

Research Article

Post Pandemic Assessment of Acceptability of COVID-19 Preventive Measures among People in Enugu North, Enugu State Nigeria: A Cross-Sectional Study

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- Public Health
- Vaccine Uptake

Abstract

Background: The COVID-19 pandemic has highlighted the importance of preventive measures in controlling disease spread. This study aimed to assess the uptake of COVID-19 preventive measures, identify associated factors, and examine current perceptions of these measures in the Enugu North Local Government Area, Enugu State, Nigeria.

Methods: A cross-sectional study was conducted from January to July 2023 among 500 residents aged 18 years and above. Data were collected using a semi-structured questionnaire. Sociodemographic, perception, uptake of preventive measures, and vaccine-related data were analyzed using descriptive statistics. Chi-square tests were used to establish associations between variables.

Results: The majority of respondents (80.6%) demonstrated poor perception towards COVID-19, and 61.8% reported poor uptake of preventive measures. Hand washing, wearing nose masks and staying at home during lockdowns were the most frequently adopted measures. Key barriers to preventive measures uptake included water scarcity (39.2%), economic hardship (52.4%), and disbelief in COVID-19's existence (44.6%). Only 9.4% of respondents had received the COVID-19 vaccine. Significant associations were found between uptake of preventive measures and age, marital status, education level, profession, monthly income, and religion (all $p < 0.05$). Perception towards COVID-19 was significantly associated with uptake of preventive measures ($p < 0.05$).

Conclusions: This study reveals low uptake of COVID-19 preventive measures in Enugu North LGA, influenced by poor perception, socioeconomic factors, and infrastructural challenges. These findings highlight the need for targeted public health interventions, improved risk communication, and addressing structural barriers to enhance adherence to preventive measures during future pandemics.

ABBREVIATIONS

COVID-19: Coronavirus Disease 2019; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2; WHO: World Health Organization; NPI: Nonpharmaceutical Intervention; WASH: Water Sanitation and Hygiene; LMIC: Low- and Middle-Income Countries; CVI: Content Validity Index; ICC: Intraclass Correlation Coefficient

BACKGROUND

COVID-19, caused by the SARS-CoV-2 virus, emerged as a global pandemic in early 2020, resulting in significant morbidity, mortality, and socioeconomic disruption worldwide [1,2]. As of February 2023, over 671 million cases and 6.8 million deaths have been reported globally [3]. In Nigeria, the first case was detected on February 27,

2020, with subsequent spread leading to over 266,000 reported cases and 3,155 deaths by February 2023 [4,5].

In the absence of effective treatments early in the pandemic, public health measures focused on preventing viral transmission through Nonpharmaceutical Interventions (NPIs) such as mask-wearing, hand hygiene, physical distancing, and lockdowns [6,7]. The successful implementation of these measures relied heavily on public adherence, which varied considerably across populations and geographic regions [8,9].

Several factors have been identified as influencing adherence to COVID-19 preventive measures, including knowledge and risk perception of the disease, attitudes towards recommended behaviors, and socioeconomic circumstances [10,11]. Studies from various countries

reported varying levels of compliance with preventive measures, with some nations achieving high adherence rates leading to successful containment of viral spread [12,13]. However, limited compliance was observed in many African countries, including Nigeria [14,15].

In Nigeria, various initiatives were implemented to prevent and control COVID-19 transmission [16]. However, the emergence of subsequent waves of infection suggested potential gaps in adherence to preventive measures. Research has indicated that unclear communication, lack of public awareness, and inadequate support for implementing preventive measures may contribute to noncompliance [17]. Additionally, variations in the types of measures implemented and levels of adherence have been observed across different states and regions within Nigeria [15].

To date, limited research has been conducted on the uptake of COVID-19 preventive measures in Enugu State, the capital of southeastern Nigeria, creating a perception gap that may hinder effective policy development for future disease outbreaks. Understanding the factors influencing adherence to preventive measures and current public perceptions is crucial for informing future public health strategies and preparedness efforts.

This study aims to assess the uptake rate of COVID-19 preventive measures, identify associated factors, and examine current perceptions of these measures in the Enugu North Local Government Area, Enugu State, Nigeria. The findings provide valuable insights for policymakers and program managers in the formulation of evidence-based strategies to increase compliance with preventive measures during future outbreaks.

