syndrome coronavirus (SARS-CoV-2) emanated from China and has since become a global public health emergency. In severe cases, the virus causes fatal pneumonia similar to that caused by SARS and Middle East respiratory syndrome coronavirus (MERS-CoV), which had emerged in the past years sporadically in countries. The course of the COVID-19 epidemic will likely be strongly impacted by how the population behaves, which in turn is influenced by what people know and believe about the disease [2].

A World Health Organization (WHO) report (April 18, 2020) indicated that the COVID-19 pandemic had spread to over 200 countries, affecting over 2,164,111 individuals and resulting in more than 146,198 deaths. This worldwide crisis has severely disrupted the global economy and posed enormous health, economic, environmental, and social challenges, significantly affecting the lives and well-being of all age groups. [3-5].

A particular concern in this regard is the spread of misinformation about COVID-19 on social media. This has led the WHO to host a page with “myth busters” on the world body’s website and engage in discussions on social media. There is a great concern by the WHO that COVID-19 could take time to be eliminated, and that the rate at which the infection is spreading across the world calls for rapid assessment of the population’s knowledge and perceptions of this infection [6-8].

The vaccine is a preparation that is administered to stimulate the body's immune response against a specific infectious disease. A vaccine typically contains an agent that resembles a disease-causing microorganism and is often made from a weakened or killed form of the microbe, its toxin, or one of its surface proteins. The agent stimulates the body's immune system to recognize the agent as a threat, destroy it, and further recognize and destroy any of the microorganisms associated with that agent that it may encounter in the future. Vaccines can be prophylactic (to prevent or ameliorate the effects of a future infection by a natural or "wild" pathogen, or therapeutic (to fight a disease that has already occurred, such as cancer) [1].

The COVID-19 pandemic spurred the rapid development of vaccines. As these vaccines are introduced to a new adult population with limited prior experience, their acceptance remains uncertain. Unlike past instances with polio and monkey pox rumors, which typically centered on a single source, COVID-19 has been accompanied by a multitude of diverse conspiracy theories. Recent analysis by the NPHCDA and NCDC in Nigeria has highlighted circulating conspiracy theories (CTs) concerning vaccine safety, efficacy, equitable distribution, and distrust in the healthcare system. This raises critical questions: How will COVID-19 vaccine hesitancy differ from previous vaccine experiences, and what novel strategies are required to address it? Although exposure to these numerous COVID-19 CTs is widespread, the extent of public belief and the characteristics of those who believe them are still unknown. While historical data suggests vaccine hesitancy in Nigeria is linked to lower literacy and poorer health outcomes, the influence of social media in spreading COVID-19 misinformation necessitates further investigation to understand current hesitancy patterns, particularly whether education level correlates with skepticism.

The NPHCDA has commenced periodic surveys to track trends in attitudes to COVID-19 vaccines. They have also instituted rumor surveillance to identify circulating rumors and respond with the facts. All must support these laudable efforts. However, more exploration is needed to understand why people believe in CTs and what pathways lead to vaccine hesitancy. Although this is a new research area, there is emerging evidence to show intrinsic and extrinsic factors may explain why some people will believe in CTs about COVID-19 vaccines rather than credible information to the contrary. Recent studies have linked vaccine hesitancy to moral foundations, universal instincts that determine how people make decisions. It may be worthwhile to explore if certain moral concerns predispose people to believe in CTs. This will complement information gleaned from standard knowledge, attitude, and practice studies and throw light on possible pathways to influencing attitudinal change even among CT believers.

Trust in government is another crucial factor. Distrust in the government and vaccination has been linked to belief in CTs and vaccine hesitancy. A global survey found that respondents

who trusted their government were more likely to accept a vaccine. Those who distrusted their governments were more likely to believe in alternative explanations for things happening. With the country's challenging economic situation and hardship exacerbated by lockdowns, there is already significant public discontent with the government, particularly in handling the relief materials meant to cushion the pandemic effects. Some believe the COVID-19 response is another conspiracy by politicians to loot the treasury. This level of distrust is likely to fuel belief in CTs about the vaccine. The COVID-19 Vaccine Ethics Research (COVER) in Nigeria aims to examine these issues in detail to improve communication strategies and messages that will contribute to a successful COVID-19 vaccine introduction in the country. COVER is a mixed-methods study using qualitative and quantitative approaches to better understand Nigeria's CT phenomena and its link to COVID-19 vaccine acceptance. Vaccines are our best bet out of the COVID-19 outbreak. The hope is that with equitable access to vaccines and the needed supply reaching Nigeria in the short to medium term, the spread of COVID-19 can be mitigated so that we all can return to some semblance of normality in our lives.

