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"Does a healthy man need vaccination?": Attitudes of older adults toward COVID-19 vaccine in South-East Nigeria

Samuel O. Ebimgbo[1]*, Yemi Adewoyin[2,3], Chukwuedozie K. Ajaero[2], and Uzoma O. Okoye[1]

[1]Department of Social Work, Faculty of the Social Sciences, University of Nigeria, Nsukka, Enugu State, Nigeria

[2]Department of Geography, Faculty of the Social Sciences, University of Nigeria, Nsukka, Enugu State, Nigeria

[3]Demography and Population Studies Programme, Schools of Public Health and Social Sciences, University of the Witwatersrand, Johannesburg, South Africa

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Abstract

The COVID-19 pandemic appears to be impeding the progress of the United Nations' Sustainable Development Goal and the African Union's Agenda 2063 in achieving optimal health and well-being for individuals, particularly older adults. Numerous older adults have succumbed to the virus, exacerbating existing global health challenges. In response, scientists worldwide have developed a vaccine to alleviate the substantial disease burden. The Nigerian government has mandated the prioritized vaccination of older adults. This study aims to investigate the attitudes of older adults toward the COVID-19 vaccine. Data were collected from 32 older adults through in-depth interviews and focus group discussions. Thematic analysis was employed to derive meaningful patterns from the collected data. The findings reveal a prevailing lack of awareness among older adults regarding the COVID-19 vaccine. They asserted that they perceived no need for vaccinations, asserting their current state of health. In addition, concerns were raised about potential adverse effects of the vaccine, including the onset of other illnesses. This study suggests that the Nigerian government, through its orientation agencies, undertakes comprehensive public education campaigns highlighting the importance of COVID-19 vaccine uptake.

Keywords: COVID-19; Hesitancy; Older adults; Pandemic; Vaccine

***Corresponding author:**
Samuel O. Ebimgbo
(samuel.ebimgbo@unn.edu.ng)

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1. Introduction

Human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), diabetes, cancer, chronic respiratory disease, and cardiovascular conditions are among the health challenges that affect older adults in Nigeria. Previous studies indicate that older adults generally hold positive attitudes toward vaccines targeting some of these diseases (Figueiredo *et al.*, 2021; Nakajima *et al.*, 2021). However, there is a notable

gap in the literature concerning the attitudes of Nigerian older adults toward the intake of COVID-19 vaccines. The emergence of COVID-19 has had profound implications for the well-being, quality of life, and various aspects of individuals' lives across the globe. Vulnerable populations, such as older adults, have been disproportionately affected by the pandemic (Amadasun, 2021; Amadasun & Omorogiuwa, 2020). As of June 17, 2022, the World Health Organization (WHO) reported over 6 million deaths attributed to COVID-19 (WHO, 2022), with more than 95% of these fatalities occurring among older adults (WHO, 2020a). The pandemic has occasioned poor health conditions among older individuals and has contributed to a range of mental health problems (Mukhtar, 2020). These mental health problems include depression and cognitive dysfunction (Flett & Heisel, 2020); anxiety, anger, stress, agitation, and withdrawal (Armitage & Nellums, 2020; WHO, 2020b); insomnia (Liu *et al*., 2020); and suicidal ideations (Wand *et al*., 2020). The emotional distress and mental health problems experienced by older adults can be linked to measures such as social and physical distancing, self-isolation, and quarantine implemented by governments to curtail the spread of COVID-19 (Flett & Heisel, 2020).

Amidst all these measures implemented to curtail the spread of COVID-19, the development and utilization of vaccines have proven to be particularly effective (Yamey *et al*., 2020). Vaccination plays a crucial role in enhancing individuals' immune systems and fostering the production of robust antibodies to combat various diseases (Centers for Disease Control and Prevention, n.d.). Consequent to the comprehensive understanding of the genome sequence of SARS-CoV-2 in the first quarter of 2020 (Wu *et al*., 2020) and the WHO's declaration of the pandemic in March 2020 (Cucinotta & Vanelli, 2020), scientists and pharmaceutical organizations worldwide mobilized efforts to invent the COVID-19 vaccine, aiming to alleviate the substantial burden imposed by the disease (Coustasse *et al*., 2021; Zimmer *et al*., 2020).