METHODS

Study Design and Setting

This cross-sectional study was conducted in the Enugu North Local Government Area (LGA), one of the 17 LGAs in Enugu State, Nigeria. The Enugu North LGA, with coordinates of 6°28'N 7°31'E, covers an area of 106 square kilometers and is one of the three LGAs that comprise Enugu Urban. It has an estimated population of 239,979 people according to the 2006 Nigerian census [18]. The study was carried out from January to July 2023.

Study Population and Sampling

The target population included males and females aged 18 years and above, who were residents of Enugu North LGA. We employed a multistage sampling technique. First, six out of the thirteen wards in Enugu North LGA were

randomly selected. From each of these wards, five streets were randomly chosen. Houses were then selected via systematic sampling, with every third house on each street included. All eligible adults in each selected house were invited to participate.

The sample size was calculated via Cochran's formula: $n = Z^2PQ/e^2$, where n is the sample size, Z is 1.96 (95% confidence level), P is 0.8 (estimated proportion of residents aware of COVID-19 preventive measures from previous study [9]), Q is 1- P (0.2), and e is 0.05 (5% margin of error). The calculated sample size was 246. Accounting for a 10% nonresponse rate, the final sample size was determined to be 273. However, to increase representativeness, we increased the sample size to 500.

Study Tool

A semi structured questionnaire was developed on the basis of a comprehensive review of literature on COVID-19 preventive measures and vaccine uptake (Supplementary material 1). The questionnaire consisted of five sections: sociodemographic characteristics (10 items), perception towards COVID-19 (11 items), uptake of COVID-19 preventive measures (11 items), barriers to uptake of preventive measures (4 items), and uptake of the COVID-19 vaccine (11 items). These items conform with WHO guidelines and recommendations for COVID-19 prevention and control [7-19].

Validity of the Study Tool

To ensure content validity, the questionnaire was reviewed by a panel of experts, including two public health specialists, an epidemiologist, and a health education specialist. The experts assessed the relevance, clarity, and comprehensiveness of the items. The Content Validity Index (CVI) was calculated, and items with a CVI of 0.78 or higher were retained. Face validity was assessed through cognitive interviews with 10 members of the target population, who provided feedback on the clarity, comprehensibility, and cultural appropriateness of the questions. The questionnaire was refined on the basis of their feedback.

Reliability of the Study Tool

The reliability of the questionnaire was assessed through a test-retest method. Twenty participants, who were not included in the main study, completed the questionnaire twice with a two-week interval between administrations. The Intraclass Correlation Coefficient (ICC) was calculated for continuous variables, and Cohen's kappa was calculated for categorical variables. Items with

an ICC or kappa value of 0.7 or higher were considered reliable. The questionnaire was then piloted on 50 residents of a neighboring LGA with similar characteristics to the study area, helping identify any remaining issues with question wording, response options, or questionnaire flow. Final adjustments were made on basis of the pilot test results.

Data Collection

For data collection, four research assistants, fluent in both the local dialect and English, were trained for two days on questionnaire administration and research ethics. The questionnaires were self-administered to literate respondents and interview-administered to nonliterate respondents. Data collection took place over a period of eight (8) weeks.

Definition of Key Variables

For this study, several key variables were defined. The COVID-19 preventive measures addressed in this study included social distancing, facemask wearing, hand washing, isolation, lockdown, and vaccination. The uptake of these COVID-19 preventive measures was assessed through self-reported adherence or compliance, categorized as "Always", "Sometimes", "Rarely", and "Never".

Ideal or good uptake was specifically defined for each measurement. For vaccination, two doses of the COVID-19 vaccine were given during the pandemic. Ideal facemask wearing was defined as wearing a well-fitted facemask at all times outside the house. Good hand hygiene practices involve hand washing or sanitizing after individuals contact objects such as doorknobs or handles, or after they return home from a public location. Proper isolation was defined as when a person verified to have COVID-19 separated themselves from healthy individuals around them, lasting until the individual was free of symptoms and tested negative for the virus. Ideal lockdown adherence meant staying at home and refraining from or limiting activities outside the home involving public contact for the stipulated time by the government. A good social distancing practice was maintaining a 1 m (3 feet) or greater physical distance at all times outside the house. Crowd avoidance was defined as not being in a crowd of more than 50 people.