Research Aims/Objectives

The main aim of the research is to assess perceptions and awareness of immunization issues among residents of Oyo, Osun, and Lagos states in Nigeria.

The objectives are to:

- 1) Determine the level of COVID-19 knowledge among the population and its association with sociodemographic factors.
- 2) Evaluate vaccination knowledge, perception, awareness, and misinformation related to COVID-19.

2. Materials & Method

2.1. Study Design

A descriptive cross-sectional design was used to investigate the knowledge and perception of Adult Nigeria men towards COVID-19 vaccination: A case study in Southwest Nigeria.

2.2. Study Area

This study was carried out in States in Southwest (Oyo, Osun and Lagos) with the use of online and interview survey methodology. Structured questionnaire designed to collect data from respondents within Nigeria, the most populous nation in Africa with an estimated population of about 200 million and a total land area of 910,770 Km² (351,650 sq.miles). Nigeria has six geopolitical zones (Southwest, Southeast, South south, Northwest, Northeast, and Northcentral) with 36 states. Southwest, geopolitical zone will be chosen for two reasons which include: the easy accessibility of the researchers to collection of the data and also because Lagos state which is located in the geopolitical zone has the

largest recorded cases of COVID-19 in Nigeria 58,317 cases out of 164, 756 cases as of April 26, 2021.

2.3. Study Population

The study population comprises of adult Nigerians in the States mainly of Southwest of Nigeria who also gave their consent to participate in this study, irrespective of their social status, occupation, religious or political affiliation.

2.4. Inclusion Criteria

Only adult Nigeria men (18 years and above) with access to the internet, who strictly have cultural background(indigenes) of the states of options will be invited via social media platforms or who are healthy to take COVID-19 vaccine at the designated area or places, who consent to participate in this study.

2.5. Exclusion Criteria

Adult Nigeria men who are less than 18 years, who strictly have cultural background of the state of options but are mentally retarded or deaf and dumb or those admitted throughout the duration of vaccination, those do not give their consent to participate in this study.

2.6. Sample Size

The sample size was determined using Leslie Kish formula. Targeted respondents include adults >18 years of all educational levels both medical and non-medical backgrounds. The sample size was calculated using the following equation

$$N = Z^2 PQ / D^2$$

Where n= minimum sample size

P=the proportion of the target population estimated to have a particular phenomenon of the interest in the study (prevalence of Adult Nigeria men towards COVID-19 vaccination.

Southwest Nigeria is approximately 40%

$$Q = 1 - P$$

$$Q = 1 - 0.4$$

$$Q = 0.6$$

Z= critical value of 1.96 at 5% (95% confidence interval)

D= precision limit (limit of error) for the purpose of this study (0.05)

$$N = (1.96)^2 \times 0.4 \times 0.6 / (0.05)^2$$

$$N = 368.7 \text{ Approximately } N=369$$

A non-response rate of 10% of 369 = 36.9

Therefore, 36.9 were added to the sample size calculated to make the sample size 369 in order to address issues of incomplete response.

405.9 Which are approximately 400

2.7. Sample Technique

Purposive and snowball sampling techniques was used to recruit the respondents. The study population includes all adult Nigerians. According to the Nation Population Commission (NPC).

2.8. Description of Research Instrument

The quantitative instrument specifically a questionnaire was adopted and used for the study. The first section of the questionnaire contains the socio-demographic information of the participants while the second section evaluates the knowledge of adult Nigerians towards COVID-19 vaccination. The third section assessed the perception of adult Nigerians towards COVID-19 vaccination. The fourth section identified factors influencing the health seeking behavior of adult Nigeria men towards COVID-19 vaccination. The questionnaire was administered interviews online and manually to ensure that the participants understand each question and due consent was sought before data collection procedure begins. For each question asked, the interviewer will tick the appropriate answer on the part of the bob reserve for such an answer. Data was collected from participants during the collection hours. The participants were enlightened on the objectives of the study before proceeding to answer the questionnaire.

2.9. Data Collection Procedure

A semi-structured online questionnaire designed using google forms with appended respondent's consent form was adopted. The survey questionnaires was shared on all electronic platforms and online social media like Facebook, emails, WhatsApp, Instagram, twitter etc. to groups, tertiary students, friends, family members and civil servants. The survey link was directly shared with accessible populations by the investigators, who also encouraged these participants to further distribute it through their contacts and various groups to expand its reach. On sending the link, prospective respondents were encouraged to roll out the survey to their contacts and online platforms. Thus, the link was forwarded to people apart from the first point of contact and so on. In conjunction with Community Health Worker face-to-face interviews was also conducted using the survey questionnaires. The survey questionnaires access the relevant socio-demographic characteristic of respondents, knowledge, risk perception and attitude to COVID-19 vaccine. The questionnaire was made up of four sections, with each section assessing respectively the demographic characteristic, knowledge, risk perception and attitude of individual respondent to COVID-19 vaccine.

