

Exposure to COVID-19 misinformation and its association with vaccine uptake in Southwest Nigeria

Henry Osaro Aisagbonhi

henry.aisagbonhi@hotmail.com

University of Ibadan

Ebele Eugenia Onwuchuluba

University of Lagos

Esther Ametor Ajakaiye

Reformers World Foundation

Azeezat Abimbola Oyewande

Lagos State Health Service Commission/General Hospital

Yejide Olukemi Oseni

Lead City University

Odofin Mayowa Omolabake

Lagos University Teaching Hospital

Ezioma Anne Chukwu

AIDS Healthcare Foundation

Ukamaka Gladys Okafor

EUCLID University, Global Health and Health Systems Research

Ifeoluwa Abiodun

Babcock University

Treasure Wariboko Obiajulu

Henry Jackson Foundation for Medical Research International

Oluwadamilola Aminat Sadare

Babcock University

Research Article

Keywords: COVID-19 infodemic, misinformation exposure, vaccine uptake, risk communication, social media, Nigeria

Posted Date: April 16th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-9120312/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.
[Read Full License](#)

Additional Declarations:

No competing interests reported.

Table 3 To 5 are available in the Supplementary Files section.

TITLE

Exposure to COVID-19 misinformation and its association with vaccine uptake in Southwest Nigeria

AUTHORS:

1. Henry Osaro Aisagbonhi

Department of Health Policy and Management, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria

2. Ebele Eugenia Onwuchuluba

Department of Clinical Pharmacy and Bio pharmacy, Faculty of Pharmacy, University of Lagos, Akoka, Lagos state, Nigeria

3. Esther Ametor Ajakaiye

Independent Researcher. Reformers World Foundation. Sagamu, Ogun State Nigeria

4. Azeezat Abimbola Oyewande

Lagos State Health Service Commission/General Hospital Odan, Lagos. Nigeria

5. Yejide Olukemi Oseni

Department of Clinical Pharmacy and Pharmacy Administration, Faculty of Pharmacy, Lead City University. Oyo State, Nigeria

6. Odofin Mayowa Omolabake

Lagos University Teaching Hospital: Department of Haematology and blood transfusion, (ART Clinic) / Idi-Araba, Lagos. Nigeria

7. Ezioma Anne Chukwu

Aids Healthcare Foundation, Los Angeles CA

8. Ukamaka Gladys Okafor

Global Health and Health Systems Research, Department of Global Health and Bioethics EUCLID University, Bangui

26 9. Ifeoluwa Abiodun

27 Medical Laboratory Department, Babcock University, Ikenne, Ogun State. Nigeria

28 10. Treasure Wariboko Obiajulu

29 Laboratory Services, Henry Jackson Foundation for Medical Research International,
30 Abuja. Nigeria

31 11. Oluwadamilola Aminat Sadare

32 Medical Laboratory Department, Babcock University, Ikenne, Ogun State. Nigeria

33 **Corresponding Author**

34 Henry Osaro Aisagbonhi

35 Department of Health Policy and Management, College of Medicine, University of Ibadan,
36 Ibadan, Oyo State, Nigeria.

37 Email: henry.aisagbonhi@hotmail.com, Phone: +234-808-899-7221

1.0. ABSTRACT

Background:

The COVID-19 pandemic was accompanied by widespread misinformation that disrupted public health communication and threatened vaccine confidence globally. Evidence from sub-Saharan Africa on whether exposure to COVID-19 misinformation independently predicts vaccination behaviour remains limited. This study examined the association between misinformation exposure and COVID-19 vaccine uptake in selected communities in Southwest Nigeria.

Methods:

We conducted a cross-sectional analytical study among 420 adults residing in four local government areas in Lagos and Ogun States, Nigeria. Data were collected using an interviewer-administered questionnaire assessing sociodemographic characteristics, sources of COVID-19 information, exposure to misinformation, and receipt of at least one dose of a COVID-19 vaccine. Descriptive statistics and bivariate analyses were performed. Multivariable logistic regression was used to identify factors independently associated with vaccine uptake, adjusting for age, sex, education level, ethnicity, and primary information source.

Results:

Overall, 74.3% of respondents reported receiving at least one dose of a COVID-19 vaccine. Social media platforms, particularly Facebook and WhatsApp, were the most frequently reported information sources. In adjusted analyses, ethnicity and exposure to COVID-19-related misinformation were independently associated with vaccine uptake. Respondents of Yoruba ethnicity had higher odds of vaccine receipt compared with Hausa respondents (adjusted OR 2.52; 95% CI 1.12–5.66; $p=0.025$). Exposure to misinformation was also independently associated with vaccine uptake (adjusted OR

2.06; 95% CI 1.20–3.53; $p=0.009$). Age, sex, education level, and primary information source were not statistically significant predictors.

Conclusions:

In these Southwest Nigerian communities, misinformation exposure and ethnic context were independently associated with COVID-19 vaccine uptake. Public health preparedness efforts should integrate context-sensitive infodemic management strategies that address sociocultural dynamics and information credibility alongside vaccine access.

Clinical trial number: Not applicable.

Keywords: COVID-19 infodemic; misinformation exposure; vaccine uptake; risk communication; social media; Nigeria.

2.0. BACKGROUND

The rapid and large-scale circulation of information has become a defining characteristic of contemporary public health emergencies (1). During infectious disease outbreaks, information spreads alongside pathogens, shaping public perception, risk interpretation, and behavioral response. The World Health Organization (WHO) defines an infodemic as an overabundance of information, both accurate and inaccurate' that spreads rapidly during epidemics and pandemics, making it difficult for individuals to identify trustworthy sources and reliable guidance (2)(3). Infodemics encompass misinformation, disinformation, rumours, stigma, and conspiracy theories, and have been recognized as a significant threat to effective outbreak preparedness and response (3).