The respondents' current perceptions towards COVID-19 preventive measures were defined as their views on the effectiveness of the listed preventive measures during the pandemic and were assessed on a five-point Likert scale: "Strongly Agree", "Agree", "Neutral", "Disagree", and "Strongly Disagree"

The scoring system for perception and uptake was established to categorize respondents' levels. For perception assessment, the questionnaire contained 11 items assessing perceptions towards COVID-19, each scored on a 5-point Likert scale (1=Strongly disagree to 5=Strongly agree for positive questions and reverse for negative questions). The maximum possible score was 55 points. Respondents' perception was categorized as: Good: Score ≥ 33 points ($\geq 60\%$ of maximum score) Poor: Score < 33 points ($< 60\%$ of maximum score)

For uptake assessment, 11 items measured adherence to preventive measures, each scored on a 4-point scale (Never=1, Rarely=2, Sometimes=3, Always=4 for positive questions and reverse for negative questions). The maximum possible score was 44 points. Uptake was categorized as: Good: Score ≥ 26 points ($\geq 60\%$ of maximum score), Poor: Score < 26 points ($< 60\%$ of maximum score). This scoring system follows standard practice in similar public health research where a 60% threshold is commonly used to differentiate between good and poor levels of perception or practice [20,21].

Several sociodemographic factors were considered in this study. Age was defined as the age of the participants in years at the time of the study. Gender was reported as either female or male. Education referred to the educational level completed or attempted by the respondents at the time of study. The marital status of the participants at the time of the study was reported as either single, married, divorced, widowed, or separated. Occupation was defined as the professional background of the participants at the time of study, reported as either a nonhealthcare provider or healthcare provider. The employment status of the participants at the time of the study was reported as either employed or unemployed. Income referred to the monthly income of the participants at the time of study. Residential location was defined as the wards and streets of the respondents at the time of study.

Data Analysis

The data were cleaned, coded, and analysed via SPSS version 22. Descriptive statistics (means, standard deviations, frequencies, and percentages) were used to summarize the main characteristics of the study participants and their responses. Chi-square tests were employed to establish associations between categorical variables. A p-value < 0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Ethical

Committee of the School of Medicine, University of Nigeria Teaching Hospital (UNTH) Ituku-Ozalla Enugu (reference number: UNTH/HREC/2023/06/825). Written informed consent was obtained from all participants. Confidentiality was ensured by using numerical identifiers instead of names. Data were stored securely and accessed only by the research team. Participation was voluntary, and respondents could withdraw at any time without consequences.

RESULTS

Sociodemographic Characteristics

A total of 500 respondents participated in the study, with a 100% response rate. The majority of participants were male (58.2%), single (50.6%), had secondary education (59.4%), were nonhealthcare providers (87.4%), were students (44.2%), and were Christian (87.6%). The age group of 25 to less than 35 years was the most represented (33.2%). The detailed sociodemographic characteristics are presented in Table 1.

Table 1: Sociodemographic Characteristics of the Respondents

Characteristics	Frequency	Percent
Age		
18 to less than 25	138	27.6
25 to less than 35	166	33.2
35 to less than 45	99	19.8
45 and more	97	19.4
Sex		
Female	209	41.8
Male	291	58.2
Marital status		
Single	253	50.6
Married	205	41.0
Divorced/widowed/separated	42	8.4
Highest level of Education		
Primary	88	17.6
Secondary	297	59.4
Tertiary	104	20.8
No formal education	11	2.2
Profession		
Non-health care provider	437	87.4
Healthcare provider	63	12.6
Employment status		
Employed with government	96	19.2
Employed in the private sector	66	13.2
Self employed	102	20.4
Unemployed	15	3.0
Student	221	44.2
Monthly income		
Below ₦30 thousand	94	18.8
Above ₦30 thousand	406	81.2
Religion		
Christianity	438	87.6
Islam	20	4.0
Others	42	8.4

Perceptions towards COVID-19

The majority of the respondents (80.6%) reported poor perceptions towards of COVID-19. The most recognized aspects were that COVID-19 can be prevented (mean score 3.53 ± 1.19) and that wearing a facemask helps prevent its spread (3.08 ± 1.21). Other prevention measures such as social distancing and lockdowns are less recognized. Perception scores are available in **Supplementary Material 2 Table S1**.