The first part contains information regarding socio-demographic background of the respondents (gender, age, religion, marital status, level of education, employment etc.). In the second section, 12 questions were used to collect information regarding knowledge related to COVID-19, the

availability of the vaccine and their attitude towards the vaccine. Each answer was be graded from 0 (incorrect answers) and 1(correct answers). The maximum score a respondent could obtain was 12 and a minimum of 0. Based on the scores, 0-5 were classified as having “poor” knowledge, scores of 6-9 were classified as “moderate” knowledge and scores of 10-12 were classified as “good” knowledge. While the remaining part assessed participants` knowledge, perception and readiness to participate in the COVID-19 vaccine trial: awareness of COVID-19 (2 items), source of information (1 item), risk of exposure (3 items), previous testing and treated for COVID-19 (2 items), signs and symptoms of COVID-19 (1 item), prevention and control (1 item), history of past vaccination (2 items), COVID-19 vaccine development (11 items) and readiness to take the COVID-19 vaccine (4 items). The survey will be self-paced, so the participants had sufficient time to read, comprehend, and answer all the questions.

2.10. Data Management and Analysis

Data was entered using Microsoft excel version 2013 and analyzed using Statistical Package for the Social Sciences software (SPSS) version 25, Chicago, IL. Descriptive statistics was carried out for measurement of frequencies and percentages of the variables. The knowledge variables was recorded to binary level such that respondents with correct option in the knowledge variables were coded 1, while not having correct knowledge was coded 0. Good knowledge of participants on COVID-19 was determined by a knowledge score of $\geq 70\%$ and lesser scores were considered to have poor knowledge. Attitude of Nigerians was grouped into “willing” and “not willing” based on their responses to the related questions. Beyond descriptive statistics, bivariate analysis was conducted using chi-square and bivariate logistic regression and statistical significance determined by $P < 0.05$ to identify predictors of attitudes of Nigerians to taking of the COVID-19 vaccines. Significant variables in the bivariate analysis were included in the multivariate logistic regression model. Statistical analysis outputs were presented in form of tables and charts.

2.10.1. Confidentiality

The data of all participants was identified by codes. The print data will be kept safe in a secured office locker during and after the study and electronic data will be stored in a password-protected computer system.

2.10.2. Beneficence

The respondents were informed that the result of the research would benefit all Nigerians who would be adequately informed on the knowledge, perception of COVID-19 vaccine. The respondents would be made to understand that the findings from the study would help policy makers, and government to develop interventions to improve COVID-19 vaccines.

3. Results

Table 1. Socio-demographic characteristics of the participants.

Socio-demographics	N = 309	%
Age group		
18-25 years	84	27.2
26-33 years	52	16.8
34-41 years	50	16.2
42-49 years	72	23.3
Above 50 years	51	16.5
Gender		
Female	147	47.6
Male	162	52.4
State of origin		
Ekiti	40	12.9
Lagos	16	5.2
Ogun	27	8.7
Ondo	21	6.8
Osun	117	37.9
Oyo	88	28.5
Religion		
Christianity	280	90.6
Islam	29	9.4
Highest educational level		
Primary	1	.3
Secondary	9	2.9
Tertiary	299	96.8
Occupation		
Artisan	14	4.5
Civil Servant	72	23.3
Clergy	5	1.6
Farmer	4	1.3
Medical Professional	61	19.7
Medical Student	25	8.1
Non-Medical Professional	50	16.2
Non-Medical Student	15	4.9
Retiree	8	2.6
Trader	13	4.2
Unemployed	42	13.6

Socio-demographics	N = 309	%	Variable	N = 309	%
Monthly income			Yes	305	98.7
≤ N18, 000	11	3.6	No	2	0.6
N18,000-N 50,000	58	18.8	Maybe	2	0.6
N50,000-N 100,000	78	25.2	Are you aware that there are several candidate COVID-19 Vaccine being develop		
≥ N100,000	108	35.0	Yes	254	82.2
None	54	17.5	No	25	8.1
			Maybe	30	9.7
			Are you aware that Nigeria had procured the WHO COVID-19 vaccine?		
			Yes	254	82.2
			No	39	12.6
			Maybe	16	5.2

3.1. Socio-demographic Characteristics of Respondents

There were 309 respondents recruited for this study as shown in Table 1. Respondents age ranges from 18-50 years old with mean age of 28.3±6.8 years, more than half of the respondents (52.4%) were male, more than one-third of the respondents were from Osun state (28.5%) followed by Oyo state. Majority of the respondents were Christians (90.6%), while almost all the respondents had tertiary education (96.8%). About 23.3% of the respondents were civil servants as more than one third (35.0%) of the respondents earned a monthly income above 100,000 naira.