The COVID-19 pandemic demonstrated that information environments can directly influence health behaviors, particularly vaccination decisions. Experimental and observational studies across multiple countries have shown that exposure to vaccine-related misinformation can reduce vaccination intent, distort perceived risk, and weaken institutional trust (4)(5). Large-scale analyses of online communication networks further indicate that false information spreads more rapidly and widely than corrective content, amplifying exposure risk within digital ecosystems (6). Consequently, infodemics are increasingly conceptualized not merely as communication noise, but as behavioral determinants capable of shaping public compliance with health interventions.

As vaccine development and distribution accelerated globally (7), the principal challenge in many contexts shifted from supply constraints to acceptance and uptake. In this phase, individuals' ability to interpret and evaluate competing narratives became central to vaccination behavior. Evidence suggests that misinformation exposure may influence vaccine confidence independently of formal education or access to information (8),

120 underscoring the importance of examining information quality and trust dynamics rather
121 than communication volume alone.

122 Nigeria has previously experienced the disruptive effects of misinformation during
123 disease outbreaks, including polio and monkey pox, where rumours and false narratives
124 weakened public trust and impeded control efforts. Historical vaccine resistance in parts
125 of Northern Nigeria illustrates how sociocultural narratives and institutional distrust can
126 undermine immunization campaigns (9). During the COVID-19 pandemic,
127 misinformation dissemination intensified, driven largely by digital media platforms and
128 informal communication networks (3). This surge in misleading information shaped
129 public perceptions of disease severity, preventive behaviors, and vaccine safety (10).

130 Nigeria represents a complex information ecosystem characterized by high social media
131 penetration, linguistic diversity, and variable health literacy (11). In such settings, digital
132 communication platforms can facilitate both rapid dissemination of accurate public
133 health guidance and amplification of conspiracy narratives. Emerging evidence from
134 African contexts indicates that misinformation exposure during COVID-19 was
135 associated with vaccine hesitancy and psychological distress (12). However, regional
136 heterogeneity within Nigeria suggests that local sociocultural dynamics, ethnic
137 composition, and communication infrastructures may shape how misinformation is
138 received and interpreted.

139 Southwest Nigeria, comprising highly urbanized areas such as Lagos alongside peri-
140 urban and semi-urban communities, provides a particularly relevant setting for
141 examining the interplay between information exposure and vaccine behavior. High
142 digital connectivity coexists with socioeconomic diversity, creating an environment

where exposure to competing narratives may be widespread but interpreted differently across social groups.

Existing literature has documented associations between misinformation exposure and vaccine hesitancy globally (4)(5), as well as psychological and behavioral consequences of infodemics during epidemics (12). Within Nigeria, several studies have examined COVID-19 vaccine acceptance, focusing predominantly on sociodemographic determinants such as age, sex, and education level. However, limited research has systematically examined misinformation exposure as a measurable independent variable within multivariable models of vaccine uptake at the community level.

Moreover, few studies have simultaneously analyzed information sources, perceived misinformation exposure, and vaccination behavior across heterogeneous local government settings within Nigeria. This gap is significant because national-level analyses may obscure localized patterns shaped by ethnic composition, communication networks, and contextual trust dynamics. Without community-level evidence, infodemic management strategies risk relying on generalized messaging that may not address context-specific drivers of vaccine decision-making.

This study conceptualizes misinformation not as simply incorrect content but as an information exposure that may influence behavioral outcomes, as information exposure works through cognitive pathways such as risk perception, trust appraisal, and heuristic processing; theoretical models of health behavior, such as trust-based frameworks and risk perception theory, indicate that perceived credibility of information sources and social identity alignment influences responses to health interventions, which means that exposure to misinformation is a potential predictor of vaccine uptake, independent of sociodemographic predictors, and by operationalizing misinformation exposure as a

variable that can be measured, it moves the literature from descriptive accounts of vaccine attitudes to analytical assessment of information environments as determinants of health behavior.

Study Objective

Against this background, the present study investigates the patterns of COVID-19–related information exposure, the prevalence and perceived impact of misinformation, and their association with COVID-19 vaccine uptake among adults in selected local government areas in Southwest Nigeria.

Specifically, the study aims to determine whether exposure to COVID-19–related misinformation is independently associated with self-reported vaccine uptake after adjusting for sociodemographic characteristics and primary information sources.

By addressing this objective, the study seeks to generate context-specific evidence to inform targeted infodemic management, strengthen culturally responsive risk communication strategies, and enhance preparedness for future public health emergencies.

3.0. METHODS

3.1 Study Design

A cross-sectional analytical study was conducted to examine exposure to COVID-19–related misinformation and its association with vaccine uptake among adults in selected Local Government Areas (LGAs) in Southwest Nigeria. The study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies (13).

3.2 Study area

The study was conducted in Lagos and Ogun States, Southwest Nigeria (14)(15). Lagos State is highly urbanised, densely populated and digitally connected, with heterogeneous socioeconomic profiles. Ogun State includes peri-urban and semi-urban communities with varying access to health services and digital infrastructure.

Four Local Government Areas (LGAs) were purposively selected to reflect urban and semi-urban populations: Alimosho and Eti-Osa LGAs (Lagos State), and Sagamu and Ikenne LGAs (Ogun State). Within each LGA, three wards were selected: Ikenne (Iperu, Ileshan, Ikenne wards); Sagamu (Sabo I, Sabo II, Ijagba wards); Eti-Osa (Ikoyi, Lekki, Victoria Island wards); and Alimosho (Igando-Ikotun, Egbe-Idimu, Ayobo-Ipaja wards).

3.3 Study participants

Eligible participants were adults aged ≥ 18 years who had resided in the selected wards for at least six months prior to the survey.

Exclusion criteria included: Age below 18 years, refusal to provide informed consent and Incomplete or improperly completed questionnaires

3.4. Sample Size Determination

Sample size was calculated using Cochran's formula for proportions (16), assuming a 95% confidence level ($z=1.96$), 5% margin of error and estimated proportion of 50%, yielding a minimum sample of 385. To account for non-response, 500 questionnaires were distributed. Of these, 488 were returned; 44 were incorrectly completed, 18 were ineligible (underage), and 6 were excluded to maintain proportional allocation. A total of 420 complete responses were included in the final analysis (Table 1). No missing data remained after cleaning.