Uptake of COVID-19 Preventive Measures

Most respondents (61.8%) report poor uptake of COVID-19 preventive measures. The most frequently adopted measures were hand washing or using sanitizers (mean score 3.15 ± 0.92), wearing a nose mask (3.11 ± 0.86), and staying at home during lockdowns (3.10 ± 0.69). Less frequent practices included maintaining physical distance and following all recommended preventive measures. The details of the preventive measures uptake are provided in **Supplementary material 2 Table S2**.

Barriers to the Uptake of Preventive Measures

The main barriers to hand washing were water scarcity (39.2%) and the perception that hand washing was unnecessary (31.6%). The primary reason for not wearing masks, was disbelief in the existence of COVID-19 (44.6%). Economic hardship (52.4%) and disbelief in COVID-19 (41.0%) were the main reasons for breaking lockdown protocols. The detailed barriers are presented in **Supplementary material 2 Table S3**.

Knowledge and Uptake of the COVID-19 Vaccine

Only 40.6% of the respondents had heard of the COVID-19 vaccine, and 35.0% knew it was available in Enugu state. A mere 9.4% had taken the vaccine, with 66.0% of those vaccinated receiving only one dose. The primary reason for vaccination was self-protection (100%), whereas the main reason for non-vaccination was a lack of awareness of the vaccine (65.6%). All the vaccine-related data are available in Table 2.

Factors Associated with Uptake of Preventive Measures

Chi-square analysis revealed significant associations between uptake of preventive measures and several sociodemographic factors including age ($p < 0.05$), marital status ($p = 0.004$), education level ($p < 0.05$), profession ($p = 0.001$), monthly income ($p = 0.012$), and religion

Table 2: Knowledge, uptake, and reasons for acceptance of or hesitancy toward the COVID-19 vaccine

Variable	Frequency	Percent
Knowledge and Uptake of COVID-19 Vaccine		
Did you hear about the COVID-19 vaccine?		
- Yes	203	40.6
- No	297	59.4
Do you know that the vaccine was available in Enugu state?		
- Yes	175	35.0
- No	325	65.0
Vaccination helped to prevent the spread of COVID-19 during the pandemic?		
- Yes	48	9.6
- No	452	90.4
Did you take the vaccine?		
- Yes	47	9.4
- No	453	90.6
If YES to "Did you take vaccine?", how many doses of the vaccine did you receive? (n=47)		
- One	31	66.0
- Two	16	34.0
Reasons for Acceptance (n=47)		
To protect myself	47	100.0
To protect my family	35	74.5
To safeguard my community	14	29.8
Trust the vaccine developers	6	12.8
Government directive	22	46.8
Others	17	36.2
Reasons for Hesitancy (n=453)		
COVID-19 is not real	92	20.3
COVID-19 was in other countries but not Nigeria	32	7.1
I didn't hear about COVID-19 vaccine	297	65.6
I didn't know where to get vaccine	1	0.2
I distrust the national government	2	0.4
The vaccine is a mark of the beast (666)	12	2.6
Concerns about the side effects and safety	7	1.5
The vaccine is not needed because the infection is harmless	0	0.0
My religion does not allow vaccination	4	0.9
Others	6	1.3

($p < 0.05$). Sex and employment status were not significantly associated with uptake. The detailed associations are presented in Table 3.

Relationships between Perception, Barriers and Uptake of Preventive Measures

There was a significant relationship between perception towards COVID-19 and uptake of preventive measures ($p < 0.05$). Respondents with good perceptions were more likely to take preventive measures effectively. Various barriers to implementing preventive measures were identified in the study. The main obstacles to hand washing include the scarcity of water, not considering it necessary, and a lack of time. These barriers were significantly associated with the uptake of preventive measures ($p = 0.021$). For wearing nose masks, the primary

Table 3: Associations of sociodemographic factors with the uptake of COVID-19 preventive measures

Respondents' characteristics	Uptake		P- value
	Good	Poor	
Age			0.000*
18 to less than 25	53	85	
25 to less than 35	79	87	
35 to less than 45	23	76	
45 and more	36	61	
Sex			0.068
Female	96	113	
Male	95	196	
Marital status			0.004*
Single	75	178	
Married	93	112	
Divorced/widowed/separated	23	19	
Highest level of Education			0.000*
Primary	13	75	
Secondary	85	212	
Tertiary	84	20	
None	9	2	
Profession			0.001*
Non-health care provider	130	307	
Healthcare provider	61	2	
Employment status			0.089
Employed with government	42	54	
Employed in the private sector	17	49	
Self employed	21	81	
Unemployed	6	9	
Student	105	116	
Monthly income			0.012*
Below ₦30 thousand	38	56	
Above ₦30 thousand	153	253	
Religion			0.000*
Christianity	146	292	
Islam	14	6	
Others	31	11	