Table 2. Knowledge of COVID-19 vaccine among Nigerians in the south west.

Variable	N = 309	%
Are you aware about the COVID-19 Vaccine		

3.2. Respondents' Knowledge of COVID-19

The general knowledge of COVID-19 vaccine was good as almost all respondents (91.9%) reportedly had good knowledge of COVID-19 vaccine (Table 2). Three hundred and five respondents (98.7%) were aware of COVID-19 vaccine. Also, about two hundred and fifty-four (82.2%) of the respondents stated that they were aware that there are several candidate COVID-19 vaccines being developed and this same number (82.2%) of respondents reportedly mentioned that they are aware that Nigeria had procured the WHO COVID-19 vaccine.

Table 3. Perception about the COVID-19 Vaccine among Nigerians in south west.

Variables	A(%)	D(%)	U(%)
Do you think the development of a vaccine can help in the fight against the pandemic?	273 (88.3)	16 (5.2)	20 (6.5)
Based on what I know, I have a positive stand on the COVID-19 vaccine	202 (65.4)	43 (13.9)	64 (20.7)
Are you aware of any side effects of COVID-19 vaccines available?	218 (70.6)	40 (12.9)	51 (16.5)
Based on the information in 54 can you still take the vaccine?	201 (65.0)	40 (12.9)	68 (22.0)
If you know the COVID-19 vaccine can affect your daily life activity after taking it, will you still make yourself available for it	141 (45.6)	114 (36.9)	54 (17.5)
Do you agree that COVID-19 will finally be successfully controlled using the vaccine	198 (64.1)	38 (12.3)	73 (23.6)
Do you think the COVID-19 vaccine will be affordable and accessible by the common man?	206 (66.7)	57 (18.4)	46 (14.9)
Do you think the vaccine should be administered free of charge in Nigeria	285 (92.2)	10 (3.2)	14 (4.5)

3.3. Respondents' Perception about the COVID-19 Vaccine

The overall perception of the respondents was good as two hundred and forty (77.7%) of the respondents had good perception towards COVID-19 vaccine as depicted in Table 3. Majority of the respondents (88.3%) were of the opinion that the development of a vaccine can help in the fight against the pandemic, while 65.5% stated that based on what they know, they have a positive stand on the COVID-19 vaccine. In addition, majority (70.6%) stated that they are aware of side effects of COVID-19 vaccines available and based on this;

about 65% stated that they could still take the vaccine. However, less than half (45.6%) stated that if they know the COVID-19 vaccine can affect their daily life activities after taking it, they will still make themselves available for it and majority (64.1%) said that they agree that COVID-19 will finally be successfully controlled using the vaccine. Two hundred and six (66.7%) of the respondents agreed that the COVID-19 vaccine will be affordable and accessible by the common man, while almost all the respondents (92.2%) agreed that the vaccine should be administered free of charge in Nigeria. (Table 3)

Table 4. Awareness and Misinformation of COVID-19 among Nigerians in the south west.

Variable	N = 309	%
To the best of your knowledge, the novel Corona virus is #		
(a) a biological weapon designed by the government of China	139	44.0
(b) a virus designed by pharmaceutical industry to sell their drugs	45	15.2
(c) an exaggeration by news media to cause fear and panic	47	15.2
(d) a severe illness transmitted to people from wild animals	150	48.5
(e) a plague caused by sins and unbelief of human being	19	6.1
(f) designed to reduce or control the population	66	21.4
(g) a biological weapon designed by the USA government	21	6.8
The Corona virus is typically spread by which means? #		
(a) contact with airborne droplets via breathing, sneezing or coughing	296	95.8
(b) kissing, hugging, sex or other sexual contact	87	28.2
(c) eating of contaminated water or food	25	8.1
(d) touching contaminated objects or surfaces	184	59.5
(e) through 5G phone network or masts	8	2.6
(f) using the test-kits or vaccine	13	4.2
(g) living a sinful life	6	1.9
Corona virus can be prevented by #		
(a) the hot weather of Africa	56	18.1
(b) regular hand washing and social distancing	284	91.9
(c) taking Chloroquine capsules and antibiotics	21	6.8
(d) fumigation and spraying bus stops and other public places	97	31.4
(e) consuming gins, garlic, ginger, herbal mixture and traditional food and soup	27	8.7
(f) closing schools and cancelling mass gathering events	44	14.2
(g) disinfecting contaminated surfaces	169	54.7
(h) anointing oil and prayers	12	3.9
The most important symptoms of COVID19/Coronavirus are #		
(a) cough	248	80.3