Table 1. Population Distribution, Estimated Sample Size, and Final Questionnaires Included by Local Government Area (LGA)

Local Government Areas (LGAs)	Ikenne	Sagamu	Eti-Osa	Alimosho	Calculated Sample Size
-------------------------------	--------	--------	---------	----------	------------------------

Total population of LGAs (N = 2,791,226)	118,735 (4.3%)	435,200 (15.6%)	283,791 (10.2%)	1,953,500 (69.9%)	385	215
Proportional sample size allocation by LGA	17	60	39	269	385	
Estimated sample size allocation by LGA	22	78	51	349	500	218
Final number of questionnaires included after data cleaning*	19	65	43	293	420	219
Observed Distribution across LCDAs						222
Ikenne LGA- 19	Sagamu LGA-65	Eti-Osa LGA-43	Alimosho LGA-293			
Observed Distribution across wards						224
Iperu – 6	Sabo I -22	Ikoyi - 15	Igando Ikotun - 98			
Ilesha -6	Sabo II- 22	Lekki -15	Egbe Idimu -98			225
Ikenne -7	Ijagba- 21	Victoria Island - 13	Ayobo Ipaja – 97			

227 3.5. Sampling Technique

228 A multistage sampling technique was employed.

229 Stage 1: Four LGAs were selected,

230 Stage 2: Three wards were selected per LGA,

231 Stage 3: Participant recruitment within wards used systematic and convenience
232 approaches.

233 Systematic selection involved: the first residential building on each street, the first
234 religious center (church/mosque) on each street and the first relaxation or sports-
235 viewing center on each street,

Convenience sampling occurred when: individuals were seated outside residential compounds, individuals were outside religious auditoriums after services, and individuals were seated at relaxation centres and willing to participate

Proportional allocation across LGAs was applied based on population size.

3.6. Research Instrument

Data were collected using a semi-structured interviewer-administered questionnaire developed from existing literature (17)(18)(19)(20). The instrument included sections on sociodemographic characteristics, vaccine acceptance and uptake, information exposure, perceived drivers of misinformation, and perceptions of media and conspiracy beliefs. Interviewers were trained before and after pilot testing to ensure neutrality and standardised administration.

3.7. Validity and Reliability

The questionnaire was pre-tested among approximately 12% of the intended sample in a non-selected LGA (Ikorodu) Lagos. Feedback informed refinement of clarity and structure and the need to retrain the interviewers. Face and content validity were assessed by four public health researchers.

3.8. Variables;

- Outcome Variable;

COVID-19 vaccine uptake was defined as self-reported receipt of at least one dose of a COVID-19 vaccine (Yes = 1; No = 0).

- Exposure Variable;

Exposure to misinformation was derived from responses to the question: "How would you classify the type of information you received during coronavirus crisis?" Response

options included rumours, fake or false news, conspiracy theories and propaganda (multiple responses allowed). Participants selecting at least one of these categories were classified as exposed (1); those selecting none were classified as not exposed (0).

Main Source of Information; Respondents selected platforms from Question 18 (multiple responses allowed).

Classification rule: If any social media platform (WhatsApp, Instagram, Snapchat, Twitter, Facebook) was selected → Social media dominant.

If only traditional media (reported under “Others,” e.g., TV, radio, newspaper) was selected → Traditional media dominant.

Covariates:

Age was categorised as 18-20, 20-30, 31-40, 41-50 and >50 years and entered as an ordinal variable (trend model) in multivariable analysis.

Education was grouped for regression analysis as low (no formal education and primary), medium (secondary, OND, HND) and high (university and postgraduate, reference category). Bivariate analysis presented original categories for descriptive completeness.

3.9. Data collection procedure;

Data collection was conducted between July 2023 and February 2024 across selected wards in the four study LGAs. Trained research assistants administered the semi-structured questionnaire through face-to-face interviews in residential areas, religious centres, and community gathering points. Eligible participants were approached systematically within selected streets and invited to participate after explanation of the study objectives. Written informed consent was obtained prior to questionnaire administration, and participation was voluntary and anonymous. Completed questionnaires were reviewed on-site for completeness and consistency before being entered into a secure database for subsequent cleaning and analysis.

4.0. DATA ANALYSIS

Data were analysed using Microsoft Excel and Epi Info™ version 7.2.7.0 (2025). Descriptive statistics summarised participant characteristics. Bivariate associations between independent variables and vaccine uptake were assessed using chi-square tests. Multivariable logistic regression was performed with vaccine uptake (Yes=1; No=0) as the dependent variable. Adjusted predictors included age (ordinal trend), sex, education level, ethnicity, main information source and exposure to misinformation. Adjusted odds ratios (AORs) with 95% confidence intervals were reported. Model fit was assessed using the score test and likelihood ratio test. Complete-case analysis was conducted (n=420). Variables included in the multivariable model were selected a priori based on theoretical relevance to vaccine behaviour and information exposure rather than solely on bivariate statistical significance.

To minimise potential sources of bias, a multistage sampling approach with proportional allocation across selected LGAs was employed to enhance internal representativeness. Interviewers were trained to ensure standardised administration of the questionnaire and reduce interviewer bias. The questionnaire was pre-tested to improve clarity and reduce measurement error. Self-reported responses were collected anonymously to minimise social desirability bias. Exposure and outcome variables were clearly operationalised prior to analysis to reduce misclassification. In multivariable analysis, adjustment for key sociodemographic variables was undertaken to address potential confounding.

5.0. RESULTS

Participant Flow

Of 500 questionnaires distributed, 488 were returned. After excluding 44 incorrectly completed forms, 18 ineligible respondents, and 6 removed to maintain proportional allocation, 420 complete responses were included in the final analysis.

Descriptive Data

The mean age of respondents was 34.8 ± 9.6 years. Females constituted 58.3% of the sample. Yoruba ethnicity accounted for 72.9%, and Christianity was the predominant religion (70.5%). More than one-third had university or postgraduate education. Full sociodemographic distribution is presented in Table 2.