Following the invention of COVID-19 vaccines, a major threat to their rollout and the complete mitigation of the pandemic is vaccine hesitancy (Coustasse *et al*., 2021). Despite instances of hesitancy documented in countries such as Jordan, Russia, France, Hungary, and Portugal (El-Elimat *et al*., 2021; Lindholt *et al*., 2021; Soares *et al*., 2021), other countries, including the United States (US), China, Saudi Arabia, Malta, Mozambique, Malaysia, Denmark, and Germany, among others, have displayed positive attitudes toward the vaccine (Al-Mohaithef & Padhi, 2020; Dula *et al*., 2021; Lazarus *et al*., 2020; Lindholt *et al*., 2021; Mohamed *et al*., 2021; Reiter *et al*., 2020; Graeber *et al*., 2021). Moreover, research indicates that a significant proportion of populations in China, Canada, Spain, and other countries has already received a full dose of the COVID-19 vaccine (Iguacel *et al*., 2021; Mohamadi *et al*., 2021; Ontario Agency for Health Protection and Promotion, 2021; Zheng *et al*., 2021). Gender, education level, age, employment status, residence, knowledge about the vaccine, course of study, influence of significant others, and concerns about vaccine safety all emerge as significant variables influencing attitudes toward the COVID-19 vaccine (Bai *et al*., 2021; Cordina *et al*., 2021; El-Elimat *et al*., 2021; Rzymski *et al*., 2021).

Nigeria received approximately 4 million doses of the COVID-19 vaccine through the COVAX Facility on March 2, 2021. Despite the availability of the COVID-19 vaccine, there is considerable hesitancy among the population to embrace it. Anorue *et al*. (2021) have revealed apprehensions among southeasterners regarding the COVID-19 vaccine. In Delta State, approximately 48.6% of the population expressed unwillingness to accept the vaccine (Josiah & Kantaris, 2021). Uzochukwu *et al*. (2021) discovered that over 65% of staff and students in Nigerian tertiary institutions demonstrated negative attitudes toward the COVID-19 vaccine. Within Enugu State, Southeast Nigeria, Onalu *et al*. (2022) observed that the majority of the populace has not embraced the COVID-19 vaccine; Ezema *et al*. (2023), in a study of the perceptions of lecturers and students in a tertiary institution, also found that many people exhibit COVID-19 vaccine apathy. Furthermore, a similar study by Nwangwu *et al*. (2021) revealed that students of Enugu State University demonstrated unwillingness to accept the COVID-19 vaccination. In the same vein, Enitan *et al*. (2020) found that approximately 80% of Nigerians were unwilling to partake in the COVID-19 vaccine trial. The qualitative study by Ogueji & Okoloba (2022) revealed that only a small number of participants had received the COVID-19 vaccine. In addition, Adigwe (2021) found that a significant number of Abuja residents were not willing to take the COVID-19 vaccine. However, among them, particularly older adults, especially those who were previously infected with COVID-19, indicated their interest in paying for the COVID-19 vaccination.

Several reasons for negative attitudes toward vaccine uptake among Nigerians have been documented in the literature. Adigwe (2021) reported that the Nigerians' concerns about the side effects of COVID-19 vaccines contribute to the hesitancy in the COVID-19 vaccine uptake. In rural areas of Nigeria, Abubakar *et al*. (2022) have identified factors such as a lack of interest in the vaccine, distrust in the government, misconceptions about the use of the vaccine against the population, denial of the

reality of COVID-19, and concerns about the safety of the vaccines as reasons for rejecting the COVID-19 vaccine. Similar findings have been reported by Ezema *et al.* (2023), who highlighted factors such as denial of COVID-19's existence, lack of trust in the Nigerian government's health-care system, misleading sermons by religious leaders, disinformation, and fear of adverse effects of COVID-19 vaccines contributing to COVID-19 vaccine hesitancy among the populace. A rapid review study by Olu-Abiodun *et al.* (2022) indicates that propaganda, concerns over adverse effects, and conspiracy theories influence people's negative attitudes toward the COVID-19 vaccine. Similarly, Eniade *et al.* (2021) found that perceived risk and lack of trust in the government system deter Nigerians from COVID-19 vaccine uptake. In a qualitative study by Onalu *et al.* (2022), the government's alleged ploy to harm citizens and religious beliefs was cited as the reason for poor uptake of the COVID-19 vaccine. Other reasons include perceived adverse effects, mistrust, and a moral obligation to receive the vaccine (Ogueji & Okoloba, 2022).