Variable	N = 309	%
(b) fever	224	72.5
(c) fatigue	142	45.9
(d) sneezing	200	64.7
(e) sore throat	206	66.7
(f) muscle pain	98	31.7
(g) shortness of breath	242	78.3
(h) I do not know any symptoms of COVID19/Corona virus	5	1.6

3.4. Awareness and Misinformation

Less than half of the respondents (44.0%) stated that Corona virus is a biological weapon designed by the government of China, (15.2%) believe that it is a virus designed by pharmaceutical industry to sell their drugs, likewise similar respondents (15.2%) opined that the virus is an exaggeration by news media to cause fear and panic (see Table 4). Furthermore, (48.5%) mentioned that it is a severe illness transmitted to people from wild animals as another minority (6.1%) said it is a plague caused by sins and unbelief of human being. Less than one-third of the respondents (21.4%) also mentioned that the virus was designed to reduce or control the population and another minority (6.8%) said that it is a biological weapon designed by the USA government. Majority (95.8%) reportedly mentioned contact with airborne droplets via breathing, sneezing or coughing as means through the

virus can spread, while 28.2% opined that it is spread through kissing, hugging, sex or other sexual contact. (8.1%) stated that it is spread through eating of contaminated water or food, while (59.5%) stated that it could spread through touching contaminated objects or surfaces. (2.6%), thirteen (4.2%) and (1.9%) stated 5G phone network or masts, using the test-kits or vaccine and living a sinful life respectively.

Fifty-six (18.1%) of the respondents stated that the hot weather of Africa can prevent the spread, while majority (91.9%) were of the opinion that it can be prevented through regular hand washing and social distancing. Minority (6.8%) stated that the virus could be prevented by taking Chloroquine capsules and antibiotics, while fumigation and spraying bus stops and other public places was cited by about one-third (31.4%) as means of preventing the virus. Furthermore, consuming gins, garlic, ginger, herbal mixture and traditional food and soup were mentioned by some respondents.

Table 5. Perception about the COVID-19 disease among Nigerians in the south west.

Variables	A (%)	D (%)	U (%)
It is possible to die from the Coronavirus?	280 (90.6)	14 (4.5)	15 (4.9)
The full meaning of COVID-19 is Corona Virus Disease 19	277 (89.6)	21 (6.8)	11 (3.6)
COVID-19 was first recorded in China	301 (97.4)	4 (1.3)	4 (1.3)
COVID-19 is a disease that affects both young and old but more severe among aged persons 60 years and above with health issues such as diabetes, hypertension, stroke	295 (95.5)	8 (2.6)	6 (1.9)
COVID-19 is an infection caused by virus	297 (96.1)	6 (1.9)	6 (1.9)
COVID-19 CAN NOT be transmitted from one infected person to another	26 (8.4)	278 (90.0)	5 (1.6)
COVID-19 can be transmitted by touching surfaces like doorknob	270 (87.4)	25 (8.1)	14 (4.5)
COVID-19 CAN NOT be transmitted through sneezing from infected person	52 (16.8)	253 (81.9)	4 (1.3)
The COVID-19 virus spreads via droplet of an infected person	287 (92.9)	13 (4.2)	9 (2.9)
Prevention is possible by using ONLY water to wash one's hands	32 (10.4)	271 (87.7)	6 (1.9)
Use of facemask is good to prevent the transmission of COVID-19	295 (95.5)	7 (2.3)	7 (2.3)
Social distancing is good to prevent the transmission of COVID-19	300 (97.1)	3 (1.0)	6 (1.9)