Table 2: Sociodemographic Characteristics of Respondents

Variables	Frequency (n)	Percent (%)
Gender		
Female	245	58.3
Male	175	41.7
Age (year)		
<20	17	4.0
20-30	134	31.9
31-40	167	39.8
41-50	77	18.3
>50	25	6.0
Mean Age $\pm$ (SD)		
34.8 years $\pm$ 9.6 years		
Ethnicity		
Hausa	30	7.1
Igbo	69	16.4
Yoruba	306	72.9
Others	15	3.6
Religion		
Christianity	296	70.5
Islamic	120	28.6
Others	4	0.9
Educational Status		
No education	21	5.0
Primary	34	8.1
Secondary	66	15.7
H.N.D	60	14.3
O.N.D	84	20.0
University graduate	109	25.9
Postgraduate	46	10.9
Marital Status		

Divorced	14	3.3
Married	241	57.4
Single	155	36.9
Widow	10	2.4
Employment Status		
Employed	181	43.1
Self employed	122	29.1
Student	38	9.1
Unemployed	79	18.81%

315 Vaccine Uptake

316 Overall, 74.3% (n=312) reported receiving at least one dose of a COVID-19 vaccine.

317 Vaccine acceptance was reported by 73.8%, and 60.0% reported confidence in the

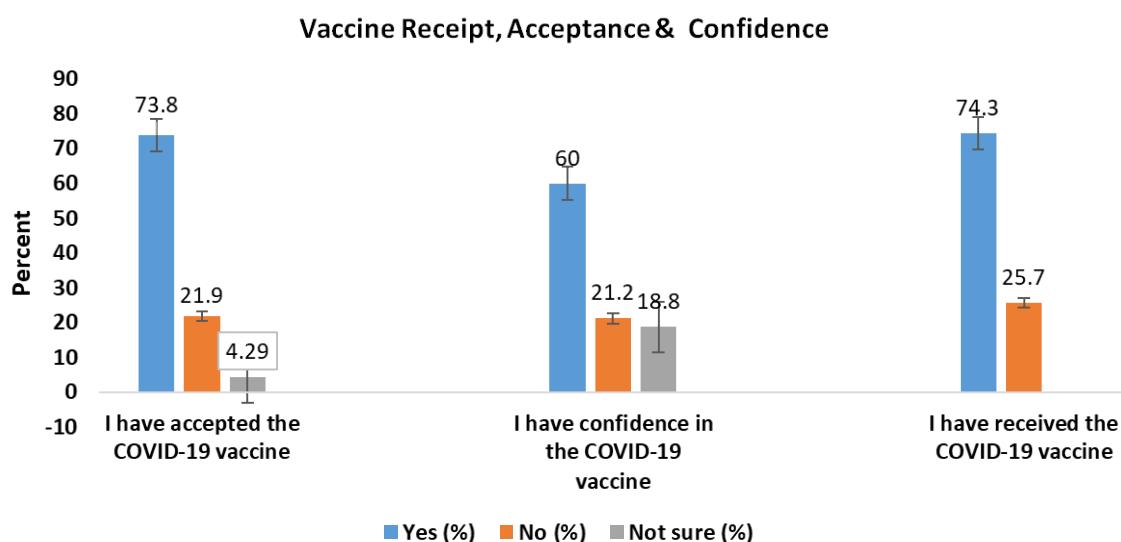
318 vaccine (Figure 1).

319 Among unvaccinated respondents, commonly reported reasons included concern about

320 information heard (28.7%), fear of side effects (26.9%), and doubt about effectiveness

321 (24.0%).

322 Figure 1: Levels of vaccine Acceptance, and Confidence among the Respondents

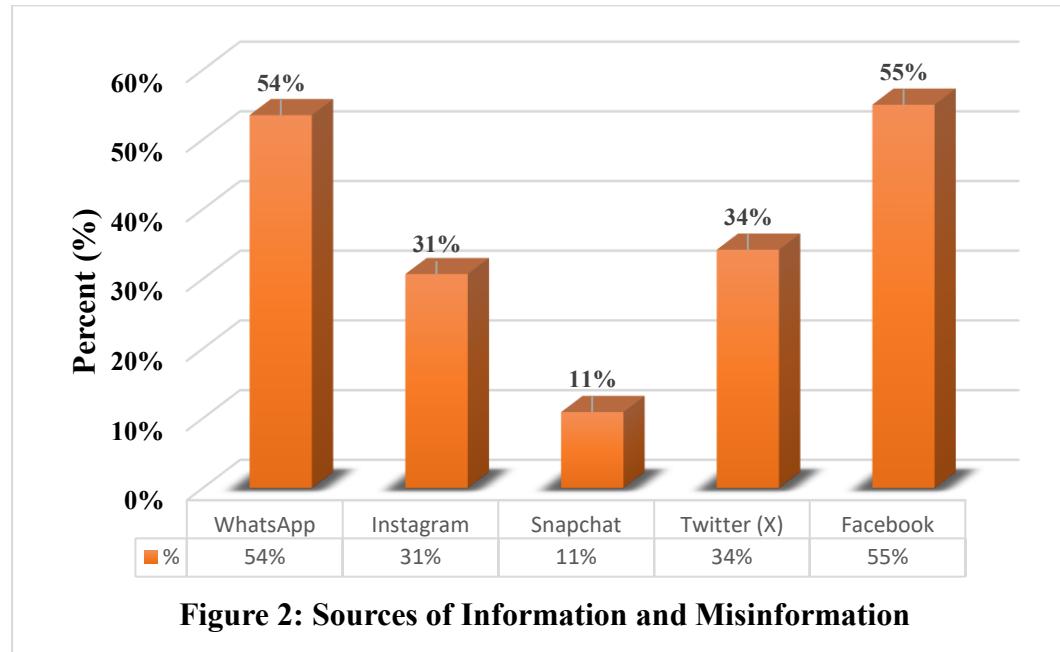


323

324 Information Exposure

A total of 91.2% reported access to COVID-19 information during the pandemic. Social media platforms were frequently selected - Figure 2. Exposure to misinformation categories was commonly reported- Table 3.