Religious beliefs are an integral part of the daily lives of many people, influencing their reactions to and uptake of medical interventions. Therefore, the exploration of COVID-19 vaccine apathy necessitates a discussion of the role of religious beliefs. Studies have demonstrated that religious beliefs play a significant role in shaping people's attitudes toward COVID-19 vaccine uptake (Kasstan, 2021; Qasim *et al.*, 2022). Diverse attitudes toward COVID-19 vaccine uptake are evident among various religious groups, with some expressing outright opposition (Garcia & Yap, 2021). Within certain religious doctrines, prayers are revered over medication, leading to a perception of vaccine ineffectiveness among the faithful (Lucia *et al.*, 2020). In addition, COVID-19 vaccine hesitancy is occasioned by a lack of trust in the efficacy of the scientific procedures employed in its development (Olagoke *et al.*, 2021; Plohl & Musil, 2021; Upenieks *et al.*, 2022). Notably, Christians have been reported to harbor negative attitudes toward the COVID-19 vaccine (Baker *et al.*, 2020; Whitehead & Perry, 2020) due to the belief that it was developed from aborted fetal tissue (Thinane, 2022). Similar sentiments have been observed among Muslims and Jewish communities (Islam *et al.*, 2021). As a result, the rollout of the COVID-19 vaccines in Indonesia was halted until approval was obtained in accordance with Islamic law (Jamal, 2020). Furthermore, Christians in the US perceive COVID-19 vaccines as unsafe and ineffective, contributing to their unwillingness to receive the vaccine (Corcoran *et al.*, 2021).

Several studies have addressed attitudes toward COVID-19 vaccine uptake in Nigeria (Adigwe, 2021; James *et al.*, 2022; Uzochukwu *et al.*, 2021). Despite these studies taking into consideration the views of older adults as well as other sub-populations toward COVID-19 vaccine uptake, the current study used a qualitative approach to contribute to the existing literature on the views and attitudes of older adults toward COVID-19 vaccines and the reasons for COVID-19 hesitancy. This focus is particularly crucial as some underlying health conditions associated with aging render older adults more susceptible to COVID-19. The study's significance is underscored by the Nigerian government's mandate to prioritize the vaccination of older adults.

2. Methods

2.1. Design, setting, and sampling

The study adopted a descriptive phenomenology design, a qualitative research method selected for its ability to describe the universal essence of the COVID-19 vaccine (Lopez & Willis, 2004; Willis *et al.*, 2016). The research was conducted within the southeast geopolitical zone of Nigeria, comprising five states, namely Abia, Anambra, Ebonyi, Enugu, and Imo. The study sample consisted of 32 participants, with 26 individuals selected for in-depth interviews (IDIs) and 6 participants selected for the focus group discussion (FGD).

In the process of selecting study areas and participants, a non-probability sampling technique was adopted, utilizing purposive, snowballing, and availability sampling procedures. Out of five states in southeast Nigeria, Anambra state was purposively selected for its substantial older adult population, totaling 237,272 older adults aged 60 years and above (145,847 males and 91425 females) (National Population Commission, 2010). In addition, Anambra state has experienced a high number of COVID-19 cases (Nigeria Center for Disease Control, [NCDC], 2020), further justifying its selection as a study area. Anambra state encompasses 21 Local Government Areas (LGAs) and three senatorial districts, namely Anambra North, Anambra Central, and Anambra South. For this study, one LGA was purposively selected from each of the two selected senatorial zones. The chosen LGAs are Idemili-South in the Anambra Central senatorial zone and Nnewi-North in the Anambra South senatorial zone. Within these selected LGAs, two communities were further selected, namely Otolo and Umudim from Nnewi-North LGA and Nnobi and Nnokwa from Idemili-South LGA.