Variables	A (%)	D (%)	U (%)
Covering of mouth when coughing is NOT needed to prevent the transmission of COVID-19	34 (11.0)	271 (87.7)	4 (1.3)
To prevent being infected with COVID-19, individual should use face mask when going to crowded places	298 (96.4)	7 (2.3)	4 (1.3)
Avoiding contact with anyone with catarrh or any other symptoms of Cold is a good way to prevent the transmission of COVID-19	265 (85.8)	29 (9.4)	15 (4.9)
To prevent being infected with COVID-19, individual should wash hand with soap and water regularly	303 (98.1)	4 (1.3)	2 (0.6)
There is vaccine provided to help the prevention of COVID-19	273 (88.3)	18 (5.8)	18 (5.8)
Isolation and treatment of people who are infected with COVID-19 virus are effective ways to reduce the spread of the virus	293 (94.8)	10 (3.2)	6 (1.9)
I feel COVID-19 is not real it is an avenue for government to embezzle money	24 (7.8)	244 (79.0)	41 (13.3)
I feel COVID-19 is the same thing as ordinary Malaria and I should not fear it	19 (6.1)	269 (87.1)	21 (6.8)
COVID-19 cannot affect me because I am an African child	15 (4.9)	280 (90.6)	14 (4.5)
COVID-19 can lead to premature death	285 (92.2)	11 (3.6)	13 (4.2)
COVID-19 is caused by witches and wizards	6 (1.9)	293 (94.8)	10 (3.2)
I feel I cannot contract COVID-19 because I use Traditional Herbs (Agbo) and medicine	18 (5.8)	272 (88.0)	19 (6.1)
I feel COVID-19 is no longer affecting people	22 (7.1)	265 (85.8)	22 (7.1)
I cannot get infected if I come in contact with an infected person	21 (6.8)	276 (89.3)	12 (3.9)
COVID-19 cannot be prevented	19 (6.1)	278 (90.0)	12 (3.9)
It is NOT advisable to go to the hospital once infected with COVID-19	41 (13.3)	254 (82.2)	14 (4.5)
COVID-19 infection is not a stigma, and I should not hide when I get infected	248 (80.3)	48 (15.5)	13 (4.2)

Majority (90.6%) believed that it is possible to die from the Coronavirus, while similar proportion (89.6%) reportedly agreed that the full meaning of COVID-19 is Corona Virus Disease 19 (Table 5). In addition, almost all respondents (97.4%) believed that COVID-19 was first recorded in China and 95.5% agreed that COVID-19 is a disease that affects both young and old but more severe among aged persons 60 years and above with health issues such as diabetes, hypertension, stroke. Almost all respondents (96.1%) agreed that COVID-19 is an infection caused by virus; while majorities (90.0%) of the respondents disagree, that COVID-19 cannot be transmitted from one infected person to another. Two hundred and seventy (87.4%) of the respondents agreed that COVID-19 can be transmitted by touching surfaces like doorknob, while two hundred and fifty-three (81.9%) disagree that COVID-19 cannot be transmitted through sneezing from

infected person. In addition, 92.9% agreed that COVID-19 virus spreads via droplet of an infected person as another 87.7% disagree that prevention is possible by using ONLY water to wash one's hands. The use of facemask was agreed to be good to prevent the transmission of COVID-19 by 95.5% of the respondents, while social distancing was agreed as good to prevent the transmission of COVID-19 by three hundred (97.1%) respondents. Majority of the respondents (87.7%) reportedly disagree that covering of mouth when coughing is not needed to prevent the transmission of COVID-19. Furthermore, majority (96.4%) agreed that to prevent being infected with COVID-19, individual should use face mask when going to crowded places and most of the respondents (85.8%) agreed that avoiding contact with anyone with catarrh or any other symptoms of Cold is a good way to prevent the transmission of COVID-19.

Table 6. Association between knowledge and some socio-demographics factors among Nigerians in the southwest. *P* value <0.05.

Variables	Knowledge		Chi-square	df	P-value
	Good	Poor			
Highest Educational level			0.910	2	0.635
Primary	1 (100)	0 (0)			
Secondary	9 (100)	0 (0)			
Tertiary	274 (91.6)	25 (8.4)			
Age group			4.734	4	0.316
18-25 years	80 (95.2)	4 (4.8)			
26-33 years	47 (90.4)	5 (9.6)			
34-41 years	45 (90.0)	5 (10.0)			
42-49 years	63 (87.5)	9 (12.5)			
Above 50 years	49 (96.1)	2 (3.9)			
Monthly income			2.861	4	0.581
≤ N18, 000	10 (90.9)	1 (9.1)			
N18,000-N 50,000	55 (94.8)	3 (5.2)			
N50,000-N 100,000	71 (91.0)	7 (9.0)			
≥ N100,000	101 (93.5)	7 (6.5)			
None	47 (87.0)	7 (13.0)			
Religion			0.928	1	0.336
Christianity	256 (91.4)	24 (8.6)			
Islam	28 (96.6)	1 (3.4)			

Hypotheses:**Hypothesis 1****Level of education.**

There is no significant association between the level of education of the adult men and their knowledge and perception. Chi-square test analysis was used in testing this hypothesis level of education of the adult men and their knowledge and perception of COVID-19. Data showed that there was no significant association between respondents' level of education and their knowledge and perception.

($X^2=0.910$, $df=2$, $p>0.05$). Therefore, the null hypothesis is accepted

Age.