Figure 2: Sources of Information and Misinformation



Regarding the nature of information encountered, respondents commonly classified circulating information as conspiracy theories (27.1%), false news (25.9%), and rumours (22.6%) (Table 4).

More than half of respondents (58.5%) reported that exposure to COVID-19-related information had a personal impact, including confusion, altered thinking, mental health effects, reduced confidence, and reduced trust in health authorities (Table 5).

Bivariate Analysis

Age group, ethnicity, and marital status were significantly associated with vaccine uptake ($p < 0.05$) - Table 6.

Multivariable Analysis

In multivariable logistic regression analysis, two variables remained independently associated with vaccine uptake (Table 7):

- Yoruba ethnicity (vs Hausa): AOR 2.52; 95% CI 1.12–5.66; p=0.025
- Exposure to misinformation: AOR 2.06; 95% CI 1.20–3.53; p=0.0088

Age (ordinal trend), sex, education level, and main information source were not statistically significant.

The model converged in four iterations. The score test ($\chi^2=33.77$, df=9, p=0.0001) and likelihood ratio test ($\chi^2=31.60$, df=9, p=0.0002) indicated overall model significance.

Table 6: Association between Respondents Socio-demographics and COVID-19 vaccine uptake

Variables	Received COVID-19 Vaccine		P-Value
	No n (%)	Yes n (%)	
Age			
18-20	10 (58.8)	7 (41.2)	0.001*
21-30	43 (32.1)	91(67.9)	
31-40	25 (15.0)	142 (85)	
41-50	23 (29.9)	54 (70.1)	
>50	7 (28)	18 (72.0)	
Gender			
Female	58 (23.7)	187(76.3)	0.255
Male	50(28.6)	125 71.4)	
Educational Status			
H.N.D	15.0 (25)	45 (75.0)	0.3716
No Education	7 (33.3)	14 (66.7)	
O.N.D	18 (21.4)	66 (78.6)	
Postgraduate	9 (19.6)	37 (80.4)	
Primary	11(32.4)	23 (67.6)	
Secondary	23 (34.8)	43 (65.2)	
University graduate	25 (22.9)	84 (77.1)	
Religion			0.4772
Christian	78 (26.4)	218 (73.6)	
Islamic	30 (25.0)	90 (75.0)	
Ethnicity			0.0001*
Hausa	12 (40.0)	18 (60.0)	
Igbo	21(30.4)	48 (69.6)	
Others	10 (66.7)	5 (33.3)	
Yoruba	65 (21.2)	241 (78.8)	
Marital Status			
Divorced	4 (28.6)	10 (71.4)	0.0001*
Married	43 (17.8)	198 (82.2)	
Single	59 (38.1)	96 (61.9)	

348 **Widow** 2 (20.0) 8 (80.0)
Observed Significant Association - ()*

Table 7. Multivariable logistic regression analysis: factors independently associated with vaccine uptake.

Variables	Adjusted OR	95% CI	P-Value
Age	1.1328	0.8945	0.3008
Gender (Male/Female)	0.8959	0.5620	0.6440
Education (Low/High)	0.6402	0.3657	0.1186
Education (Medium/High)	0.9393	0.5349	0.8275
Ethnicity (Igbo/Hausa)	1.6751	0.6696	0.2702
Ethnicity (Others/Hausa)	0.3197	0.0832	0.0967
Ethnicity (Yoruba/Hausa)	2.5202	1.1213	0.0253*
Main source of COVID-19 information (Traditional Media (reference: Social media dominant))	1.2791	0.6345	0.4913
Exposure to misinformation (YES/NO)	2.0572	1.1996	0.0088*
CONSTANT	-	-	0.5465
Convergence:	Converged		
Iterations:	4		
Final -2*Log-Likelihood:	447.2372		
Cases Included:	420		
Test	Statistic	D.F.	P-Value
Score	33.7705	9	0.0001*
Likelihood Ratio	31.6025	9	0.0002*
<i>Observed Significant Association - (*)</i>			

349 *Reference categories: Female (gender), High education, Hausa ethnicity, Social media*
350 *dominant (main information source), and Not exposed to misinformation.*

351 **6.0. DISCUSSION**

352 This study demonstrates that COVID-19 vaccine uptake in selected local government
353 areas of Southwest Nigeria was independently associated with exposure to
354 misinformation and ethnic context, rather than conventional sociodemographic
355 predictors such as age, sex, or education. While uptake was relatively high (74.3%),
356 exposure to misinformation remained significantly associated with vaccination behavior
357 even after multivariable adjustment.

358 These results further support the emerging awareness of infodemics as drivers of
359 behavior rather than background noise (21)(22). The fact that misinformation was an
360 independent correlate suggests that vaccination decisions are embedded in interpretive

contexts defined by trust, narrative framing, and social identity. The finding that misinformation exposure was linked to higher vaccine uptake may seem counterintuitive, but it might simply represent high overall information exposure among informed individuals in a saturated information ecosystem, where people often encounter correct as well as incorrect information (23). Exposure does not necessarily translate to endorsement, and it can represent an active search for information, which has been linked to increased vaccine engagement in some situations (8)

The relatively high uptake observed suggests that early structural barriers (limited supply, safety uncertainty, logistical access) had diminished over the study period (20). This is consistent with global evidence that vaccine hesitancy changes throughout the phases of a pandemic, transitioning from access-related to trust- and narrative-related (22).

Misinformation exposure was also an independent predictor, which is consistent with previous findings that misinformation changes perceived risk and vaccine intent (24)(25)(26), as well as experimental studies showing that misinformation exposure can decrease vaccine intent (8), and large-scale social media analyses showing that misinformation travels faster and farther than corrective information (6). Therefore, exposure may influence interpretive frameworks even among those with high formal education levels.