The participants were selected utilizing a combination of snowball and availability sampling techniques. Some participants were recruited with the help of community leaders in the selected communities. With their assistance, we identified one or two older adults who subsequently referred us to other eligible participants. In total, 32

Table 1 . Sociodemographic characteristics of the male participants by pseudonyms, LGA, age, marital status, educational level, occupation, and monthly income

Serial number	Pseudonym	LGA	Age	Religion	Study	Marital status	Educational qualification	Occupation	Monthly income
1	Mr. Iku	NN	82	Christianity	FGD	Married	No education	Unemployed	Undisclosed
2	Mr. Eme	NN	80	Christianity	FGD	Widower	No education	Unemployed	Undisclosed
3	Mr. Emma	NN	62	Christianity	FGD	Married	Secondary	Trader	Undisclosed
4	Mr. Mba	NN	70	Christianity	FGD	Married	No education	Artisan	Undisclosed
5	Mr. Ben	NN	72	Christianity	FGD	Widower	No education	Trader	Undisclosed
6	Mr. Geo	NN	66	Christianity	FGD	Married	University	Retiree	Undisclosed
7	Mr. Gody	NN	60	Christianity	IDI	Married	Secondary	Farmer	Undisclosed
8	Mr. Isa	NN	69	Christianity	IDI	Married	No education	Trader	Undisclosed
9	Mr. Mik	NN	65	Christianity	IDI	Married	University	Pastor	Undisclosed
10	Mr. Sim	NN	79	Christianity	IDI	Widower	No education	Unemployed	Undisclosed
11	Mr. Lui	NN	74	Christianity	IDI	Married	Secondary	Working	₦47,000
12	Bar. Edo	NN	61	Christianity	IDI	Married	University	Lawyer	Undisclosed
13	Mr. Sol	NN	88	Christianity	IDI	Widower	Primary	Trader	₦25,000
14	Mr. Nel	IS	81	Christianity	IDI	Married	Primary	Retiree	Undisclosed
15	Mr. Pau	IS	61	Christianity	IDI	Widower	Primary	Trader	Undisclosed
16	Mr. Jul	IS	72	Christianity	IDI	Married	Primary	Unemployed	₦2,000
17	Mr. Ken	IS	68	Christianity	IDI	Married	No education	Farmer	Undisclosed
18	Mr. Mel	IS	60	Christianity	IDI	Married	Primary	Trader	₦8,000

Abbreviations: IS: Idemili-South; NN: Nnewi-North; LGA: Local Government Areas. Source: Researchers' fieldwork in 2021.

Table 2. Sociodemographic characteristics of the female participants by pseudonyms, LGA, age, marital status, educational level, occupation, and monthly income

Serial number	Pseudonym	LGA	Age	Religion	Study	Marital status	Educational qualification	Occupation	Monthly income
1	Mrs. Gra	NN	85	Christianity	IDI	Widow	No education	Unemployed	Undisclosed
2	Mrs. Luc	NN	85	Christianity	IDI	Widow	Primary	Farmer	₦30,000
3	Mrs. Mon	NN	61	Christianity	IDI	Married	Primary	Unemployed	₦50,000
4	Mrs. Ngo	NN	60	Christianity	IDI	Widow	Secondary	Trader	Undisclosed
5	Mrs. Brig	NN	62	Christianity	IDI	Widow	No education	Trader	₦20,000
6	Mrs. Joye	NN	60	Christianity	IDI	Widow	Primary	Unemployed	Undisclosed
7	Mrs. Anth	NN	64	Christianity	IDI	Widow	Secondary	Trader	Undisclosed
8	Mrs. Vic	IS	62	Christianity	IDI	Married	University	Teaching	₦45,000
9	Mrs. Com	IS	79	Christianity	IDI	Married	University	Teaching	Undisclosed
10	Mrs. Roso	IS	76	Christianity	IDI	Widow	University	Retiree	Undisclosed
11	Mrs. Graco	IS	70	Christianity	IDI	Married	Primary	Unemployed	Undisclosed
12	Mrs. Fel	IS	73	Christianity	IDI	Widow	Primary	Trader	Undisclosed
13	Mrs. Bene	IS	75	Christianity	IDI	Widow	Primary	Unemployed	Undisclosed
14	Mrs. Afor	IS	65	Christianity	IDI	Married	University	Retiree	Undisclosed

Abbreviations: IS: Idemili-South; NN: Nnewi-North; LGA: Local Government Areas. Source: Researchers' fieldwork in 2021.

participants (18 males and 14 females) were selected for the study. The gender imbalance among participants was occasioned by their availability, with men being more accessible for the study than women. Specifically, 20 participants (13 males and seven females) were selected from Nnewi-North LGA, while 12 participants (five males and seven females) were selected from Idemili-South LGA. For the FGD, six males were selected from Otolo in Nnewi-

North LGA. In the case of the IDI, 14 participants (seven males and seven females) were selected from Umudim in Nnewi-North LGA, while seven females were selected from Nnobi and five males from Nnokwa, both situated in Idemili-South LGA. The details are as shown in Table 1.