There is no significant association between the age of the adult men and their knowledge and perception

Chi-square test analysis was used in testing this hypothesis age group of the adult men and their knowledge and perception of COVID-19. Data showed that there was no significant association between respondents' age and their knowledge and perception.

($X^2=4.734$, $df=4$, $p>0.05$). Therefore, the null hypothesis is

accepted

Monthly income.

There is no significant association between the monthly income of the adult men and their knowledge and perception. Chi-square test analysis was used in testing this hypothesis monthly income of the adult men and their knowledge and perception of COVID. Data showed that there was no significant association between respondents' monthly income and their knowledge and perception.

($X^2=2.861$, $df=4$, $p>0.05$). Therefore, the null hypothesis is accepted

Religion.

There is no significant association between the religion of the adult men and their knowledge and perception Chi-square test analysis was used in testing this hypothesis religion of the adult men and their knowledge and perception of COVID. Data showed that there was no significant association between respondents' religion and their knowledge and perception.

($X^2=0.928$, $df=1$, $p>0.05$). Therefore, the null hypothesis is accepted.

Hypothesis 2

There is no significant association between the knowledge and the perception on the COVID-19 vaccine.

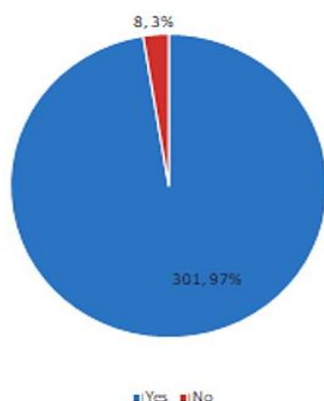


Figure 1. Pie chart showing awareness of the COVID-19 disease among Nigerians in the southwest.

4. Discussion

This article was previously posted to the Research square preprint server on 21 October 2023 to welcome suggestions and comments to improve the quality of the work.

Adult Nigeria COVID-19 vaccination respondents in the southwest region were between 18-50 years of age, with a mean age of 28.3 ± 6.8 years similar to earlier study of [16]. This is less than studies of [6-9], the mean ages of the respondents. Males accounted for more than half of all respondents (52.4%) similar to [7, 8] in contrast to the study of [7-9] who reported more females.

Osun State accounted for more than one-third of the responses received (37.9%) similar to [6] because the researchers are based there and disseminate the questionnaires among their contacts, this is not unexpected. 96.8% of the respondents constituted the majority and had completed their higher education. This is a higher percentage than in the study published by [11-14], where 53.2% of the respondents are in the majority. 90.6% of the respondents identified as Christians in line with [6].

With 23.3% of the respondents being civil servants more than one-third of the respondents 35.0% earned a monthly income above 100,000 naira this is contrary to the report of [9, 16].

Knowledge of COVID-19 vaccine by the respondents

Almost all respondents (91.9%) declared a solid knowledge of the COVID-19 vaccination. This is similar to a study conducted across six geopolitical zones and the Federal Capital Territory to evaluate knowledge of the COVID-19 vaccine, which was based on the number of exact responses given in comparison to average scores and found that 90.3% of respondents was conscious of the COVID-19 virus [14]. As stated in this study, 8.1% of adult Nigerian respondents are unaware of the COVID-19 virus. This is probably due to the

dissemination of information via social media, radio and television station jingles, public awareness, sensitization, and signposting. This finding is consistent with a study by [15], who found that the public's perceptions and knowledge of the COVID-19 virus was greater amongst respondents who were considered less educated compared to those that are healthcare professionals. This is similar to the studies by [16] who discovered that healthcare workers are relatively willing to be vaccinated against COVID-19, with 62.5% of respondents knowing more than half of the information they needed. (Table 2)

Respondents' perception about the COVID-19 Vaccine.

Two hundred forty (77.7%) of the respondents had a favorable view of the COVID-19 vaccination and resonance of the results, suggesting the majority of respondents' overall perception was favorable [6, 9-11]. 88.3% of respondents thought that the development of a vaccine could help in the fight against the pandemic, and 65.5% said that, because of their knowledge, they favored the COVID-19 vaccine, which is consistent with reports [9-11]. Furthermore, the majority (70.6%) agreed they are aware of the COVID-19 vaccines' adverse reactions, and approximately 65% agreed they could still take the vaccine while they await their results [17-20]. Less than half (45.6%), however, said they were still going to make themselves available for the COVID-19 vaccine regardless of how they learned it could impact their daily activities after taking it, and the majority (64.1%) accepted that the vaccine is likely to be successful in managing COVID-19 [18-20]. Sixty-six people (66.7%) of the respondents agreed that the COVID-19 vaccine will be affordable and readily available for the average citizen, while almost everyone (92.2%) agreed that the vaccine should be given in Nigeria at no charge, which is consistent with the results of [6, 9](Table 3)