*Statistical significance, $p < 0.05$

reasons for noncompliance were the belief that COVID-19 is not real, the feeling of being suffocated or uncomfortable with the mask, and the cost of the mask. This relationship was also statistically significant ($p = 0.002$). Attending crowded events during the pandemic was attributed mainly to events being considered crucial, socializing needs, and entertainment purposes. However, the relationship between these factors and preventive measures uptake was not statistically significant ($p = 0.057$). Breaking lockdown protocols was primarily due to economic hardship, disbelief in the reality of COVID-19, and the mistrust of authorities. This relationship was found to be statistically significant ($p = 0.006$). The data revealed that the belief that COVID-19 was not real was a recurring barrier across multiple preventive measures. Economic factors, such as water scarcity and financial hardship, also play a significant role in preventing people from adhering to preventive measures. This relationship is shown in Table 4.

Table 4. Relationships between perception towards COVID-19, barriers to and uptake of preventive measures

	Uptake		P- value
Perception	Good	Poor	0.001*
Good	65	32	
Poor	126	277	
Barriers			
Reason for not washing hands frequently with soap for up to 20 minutes during the pandemic was?			0.021*
Scarcity of water	74	122	
Not necessary	52	106	
Lack of time	24	19	
Others	41	62	
Reason for not wearing nose mask during the pandemic was?			0.002*
Covid-19 is not real	86	137	
Cost of nose mask	9	16	
Feels suffocating with it	18	35	
Feels uncomfortable with it	4	6	
Others	74	115	
Reason for attending crowded events during the pandemic was?			0.057
To socialize	31	50	
To catch fun	5	7	
Very crucial event	112	181	
Others	43	71	
Reason for breaking the lockdown protocol during the pandemic was?			0.006*
Covid-19 is not real	80	125	
Economic hardship	91	171	
Mistrust of authorities	13	10	
Others	7	3	

*Statistical significance, $p < 0.05$

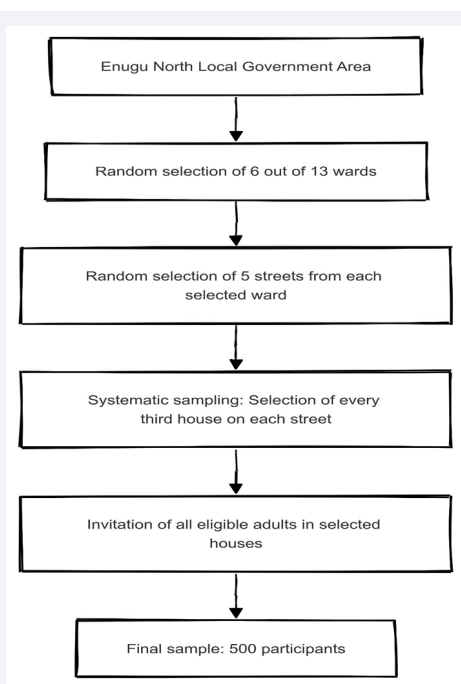


Figure 1 Sampling Strategy

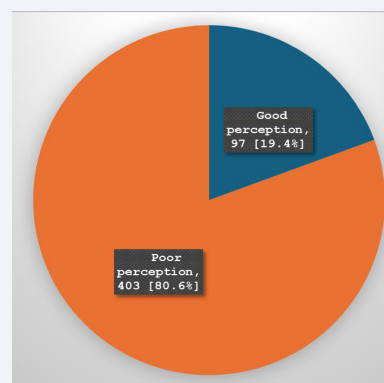


Figure 2 Level of Perception

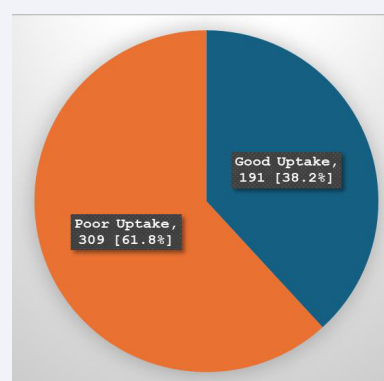


Figure 3 Level of Uptake

DISCUSSION

This study aimed to assess the uptake of COVID-19 preventive measures, identify associated factors, and examine current perceptions of these measures in the Enugu North Local Government Area, Enugu State, Nigeria. Our findings reveal a complex interplay of sociodemographic factors, perception levels, and barriers influencing adherence to preventive measures.