The results align with conceptualizing infodemics as an "information disorder" that influences cognition and trust rather than simply distorting factual content (27), and they align with evidence that misinformation exposure can change perceived risk and vaccine confidence even among populations with high levels of education and wide availability of digital access (8; 23). The findings imply that the quality and framing of information, rather than the existence of information, are the key determinants of vaccination

behavior. The ethnic differences observed further contextualize vaccination as socially situated behavior (28). Cultural identity often shapes institutional trust and responsiveness to public health interventions (29)(30)(31). Evidence from multi-ethnic societies consistently demonstrates variation in vaccine uptake linked to historical trust trajectories, linguistic accessibility, and communal authority structures (32)(9).

Regionally patterned acceptance of vaccination campaigns has been documented previously in Nigeria, and may reflect sociocultural context as well as prior government engagement (8)(9)(33). The higher uptake among Yoruba respondents compared with Hausa respondents may reflect alignment with trust, prior engagement with vaccination programs, or localized health system integration (31)(34)(35), similar to evidence from other contexts where minority or historically marginalized communities may have differential vaccination behaviors (36).

In contrast to previous pandemic-phase studies (37)(38)(39), after adjustment, age, sex, education level, and primary information source were not independently associated with uptake, suggesting temporal normalization of sociodemographic disparities as vaccine access expanded. As is increasingly seen in emerging literature (1)(24), as pandemics evolve, structural predictors tend to weaken, whereas attitudinal and trust-based factors become more salient. In fact, perceived credibility of content may be more important than the information channel (40), which suggests that infodemic management should emphasize quality, framing, and trust repair, rather than just increasing the volume of communication.

7.0. STRENGTHS AND LIMITATIONS

A key strength of this study is the operationalisation of misinformation exposure as a measurable construct incorporated into multivariable modelling, moving beyond

descriptive accounts of vaccine attitudes. The multistage sampling approach and proportional allocation enhanced internal representativeness within the selected LGAs, and complete-case analysis (n=420) strengthened analytic integrity.

Several limitations should be considered. First, the cross-sectional design precludes causal inference; exposure and vaccination status were measured simultaneously, and temporal sequencing cannot be established. Longitudinal evidence indicates that misinformation effects may fluctuate over time (8). Second, exposure and vaccination status were self-reported and may be subject to recall or social desirability bias, although anonymity likely reduced this risk. Third, classification of main information source relied on self-report and did not capture frequency, intensity or algorithmic amplification dynamics known to shape exposure (23). Finally, the study was conducted in Southwest Nigeria, where vaccine availability and health infrastructure were relatively strong; generalisability to underserved or conflict-affected regions may be limited.

8.0. CONCLUSION

This study examined the relationship between COVID-19–related infodemics and vaccine uptake among adults in selected local government areas of Southwest Nigeria. The findings indicate that although COVID-19 vaccine uptake was relatively high among respondents, exposure to misinformation and ethnicity were independently associated with vaccine receipt after adjusting for key sociodemographic factors.

The persistence of misinformation as an independent factor underscores the substantial influence of information disorder on vaccination behavior, even in contexts where vaccine availability and access have improved. This highlights the importance of addressing not only the volume of information circulating during public health emergencies but also its accuracy, credibility, and interpretation. The observed ethnic

differences in vaccine uptake further emphasize the need for context-specific approaches that account for sociocultural diversity in public health communication.

Overall, the findings suggest that effective management of infodemics is critical to sustaining and improving vaccine uptake. Public health responses that integrate targeted misinformation mitigation strategies alongside culturally sensitive engagement efforts are more likely to enhance trust in health authorities and support equitable vaccination outcomes.

List of Abbreviations:

COVID-19 - **Coronavirus Disease 2019**

AOR – Adjusted Odd Ratios

CI – Confidence interval

OOUTH - Olabisi Onabanjo University Teaching Hospital

HREC - Health Research Ethics Committee

LGA - Local Government Area

9.0. DECLARATIONS

9.1 Ethics approval and consent to participate

Ethical approval was obtained from the Olabisi Onabanjo University Teaching Hospital Health Research Ethics Committee (OOUTH/HREC/606/2023AP). Written informed consent was obtained. Participation was voluntary and anonymous. This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and all relevant Nigerian national ethical guidelines.

9.2 Consent for Publication

Not applicable. The manuscript does not contain any individual person data in any form.

9.3 Availability of Data and Materials

458 The datasets supporting the conclusions of this article are included within the article and its
459 additional files. They include:

460 1. Supplementary tables 3, 4 and 5.

461 2. STROBE Checklist,

462 3. Code book

463 4. Raw Study Data

464 5. Study Questionnaire

465 9.4 Competing interests

466 The authors declare that they have no competing interests.

467 9.5 Funding

468 This research received no external funding.

469 9.6 Authors' contributions

470 HOA conceived the study, contributed to study design and statistical analysis,
471 coordinated data collection, and drafted the initial manuscript. EEO contributed to study
472 design, data collection, and critically revised the manuscript for important intellectual
473 content. AEA contributed to data collection and manuscript review. OAA contributed to
474 data collection and manuscript review. OYO contributed to data collection and
475 manuscript review. OMO contributed to study conceptualization, data collection, and
476 manuscript review. CEA contributed to study conceptualization, data collection, and
477 manuscript review. OUG contributed to study design, data collection, and manuscript
478 review. IA contributed to data collection and manuscript review. OTW contributed to data
479 collection and manuscript review. SAO contributed to data collection, assisted with
480 drafting the manuscript, and manuscript review.

481 All authors read and approved the final manuscript.

482 9.7 Acknowledgments

The authors appreciate all study participants for their cooperation during data collection.

All the authors read and approved the final manuscript.

REFERENCES

1. Terry K, Yang F, Yao Q, Liu C. The role of social media in public health crises caused by infectious disease: a scoping review. *BMJ Global Health*. 2023 Dec 28;8(12).

<https://doi.org/10.1136/bmjgh-2023-013515>

2. World Health Organization. COVID-19 global risk communication and community engagement strategy, December 2020-May 2021: interim guidance, 23 December 2020. World Health Organization (WHO); 2020. Accessed 10th October, 2024.