Awareness and misinformation about COVID-19

On COVID-19/Coronavirus awareness and misinformation; in this section, respondents were asked to respond to their understanding of the virus's existence, symptoms, and prevention approaches. This requires a response. Our results demonstrate that the majority of respondents have an understanding of the conventional description of Coronavirus illnesses, which consists of a viral infection that disrupts affected individual's respiration. This can be due to the Nigeria Centre for Disease Control (NCDC) and the World Health Organization's frequent awareness and sensitization commercials on television, radio, and other social media.

The majority of the respondents believed Coronavirus is a severe illness transmitted to people from wild animals or a biological weapon designed by the government of China, with an average of about 150 (48.5%) and 139 (44.0%) respectively. The minority believed Coronavirus is designed to reduce or control the population, an exaggeration by the news media to cause fear and panic, a virus designed by the pharmaceutical industry to sell their drugs, a biological weapon designed by the USA. This result aligns with previous find-

ings in other parts of Nigeria and other parts of the world [8, 11], indicating an elevated level of awareness regarding coronavirus. A summary of the results of the survey, the majority of respondents were aware that COVID-19/Coronavirus can be spread by breathing, coughing, sneezing, or touching contaminated objects or surfaces. Nevertheless, a significant number of the respondents assumed it might be transmitted by kissing, hugging, sex or other sexual contact, eating contaminated food or water, using test kits or vaccinations, moving over 5G mobile phone networks or masts, and resulting a sinful life. The findings proved similar to previous studies by [11]. Many respondents agree that Coronavirus can be prevented by regular hand washing, social distancing, and disinfecting contaminated surfaces 284(91.9%), 169(54.7%), however, few respondents believed that Coronavirus can be prevented by fumigation and spraying bus stops and other public places, the hot weather of Africa, closing schools and canceling mass gathering events, consuming gins, garlic, ginger, herbal mixture, and traditional food and soup, taking Chloroquine This is consistent with contribution of [11].

According to the survey, the most important symptoms of COVID-19/Coronavirus are in the following order: shortness of breath, cough, fever, sore throat, sneezing, fatigue, and muscle pain with 248 (80.3%), 242 (78.3%), 224 (72.5%), 206 (66.7%), 200 (64.7%), 142 (45.9%), and 98 (31.7%) respectively, while 5(1.6%) claimed they do not know any symptoms of COVID19/Coronavirus in line with the result of [12], who listed the symptoms as Symptoms include fever, cough, dyspnea, weakness and fatigue, headache and diarrhea.(Table 4)

Sources of information about COVID-19

Respondents were asked where they learnt new information about COVID-19. With 274 respondents, the majority claim they got current information from mass media (television, radio, newspapers, posters, etc.). The mainstream media re-

mains a reliable source of information. COVID-19 information was no exception, as the mass media performed its duty of informing, raising awareness, and sensitizing the public about the disease during the COVID-19, Delta, and Omicron variants. The media provides the public with valuable information on transmission, prevention, fresh COVID-19 case the figures for death tolls, and recovered patients. This is closely followed by the internet [17], where people look for information about COVID-19. Similarly, respondents (214) mentioned social media as a source of new COVID-19 information As it currently stands, social media is filled with COVID-19 information, making it easier for people to get current and precise knowledge about the disease. The challenge is that people could be misled by both wrong and fake information regarding the circumstance, in addition to reliable information on it. These multiple sources of information are all encompassing since they meet the information needs of both literates and illiterates while simultaneously bridging society's digital divide.

5. Conclusions

Our research shows that national public health campaigns in Nigeria have effectively increased COVID-19 knowledge and reduced misinformation concerning vaccination and mass drug administration. Nevertheless, misinformation surrounding the vaccination process remains a concern, necessitating intensified efforts through telecommunications and social media. We advise the community to be vigilant against misinformation, to consult healthcare providers for accurate information, and to support evidence-based public health practices. Moreover, public health authorities should continuously reassess and adapt monitoring and evaluation strategies to address new challenges posed by COVID-19 pandemic.

Abbreviations

COVID-19	Coronavirus Disease
SARS-CoV-2/2019-nCoV	Severe Acute Respiratory Syndrome Coronavirus-2
NPHCDA	National Primary Health Care Development Agency
WHO	World Health Organization
COVER	COVID-19 Vaccine Ethics Research

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Conflicts of Interest

The authors declare no conflicts of interest.

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