2.2. Data collection

The study utilized a semi-structured IDI guide and an FGD guide as the primary instruments for data collection. Recognizing that the study area was predominantly inhabited by Igbo-speaking individuals, the study instruments were prepared in the Igbo language to facilitate seamless communication and discussions. However, participants were given the option to be interviewed in English if they preferred. One FGD session, consisting of six participants, was conducted with male older adults, while 26 IDIs were conducted, involving 14 females and 12 males. To accommodate the language preferences of the participants, interviews and discussions were conducted in both Igbo and English. In addition, with the permission of the participants, an electronic recorder was used to capture verbal communication, while field notes were used to document non-verbal communication cues expressed by participants.

During the participant recruitment process, we engaged in discussions to determine their preferred date, time, and venue for the interview and discussion. Their participants expressed a preference for conducting these sessions in their homes and community halls. In addition, we provided comprehensive information about the study, including its aims, potential risks, and expected benefits. We assured participants of the confidentiality and anonymity of their responses and emphasized their right to withdraw from the study at any point. A total of 38 older adults were approached for participation in the study, but six declined due to unavailability. Each interview session, whether individual or group discussions, lasted between 25 and 40 min, while the group discussion sessions lasted 55 – 60 min. The sociodemographic characteristics of the IDI participants are shown in Table 2.

2.3. Data analysis

The analyses of the transcripts and field notes adhered to the inductive thematic analysis (Braun & Clarke, 2006). In an effort to maintain the authenticity of the original data collected from the field, a manual analysis method was employed without reliance on computer software. Audio files containing participant responses were transcribed verbatim in Igbo and subsequently translated into English to ensure consistency of meaning in both languages. Field notes, where both verbal and non-verbal cues were documented, were assigned identification codes to reflect the expression of the participants. This coding system facilitated the integration of observations related to non-verbal points by establishing links between the audio-recorded interview, the coded field notes, and our collective memory of the events. This comprehensive approach ensured that no information, whether originally recorded in English or Igbo, was lost during the transcription and translation.

The researchers performed initial coding, a process that generated numerous categories without any reservation of codes (Charmaz, 2006). During this phase, emerging thoughts were identified, and relationship diagrams were drawn in line with the study objectives. Frequently used keywords by respondents were pinpointed as indicators of important themes. In the second phase, we eliminated, combined, or subdivided the coding categories identified in the initial coding. This involved a thorough reading of the analysis over time to gain familiarity with and mastery of common and recurrent themes. Our attention was directed toward recurring thoughts and broader themes connected to the codes (Charmaz, 2006; Krueger, 1994; Ritchie & Spencer, 1994). The final findings of this study were then reported based on these themes (Table 3).

3. Results

3.1. Theme 1: Attitudes toward COVID-19 vaccine uptake

We sought to examine the attitudes of Nigerian older adults toward the COVID-19 vaccine. Transcript analysis revealed that older adults exhibited non-compliance with COVID-19 vaccine uptake, actively rejected the idea of receiving the COVID-19 vaccine, and expressed a reluctance to advocate for its acceptance, among others.

3.1.1. Non-compliance with COVID-19 vaccine uptake

The analysis of the transcript indicates a widespread lack of compliance with the COVID-19 vaccine uptake among almost all the participants. The study's findings underscore that only one male participant acknowledged receiving the COVID-19 vaccine. In both LGAs, all other participants reported not having been vaccinated. Mr. Jul from Idemili-South explicitly stated, "No, I did not take it. Why would they inject me? Am I sick or what?… After a hiss, I did not take it, '*Coro*' (COVID-19) has come and gone, and I did not." In addition, some participants conveyed a belief that they did not need the vaccine as they considered themselves immunized by God. Mr. Lui, a male participant in the IDI, asserted, "I did not take the vaccine. I did not take it because I do not need it; I am immunized by God." A female participant, Mrs. Brig from Nnewi-North, echoed this sentiment, stating, "I did not take the vaccine.