<https://iris.who.int/server/api/core/bitstreams/d980625d-1c55-464c-ae3a-75381ac2f979/content>. Accessed 10th October, 2024.

3. Eysenbach G. How to fight an infodemic: the four pillars of infodemic management.

Journal of medical Internet research. 2020 Jun 26;22(6):e21820. DOI:10.2196/21820

4. Neely SR, Eldredge C, Ersing R, Remington C. Vaccine hesitancy and exposure to

misinformation: a survey analysis. *Journal of general internal medicine*. 2022

Jan;37(1):179-87. <https://doi.org/10.1007/s11606-021-07171-z>

5. Pierri F, Perry BL, DeVerna MR, Yang KC, Flammini A, Menczer F, Bryden J. Online

misinformation is linked to early COVID-19 vaccination hesitancy and refusal.

Scientific reports. 2022 Apr 26;12(1):5966. [https://doi.org/10.1038/s41598-022-](https://doi.org/10.1038/s41598-022-10070-w)

[10070-w](https://doi.org/10.1038/s41598-022-10070-w)

6. Vosoughi S, Roy D, Aral S. The spread of true and false news online. *science*. 2018 Mar

9;359(6380):1146-51. <https://doi.org/10.1126/science.aap9559>

7. Daems R, Maes E. The race for COVID-19 vaccines: accelerating innovation, fair

allocation and distribution. *Vaccines*. 2022 Sep 2;10(9):1450.

<https://doi.org/10.3390/vaccines10091450>

8. Loomba S, De Figueiredo A, Piatek SJ, De Graaf K, Larson HJ. Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA. *Nature human behaviour*. 2021 Mar;5(3):337-48. <https://doi.org/10.1038/s41562-021-01056-1>
9. Larson HJ. The state of vaccine confidence. *The Lancet*. 2018 Nov 24;392(10161):2244-6. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)32608-4/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)32608-4/fulltext). Accessed 10th October, 2024.
10. Majid U, Wasim A, Bakshi S, Truong J. Knowledge,(mis-) conceptions, risk perception, and behavior change during pandemics: A scoping review of 149 studies. *Public Understanding of Science*. 2020 Nov;29(8):777-99. <https://doi.org/10.1177/0963662520963365>
11. Kuyinu YA, Femi-Adebayo TT, Adebayo BI, Abdurraheem-Salami I, Odusanya OO. Health literacy: prevalence and determinants in Lagos state, Nigeria. *PloS one*. 2020 Aug 13;15(8):e0237813. <https://doi.org/10.1371/journal.pone.0237813>
12. Do Nascimento IJ, Pizarro AB, Almeida JM, Azzopardi-Muscat N, Gonçalves MA, Björklund M, Novillo-Ortiz D. Infodemics and health misinformation: a systematic review of reviews. *Bulletin of the World Health Organization*. 2022 Jun 30;100(9):544. doi: 10.2471/BLT.21.287654
13. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: Guidelines for reporting observational studies. *PLoS Med*. 2007;4(10):e296. doi:10.1371/journal.pmed.0040296.

14. National Bureau of Statistics, 2022 -
[https://www.nigerianstat.gov.ng/pdfuploads/DEMOGRAPHIC_BULLETIN_2022_FIN
AL.pdf](https://www.nigerianstat.gov.ng/pdfuploads/DEMOGRAPHIC_BULLETIN_2022_FIN_AL.pdf). Accessed 16th October, 2024.
15. Adeloye D, Ige-Elegbede JO, Auta A, Ale BM, Ezeigwe N, Omoyele C, Dewan MT, Mpazanje RG, Agogo E, Alemu W, Gadanya MA. Epidemiology of physical inactivity in Nigeria: a systematic review and meta-analysis. *Journal of Public Health*. 2022 Sep;44(3):595-605. <https://doi.org/10.1093/pubmed/fdab147>
16. Cochran, W. G. 1977. *Sampling Techniques*. 3rd ed. New York: John Wiley & Sons. [https://www.academia.edu/download/68847310/COCHRAN_W._Sampling_techniqu
es_compressed.pdf](https://www.academia.edu/download/68847310/COCHRAN_W._Sampling_techniques_compressed.pdf). Accessed 10th October, 2024.
17. Bapaye JA, Bapaye HA. Demographic factors influencing the impact of coronavirus-related misinformation on WhatsApp: cross-sectional questionnaire study. *JMIR public health and surveillance*. 2021 Jan 28;7(1):e19858. doi:10.2196/19858
18. Adedeji-Adenola H, Olugbake OA, Adeosun SA. Factors influencing COVID-19 vaccine uptake among adults in Nigeria. *PloS one*. 2022 Feb 24;17(2):e0264371 <https://doi.org/10.1371/journal.pone.0264371>
19. Adejumo OA, Ogundele OA, Madubuko CR, Oluwafemi RO, Okoye OC, Okonkwo KC, Owolade SS, Junaïd OA, Lawal OM, Enikuomihin AC, Ntaji MI. Perceptions of the COVID-19 vaccine and willingness to receive vaccination among health workers in Nigeria. *Osong Public Health and Research Perspectives*. 2021 Jul 19;12(4):236. doi: 10.24171/j.phrp.2021.0023
20. De Figueiredo A, Simas C, Larson HJ. COVID-19 vaccine acceptance and its socio-demographic and emotional determinants: a multi-country cross-sectional study. *Vaccine*. 2023 Jan 9;41(2):354-64, <https://doi.org/10.1016/j.vaccine.2022.10.051>