Our study revealed that the majority of respondents (80.6%) demonstrated poor perception and perceptions towards COVID-19. This finding aligns with studies from Nigeria, other parts of Africa and Asia [22-25]. For example, Hezima et al. [23], reported that 71.8% of participants in Sudan had poor perception towards COVID-19. Similarly, a study in Ethiopia by Akalu et al. [24], reported that only 31.6% of respondents had good perception towards COVID-19, implying that 68.4% had poor perception. These findings underscore the need for continued public health education efforts, even as the pandemic evolves.

Interestingly, our study revealed that the most recognized aspects of COVID-19 were its preventability and the effectiveness of facemasks in preventing its

spread. This selective understanding might be attributed to the emphasis placed on these measures in public health messaging. However, the lower recognition of other preventive measures such as social distancing and lockdowns suggests a need for more comprehensive and balanced public health communication strategies. As highlighted by Vinck et al. [26], in their study on Ebola in the Democratic Republic of Congo, misconceptions about disease prevention can significantly hinder efforts to control outbreaks.

The poor uptake of COVID-19 preventive measures (61.8% of respondents) observed in our study is concerning but not new in the African context. Several studies across the continent have reported similar findings. For instance, Ilesanmi & Afolabi [27], reported that 60.9% of respondents in Nigeria had poor preventive practices against COVID-19, closely mirroring our results. In Ethiopia, Lake et al. [28], reported that only 59.7% of participants had good preventive practices. These findings suggest that poor adherence to COVID-19 preventive measures is a widespread issue across various African countries, highlighting the need for improved public health interventions and education. In our study, hand washing, wearing nose masks, and staying at home during lockdowns were the most frequently adopted measures, which aligns with findings from other Nigerian studies [9-27].

The lower adherence to physical distancing observed in our study could be attributed to various factors, including cultural norms that favour close social interactions and economic necessities that make distancing challenging in crowded urban settings. This finding echoes observations by Chamberlain et al. [29], in their research on COVID-19 prevention practices in sub-Saharan Africa, where they noted that physical distancing was one of the most challenging measures to implement consistently.

Our study identified several key barriers to the uptake of preventive measures, including water scarcity, economic hardship, and disbelief in the existence of COVID-19. These findings resonate with broader challenges faced in many low- and middle-income countries (LMICs) during the pandemic.

The issue of water scarcity as a barrier to hand hygiene practices has been documented in other studies from LMICs. For example, Bauza et al. [30], highlighted how inadequate water, sanitation, and hygiene (WASH) infrastructure in India posed significant challenges to COVID-19 prevention efforts. This underscores the need for public health interventions to be cognizant of and responsive to local infrastructural limitations.

Economic hardship as a barrier to adherence, particularly during lockdowns, aligns with findings from across the African continent. A study by Schröder et al. [31], in South Africa revealed that economic necessity was a primary driver of noncompliance with stay-at-home orders. This highlights the complex interplay between public health measures and socioeconomic realities in resource-constrained settings.

The disbelief in the existence of COVID-19 as a barrier to preventive measure uptake is particularly concerning. This finding echoes observations by Reuben et al. [32], in their study on COVID-19 misinformation in Nigeria. The persistence of such beliefs despite the global impact of the pandemic underscores the critical need for targeted risk communication strategies that address local misconceptions and build trust in public health information.

Our study revealed significant associations between several sociodemographic factors (age, marital status, education level, profession, monthly income, and religion) and the uptake of preventive measures. These findings align with a growing body of literature on the social determinants of health behaviors during the COVID-19 pandemic.

The association between higher education levels and better uptake of preventive measures observed in our study is consistent with findings from other contexts. For example, a study by Nivette et al. [33], in Switzerland reported that higher education was associated with greater compliance with COVID-19 mitigation measures. This underscores the importance of education in shaping health behaviors and suggests that public health interventions may need to be tailored to different educational levels.