Table 3. Guide of questions for focus group discussion and in-depth interviews, emerged themes, and sub-themes

Serial number	Key questions	Emerged Themes	Sub-Themes
1.	What is your view regarding the COVID-19 vaccine that older adults are meant to take?	Attitudes toward COVID-19 vaccine uptake	a. Non-compliance of older adults to the vaccine uptake, their b. Rejection of COVID-19 vaccine uptake c. Unwilling to encourage others to vaccine uptake
2.	What factors encourage older adults to reject covid-19 vaccine?	Reasons for the rejection of COVID-19 vaccine	a. It causes other sicknesses b. Negative reactions on the body c. Fulfillment of God's word (A mark of the beast; 666)

They advised us to do so, but I did not because God was with me, and I wasn't suffering from COVID-19. People are going, but I have not, for 1 day, attempted to go because God has given me sound health, but if I am sick, I will go to the hospital for treatment."

3.1.2. Rejection of COVID-19 vaccine uptake

Given that almost all participants conveyed that they had not received the COVID-19 vaccine, our inquiry extended to discerning their willingness to accept the vaccine in the future. It appears that almost all participants in the study demonstrated indifferent attitudes toward COVID-19 vaccine uptake. With the exception of one male participant expressing a conditional willingness to accept the vaccine if available in the community, all other participants stated their unwillingness to take the vaccine. During the FGD involving male older adults, a unanimous indifferent attitude toward the vaccine was observed. Participants in the FGD thought that the local climate (Nigeria) was too hot for the virus to survive. In the same vein, the IDI participants overwhelmingly demonstrated negative attitudes toward COVID-19 vaccine uptake. They expressed their unwillingness to accept the vaccine. Mrs. Graco from Idemili-South stated, "I will not take it, even if they bring it to my house, I will not take it… *laughs*…" In addition, a participant, a lawyer by profession, went to the extent of canceling all his foreign trips rather than taking the vaccine. He reflected, "No, no, no, I don't have any vaccines. If people want it, it's their decision. For me, I don't have it. Even if I want to travel, I will suspend it. I won't take it."

Several participants emphasized their perception of good healthy as a reason for rejecting the vaccines, asserting that they saw no necessity for vaccination. They expressed a preference for seeking medical attention at a hospital in the event of any health challenges. One participant's perspective on this matter was reflected in the following quote:

> "I will not take the vaccine, ho ha. No, I refuse to take it. If I am sick or have a headache, I have my hospital card, and I will visit the hospital for proper diagnosis and treatment. I won't take the vaccine. Let them continue taking." (Mr. Ken; Idemili-South).

In addition, one participant highlighted a perspective suggesting that COVID-19 has existed for some time but has not been acknowledged in other countries. He revealed that COVID-19 is essentially common malaria, a longstanding affliction in Africans. This viewpoint is articulated in the following quote:

> "I will not take the vaccine… well, I am healthy. For me, COVID or whatever they call it, has been in existence for a long time, but it has not been experienced by the whites (Westerners) because our bodies and theirs are not the same. The sickness is just malaria that has been ravaging us before now. It is malaria, but because we are not the same as the whites, it is affecting them so much." (Mr. Sim; Nnewi-North)

3.1.3. Unwillingness to encourage others to vaccine uptake

We also sought to ascertain if older adults would encourage or support others to accept the COVID-19 vaccine, whether they are their fellow older adults or other sub-populations in society. However, the participants revealed that they are neither willing to support nor encourage anyone to accept the COVID-19 vaccine. During the FGD sessions, all participants expressed their unwillingness to offer support or encouragement for COVID-19 vaccine acceptance. In the same vein, with the exception of only two participants in the IDI study who are willing to support others, every other participant declined to provide support or encouragement for vaccine acceptance. Mrs. Fel, a female participant, said, "If others can take, let them go ahead, but as for me, I will not encourage anybody to take the vaccine. If you people (researchers) can take the vaccine, it's your business; I am not part of it." Another participant, Mrs. Anth, a widow, stated, "Eeh, I don't support ohh! Because my daughter called me and instructed me not to take the vaccine." Mr. Geo from Nnewi-North rhetorically asked, "Why should I support a healthy man to take an injection? Is it a vaccine food or what? My advice is, if they don't have food, they should get something and eat."