21. Wonodi C, Obi-Jeff C, Adewumi F, Keluo-Udeke SC, Gur-Arie R, Krubiner C, Jaffe EF, Bamiduro T, Karron R, Faden R. Conspiracy theories and misinformation about COVID-19 in Nigeria: Implications for vaccine demand generation communications. *Vaccine*. 2022 Mar 18;40(13):2114. doi: 10.1016/j.vaccine.2022.02.005
22. World Health Organization. An overview of infodemic management during the COVID-19 pandemic, Pages 1 and 52, January 2020–July 2022. https://books.google.com/books?hl=en&lr=&id=nIXTEAAQBAJ&oi=fnd&pg=PR4&dq=World+Health+Organization.+An+overview+of+infodemic+management+during+the+COVID-19+pandemic,+January+2020%E2%80%93July+2022.&ots=zSf09N0iLt&sig=tykn78G_JR4nHKrP6DcW__bt9A
23. Cinelli M, Quattrociocchi W, Galeazzi A, Valensise CM, Brugnoli E, Schmidt AL, Zola P, Zollo F, Scala A. The COVID-19 social media infodemic. *Scientific reports*. 2020 Oct 6;10(1):16598. <https://doi.org/10.1038/s41598-020-73510-5>
24. Zielinski C. Infodemics and infodemiology: a short history, a long future. *Revista panamericana de salud publica*. 2021 May 28;45:e40. <https://doi.org/10.26633/RPSP.2021.40>
25. Van Der Linden S. Misinformation: susceptibility, spread, and interventions to immunize the public. *Nature medicine*. 2022 Mar;28(3):460-7. <https://doi.org/10.1038/s41591-022-01713-6>
26. Colautti L, Cancer A, Magenes S, Antonietti A, Iannello P. Risk-perception change associated with COVID-19 vaccine's side effects: the role of individual differences. *International Journal of Environmental Research and Public Health*. 2022 Jan 21;19(3):1189. <https://doi.org/10.3390/ijerph19031189>

27. Wardle C, Derakhshan H. Information disorder: Toward an interdisciplinary framework for research and policymaking. Strasbourg: Council of Europe; 2017 Sep 27. <https://www.firstdraftnews.org/wp-content/uploads/2017/11/PREMS-162317-GBR-2018-Report-de%CC%81sinformation-1.pdf>. Accessed 19th June, 2025.
28. Van der Meer M. On the Significance of Place: Vaccination Refusal as a Situated Phenomenon. *Journal of Trial & Error*. 2025 Apr 1. <https://doi.org/10.36850/dfab-4bcf>
29. Smedley A, Smedley BD. Race as biology is fiction, racism as a social problem is real: Anthropological and historical perspectives on the social construction of race. *American psychologist*. 2005 Jan;60(1):16. <http://rws200jspencer.pbworks.com/w/file/fetch/104349117/Race%20as%20Biology%20Is%20Fiction.pdf>
30. Musa D, Schulz R, Harris R, Silverman M, Thomas SB. Trust in the health care system and the use of preventive health services by older black and white adults. *American journal of public health*. 2009 Jul;99(7):1293-9. <https://doi.org/10.2105/AJPH.2007.123927>
31. Bogart LM, Ojikutu BO, Tyagi K, Klein DJ, Mutchler MG, Dong L, Lawrence SJ, Thomas DR, Kellman S. COVID-19 related medical mistrust, health impacts, and potential vaccine hesitancy among Black Americans living with HIV. *JAIDS Journal of Acquired Immune Deficiency Syndromes*. 2021 Feb 1;86(2):200-7. <https://doi.org/10.1097/QAI.0000000000002570>
32. Sallam M. COVID-19 vaccine hesitancy worldwide: a concise systematic review of vaccine acceptance rates. *Vaccines*. 2021 Feb 16;9(2):160. <https://doi.org/10.3390/vaccines9020160>

33. Betsch C, Schmid P, Heinemeier D, Korn L, Holtmann C, Böhm R. Beyond confidence: Development of a measure assessing the 5C psychological antecedents of vaccination. *PloS one*. 2018 Dec 7;13(12):e0208601.
<https://www.nigerianjsp.com/index.php/NJSP/article/view/154>
34. Darden M, Macis M. Trust and health care-seeking behavior. Cambridge, Massachusetts, USA: National Bureau of Economic Research; 2024 Jan 5.
<https://www.aeaweb.org/conference/2025/program/paper/2ZDBi3bY>. Accessed 10th October, 2024.
35. Onuoha OO, Okereke OJ, Ngwoke GO, Ekpechu JO. Influence of Cultural Factors on Health Seeking Behavior in Ebonyi State, South East, Nigeria. *Nigerian Journal of Social Psychology*. 2024 Aug 5;7(2).
<https://www.nigerianjsp.com/index.php/NJSP/article/view/154>
36. Khubchandani J, Sharma S, Price JH, Wiblishauser MJ, Sharma M, Webb FJ. COVID-19 vaccination hesitancy in the United States: a rapid national assessment. *Journal of community health*. 2021 Apr;46(2):270-7. <https://doi.org/10.1007/s10900-020-00958-x>
37. Jain A, Van Hoek AJ, Boccia D, Thomas SL. Lower vaccine uptake amongst older individuals living alone: A systematic review and meta-analysis of social determinants of vaccine uptake. *Vaccine*. 2017 Apr 25;35(18):2315-28.
<https://doi.org/10.1016/j.vaccine.2017.03.013>
38. Lazarus JV, Wyka K, Rauh L, Rabin K, Ratzan S, Gostin LO, Larson HJ, El-Mohandes A. Hesitant or not? The association of age, gender, and education with potential acceptance of a COVID-19 vaccine: a country-level analysis. *Journal of health*

626 communication. 2020 Oct 2;25(10):799-807.
627 <https://doi.org/10.1080/10810730.2020.1868630>
628 39. Gram MA, Moustsen-Helms IR, Valentiner-Branth P, Emborg HD. Sociodemographic
629 differences in Covid-19 vaccine uptake in Denmark: a nationwide register-based
630 cohort study. BMC Public Health. 2023 Feb 24;23(1):391.
631 <https://doi.org/10.1186/s12889-023-15301-x>
632 40. Vraga EK, Bode L. Using expert sources to correct health misinformation in social
633 media. Science communication. 2017 Oct;39(5):621-45.
634 <https://doi.org/10.1177/1075547017731776>
635

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [AdditionalFile1SUPPLEMENTARYTABLES35.docx](#)