The greater uptake of preventive measures among healthcare providers in our study is encouraging and aligns with findings from other countries. A systematic review by Lake et al. [28], revealed that healthcare workers generally had good knowledge and positive attitudes towards COVID-19 preventive measures. However, the stark difference in uptake between healthcare providers and nonhealthcare providers in our study suggests a need for more effective knowledge transfer from the health sector to the general public.

The low awareness (40.6%) and uptake (9.4%) of the COVID-19 vaccine observed in our study is concerning but not surprising given the global challenges in vaccine distribution and acceptance. These figures are lower than those reported in some other African countries. For instance, a study by Kanyike et al. [34], in Uganda

reported that 37.3% of respondents were willing to accept the COVID-19 vaccine. The even lower uptake in our study population suggests significant barriers to vaccine acceptance and access in this region of Nigeria.

The primary reason for vaccination in our study was self-protection, which aligns with findings from other contexts. A global survey by Lazarus et al. [35], revealed that perceived personal risk was a significant predictor of vaccine acceptance. However, the low uptake despite this motivation suggests that other factors, such as vaccine availability and accessibility, may be significant barriers in our study setting.

The main reason for non-vaccination in our study was lack of awareness about the vaccine. This differs somewhat from findings in other contexts where vaccine hesitancy due to safety concerns or mistrust was more prominent [36]. This suggests that in our study setting, basic awareness campaigns could have a significant impact on vaccine uptake.

The significant relationship between perception towards COVID-19 and uptake of preventive measures observed in our study is consistent with the Health Belief Model [37], and findings from other studies. For example, a review by Nwagbara et al. [38], found that good perception towards COVID-19 was consistently associated with better adherence to preventive measures across various countries.

However, our study also revealed that perception alone is not sufficient to ensure adherence to preventive measures. The identified barriers, including economic hardship and infrastructural limitations, highlight the need for a multifaceted approach to promote preventive behaviors. This aligns with the socioecological model of health behavior [39], which recognizes that individual behaviors are shaped by multiple levels of influence, including personal, interpersonal, community, and societal factors.

A key strength of this study is its focus on a specific local government area in Nigeria, providing granular insights into COVID-19 prevention behaviors in this context. However, this localized focus also limits the generalizability of our findings to other parts of Nigeria or Africa. Additionally, the reliance on self-reported data may have introduced social desirability bias, potentially leading to overreporting of adherence to preventive measures. Future studies could benefit from incorporating objective measures of adherence where feasible.

Our findings have several implications for public health practices and policies in Nigeria and similar settings,

and can be applied to prepare for and respond to future pandemics. There is a clear need for ongoing public health education to address perception gaps and misconceptions about infectious diseases and their prevention. This education should be adaptable to rapidly emerging health threats.

Interventions to promote preventive behaviors should go beyond addressing individual knowledge and attitudes, and tackle structural barriers such as water scarcity and economic hardship, which can hinder adherence to public health measures during crises. Vaccine awareness campaigns should be a constant feature of public health strategies, with a focus on addressing the specific reasons for the hesitancy identified in this population. This proactive approach can help build trust and acceptance in the event of future pandemics.

Public health messaging should be tailored to different sociodemographic groups, recognizing the varying levels of uptake across these groups. This customized approach ensures that information effectively reaches all segments of society during future outbreaks. Additionally, efforts to bridge the gap in preventive behavior between healthcare providers and the general public could leverage healthcare workers as community educators and role models. Establishing this network of trust and information dissemination before a crisis occurs can prove invaluable during future pandemics.

These multifaceted approaches could help create a more comprehensive and effective strategy for combating the spread of future infectious diseases and improving overall public health outcomes in Nigeria and similar contexts.

CONCLUSION

This study provides valuable insights into the complex landscape of COVID-19 prevention in Enugu North LGA, Nigeria. While challenges remain, particularly in terms of vaccine uptake and addressing structural barriers to preventive behaviors, the identified associations between perception and behavior offer promising platforms for intervention. As the global community continues to recover from the COVID-19 pandemic and prepares for future pandemics, context-specific understanding of prevention behaviors, as provided by this study, will be crucial in shaping effective public health responses.

DECLARATIONS

Availability of Data and Materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request

Authors' Contributions

NPO and DCO conceptualized and designed the study. Data collection was conducted by NPO and DCO. NPO performed data analysis. DCO drafted the initial manuscript, and all authors contributed to revisions before approving the final version for submission.

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