3.2. Theme 2: Reasons for COVID-19 vaccine hesitancy

We sought to uncover the reasons behind older adults' vaccine hesitancy, given their expressed unwillingness to accept the vaccine. According to the transcripts analysis, some participants cited concerns that the vaccine might cause other illnesses. Mr. Mik stated, "My brothers (researchers), I won't take the vaccine because there was a time it was announced that those people that took the injection abroad have been infected with another illness." Similarly, a female participant, Mrs. Joye from Nnewi-North, shared her thoughts, "I won't take it; I will not take the injection because some people discovered that anyone who takes the injection doesn't survive it, especially those who are not up to 60 years. They also said that it has an aftereffect on those who receive the vaccine. I will not take the vaccine." Another female participant, Mrs. Vic from Idemili-South, expressed her concern, "… but the question is that people that started it, what they are showing us is that someone's body can light up an electric bulb, that someone's body can work as a magnetic substance. So, you notice that the consequences are detrimental to one's health. The vaccine is a failure, it's a failure, it's a failure. I can't be part of it." Other participants viewed the vaccine as the fulfillment of God's word regarding the end time, believing that accepting the COVID-19 vaccine involves receiving the mark of the beast, symbolized by 666. A female participant reflected her thoughts in the following quote:

> "Waa! First, the Bible is real, and we are well warned about the inventions that will be made manifest in the end time. We are told about the mark of the beast, the time of that 666, and so on. The Bible told us that we would be injected on our hands and heads. It is happening now; reading makes a man and all that the Bible says is happening now. The world, through technology, is about to fulfill the word of God. So, these technologies are strategies to fulfill it. What is coming next cannot be easily comprehended now".

4. Discussion

Vaccine development and utilization have proven highly effective in curtailing the spread of the COVID-19 pandemic (Kumari *et al*., 2021), as they boost individuals' immune systems, generating antibodies to combat existing diseases. The COVID-19 vaccine, in particular, is essential for preventing the virus's spread and further outbreak. However, the issue of COVID-19 vaccine hesitancy poses a significant threat to global health safety (Ezema *et al*., 2023). Vaccines play an important role in reducing morbidity and mortality associated with various infectious diseases by conferring benefits upon vaccinated individuals and safeguarding communities through the reduction of disease transmission (Rodrigues & Plotkin, 2020). In light of these considerations, this study sought to ascertain the attitudes of Nigerian older adults toward the uptake of the COVID-19 vaccine. The study's findings revealed that almost all participants had not yet received the COVID-19 vaccine. With the exception of one male participant who acknowledged having received the COVID-19 vaccine, the remaining participants had not accepted the vaccine. Similar observations were reported in Jordan and Malaysia, where there was low uptake of the COVID-19 vaccine (El-Elimat *et al*., 2021; Mohamed *et al*., 2021). On the contrary, in countries such as China and Spain, findings revealed that a majority of the populace, including older adults, had completed the full course of the COVID-19 vaccine (Iguacel *et al*., 2021; Mohamadi *et al*., 2021; Ontario Agency for Health Protection and Promotion, 2021; Zheng *et al*., 2021).

The findings of this study underscore that participants demonstrated indifferent attitudes toward the uptake of the COVID-19 vaccine. Among the older adults who participated in the study, only one expressed willingness to accept the vaccine if it were made available. The narratives provided by the participants reveal a lack of knowledge among Nigerian older adults about COVID-19, its consequences, and the importance of the vaccine in reducing the spread of COVID-19. Comparable to the findings in Jordan and Malaysia, these nations also displayed indifferent attitudes toward accepting the COVID-19 vaccine (El-Elimat *et al*., 2021; Mohamed *et al*., 2021). In contrast, older adults in Saudi Arabia demonstrated a greater willingness to accept the COVID-19 vaccine (Al-Mohaithef & Padhi, 2020). Similar positive trends were observed in countries such as Malta, the United Kingdom, the US, France, and other nations (Cordina *et al*., 2021; Lazarus *et al*., 2020; Murphy *et al*., 2020; Szilagyi *et al*., 2020; Sherman *et al*., 2020).

The findings of this study revealed a range of reasons provided by participants for their aversion to the COVID-19 vaccine. Some of the reported reasons include unfounded rumors suggesting that the vaccine causes other illnesses, that individuals who receive it may succumb to its effects, and that the vaccine possesses the ability to light an electric bulb or attract iron substances. These findings underscore a noticeable lack of knowledge among Nigerian older adults regarding the COVID-19 vaccine. Similar concerns were observed in other countries, such as Poland, where Rzymski *et al.* (2021) discovered that older adults expressed fear of the COVID-19 vaccine due to concerns about severe adverse effects, serious allergic reactions, and

unknown long-term effects. In contrast, citizens of Saudi Arabia and Venezuela exhibited a more informed stance on COVID-19, demonstrating positive attitudes toward the COVID-19 vaccines as a crucial means of containing the disease (Al-Hanawi *et al*., 2020; Bates *et al*., 2021).

Religious belief was found to influence older adults' COVID-19 vaccine hesitancy. Some participants stated that they need not get the vaccine because God has already conferred them with immunization. Others believe that the vaccine is the fulfillment of God's word, a method of injecting "666," which is the mark of the beast, into someone's body. These findings demonstrated older adults' lack of knowledge about COVID-19 and the vaccine. Similarly, the study by Onalu *et al*. (2022) discovered that Nigerians believe that the COVID-19 vaccine is a ploy by the Antichrist to inscribe the mark of the beast on people. Several studies have found that Christians, Muslims, and Jews all have negative attitudes toward COVID-19 vaccine uptake due to their religious beliefs (Baker *et al*., 2020; Corcoran *et al*., 2021; Islam *et al*., 2021; Jamal, 2020; Thinane, 2022; Whitehead & Perry, 2020).

Like many other studies, this one has limitations. The study's location in a specific state and geopolitical zone may impact the broader generalizability of the findings, especially if the participants were all local residents. As a result, the views they hold may only represent a subset of the Nigerian population. Therefore, there is a need for a similar study to be conducted in the country's other geopolitical zones.

5. Conclusion

COVID-19 has been linked to millions of deaths worldwide, with older adults bearing a disproportionate share of the toll. The pandemic has also affected the physical and mental health of older adults. Pharmaceutical companies and scientists from around the world collaborated to develop a vaccine to combat the effects of COVID-19. Nigeria is among the countries that have received doses of the COVID-19 vaccine, with a directive to prioritize vaccination for the older population before other sub-populations. The purpose of this study was to investigate the attitudes of Nigerian older adults toward the COVID-19 vaccine, with the southeast geopolitical zone as the study area. However, the study's findings revealed that the majority of older adults exhibited indifferent attitudes toward COVID-19 vaccine uptake. This indifference is rooted in their tendency to associate the vaccine with other illnesses, influenced by religious beliefs and concerns about perceived vaccine side effects. Consequently, despite the susceptibility of Nigerian older adults to COVID-19, their vaccine uptake is very low. Therefore, the study suggests that the Nigerian government, through orientation agencies, should undertake public education initiatives highlighting the importance of COVID-19 vaccine uptake. In addition, there is a need for policies that regulate the activities of unvaccinated individuals in various public domains.

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Conflict of interest

The authors declare no conflict of interest.

Author contributions

Conceptualization: Samuel O. Ebimgbo, Yemi Adewoyin, Uzoma O. Okoye

Formal analysis: Samuel O. Ebimgbo, Chukwuedozie K. Ajaero

Investigation: Samuel O. Ebimgbo, Yemi Adewoyin, Uzoma O. Okoye

Methodology: Samuel O. Ebimgbo, Chukwuedozie K. Ajaero, Uzoma O. Okoye

Writing – original draft: Samuel O. Ebimgbo, Uzoma O. Okoye

Writing – review & editing: Yemi Adewoyin, Chukwuedozie K. Ajaero

Ethics approval and consent to participate

The study received ethical approval from the Health Research Ethics Committee at the University of Nigeria, Teaching Hospital, Enugu (ref: NHREC/05/01/2008B-FWA00002458-1RB00002323). All interviews were carried out with the voluntary consent of participants. All the

participants were required to give oral permission. Their right to withdraw from the study whenever they were no longer interested in the study was given to them.

Consent for publication

The participants gave their oral permission to publish all the information they provided. Their confidentiality and anonymity were assured to them, hence the use of pseudonyms.

Availability of data

The data used for this study are available on request from the authors.

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