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A qualitative study of Nigerian community members awareness of Mpox and their willingness and barriers to receiving the Mpox vaccine

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Abstract

Background Two vaccines, the JYNNEOS and ACAM 2000 have been approved for use for Mpox protection, however vaccine hesitancy and vaccine refusal poses a significant challenge in its uptake. This study explored participants' awareness of Mpox, willingness, and barriers to receiving the approved Mpox vaccines when they become available in Nigeria.

Method This was a qualitative cross-sectional study. Participants were recruited using a purposive sampling technique. A total of 16 Focus Group Discussions (FGDs) and 64 in-depth interviews (IDIs) were conducted by trained research assistants among community members in four states in Nigeria (Bayelsa, Delta, Lagos, and Rivers states) between October 1 and November 30, 2023. The interviews were audio-recorded and transcribed before thematic analysis was conducted.

Results One hundred and sixty-four persons, comprising 71 males and 93 females, participated in this study. The anticipated rollout of the Mpox vaccine in Nigeria elicited mixed reactions; while some participants expressed willingness to be vaccinated, others expressed their concerns about the vaccine side effects, vaccine safety, and their mistrust of new vaccines. There were also reports about physical access and financial cost being a barrier to receiving the Mpox vaccine.

Conclusion The study highlights the critical need for more community-based public health education campaigns to enhance awareness and correct misconceptions about Mpox. Effective communication strategies that address specific community issues and emphasize vaccine safety are important for increasing vaccination uptake and controlling the spread of Mpox in Nigeria.

Keywords Mpox cases · Mpox vaccine · Nigeria

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1 Introduction

The outbreak of Mpox (a viral zoonotic infection formerly known as Monkeypox) cases to over 97,000 cases and 186 deaths across 117 countries globally as of April 2024 is of public health concern [1]. On August 14, 2024, the World Health Organization declared the Mpox outbreak a Public Health Emergency of International Concern (PHEIC) following the spread of a more virulent strains of the Mpox virus [1]. As at August 15, 2024, Nigeria has reported 39 confirmed cases of Mpox across 19 states [2], with Bayelsa, Delta, Lagos, and Rivers states reporting very high number of cases compared to the other states [3–5]. Despite its classification as an endemic zoonotic viral infection in Nigeria, awareness and understanding of Mpox among community members remain limited. A quantitative study among 958 community members across three states in Nigeria (Oyo, Lagos and Jigawa) provided evidence that the knowledge of Mpox infection transmission, prevention, and treatment was low across the states with only 28.9% of respondents reporting that sharing utensils with an infected person is a means of contracting the disease, and 15.9% were aware that Mpox infection may resolve spontaneously [6]. Their finding is similar to the results from the literature review conducted by Lounis and Riad [7], on Mpox (Mpox)-related knowledge and vaccination hesitancy in non-endemic countries that found an unsatisfactory level of knowledge and awareness among dental professionals, healthcare workers, and general physicians.

Multiple Mpox outbreaks in Nigeria and the recent spread of more virulent strains to several African countries have highlighted the urgent need for effective public health interventions, including vaccination programs [8–11]. While vaccines like JYNNEOS and ACAM 2000, initially approved for smallpox but shown to protect against Mpox, have been deployed in the U.S., UK, and Canada, there is limited literature on global community awareness and the unique social, cultural, and economic barriers influencing vaccine uptake in African countries, including Nigeria [12, 13]. Although clinical trials of the Mpox vaccine is still ongoing, studies have highlighted the vaccine's strong efficacy, especially among high-risk populations, including healthcare workers, men who have sex with men (MSM), and individuals with close contact with infected persons [13, 14].

Vaccine hesitancy is defined as delay in acceptance or refusal of vaccination despite availability of vaccination services" and is listed as one of the top ten global health threats according to the World Health Organization [15]. Several factors responsible for vaccine hesitancy are misinformation, cultural beliefs, past experience with health services, family histories, lack of access to healthcare services, and political ideology amongst others [16, 17]. While some studies have assessed community members' vaccine willingness and barriers to other infectious diseases, only a few adequately explore the unique sociocultural dynamics surrounding Mpox in Nigeria [18]. Despite the dearth of information on the Mpox vaccine globally, most studies have adopted a quantitative approach to explore the willingness to receive the Mpox vaccines among members of the community [19, 20], men who have sex with men [21], healthcare providers [22], and other population groups [23]. With the possible availability of an Mpox vaccine in Nigeria, exploring the willingness of people to receive the Mpox vaccine, as well as the barriers and facilitators to receiving the vaccine when available is critical to designing intervention programs for it's successful uptake Previous studies on vaccine hesitancy and uptake have primarily utilized quantitative methodologies, often focusing on statistical measures of uptake rates, demographic factors, or general attitudes toward vaccination rather than in-depth exploration of personal beliefs, motivations, and concerns specific to Mpox [24, 25]. Hence, this qualitative approach allows for a nuanced understanding of community perceptions and behaviors, offering critical insights that are less accessible through quantitative methods. By applying the Health Belief Model (HBM), this study also examine community members' views on Mpox susceptibility, perceived benefits and barriers to vaccination, and cues to action, thus providing a perspective on factors influencing vaccine willingness or hesistancy. this study aims to inform policymakers and health practitioners about the specific needs and concerns of the population, thereby fostering a more effective public health response. Our study explored the awareness of Mpox, and the willingness and barriers to receiving the Mpox vaccine when available among community members living in Mpox endemic regions (Bayelsa, Delta, Lagos, and Rivers state) in Nigeria.

2 Methodology

2.1 Study design

This study utilized a qualitative design and employed both focus group discussions (FGDs) and in-depth interviews (IDIs) as primary data collection techniques. The combination of FGDs and IDIs facilitate a comprehensive exploration of various dimensions related to the research topic.

2.2 Study setting

Our study was conducted among adult residents in four Nigerian states with relatively high prevalence of Mpox: Bayelsa, Delta, Lagos, and Rivers state which were selected due to their significant higher prevalence of Mpox cases compared to other states in Nigeria [3–5]. These states reported the highest number of Mpox cases [3–5], making them essential areas for investigating community awareness, willingness and barriers related to Mpox vaccination. (Data was collected between October 1, 2023 and November 30, 2023.

Lagos State, which is the largest city in Nigeria, with over 20 million citizens is regarded as the economic and commercial capital of Nigeria [24]. Lagos is heavily urbanized, but it also faces issues such as overcrowding, informal settlements, and increased human movement which are characteristics that might enable the rapid spread of infectious diseases like Mpox [24]. Lagos has been reported to have the greatest number of Mpox cases in Nigeria [25]. Bayelsa State, located in the Niger Delta area of Nigeria, has a population of around 2.3 million people [26]. Bayelsa is known by its lush woods, wetlands, and huge water bodies [26]. These natural variables contribute to the local population's reliance on bush meat and intimate encounters with wildlife, making Bayelsa particularly susceptible to zoonotic diseases like Mpox [27]. Rivers State, with a population of around 7.3 million people, is an economic powerhouse with a considerable urban population in its capital, Port Harcourt. However, substantial areas of the state remain rural and impoverished, with residents dependent on traditional traditions such as bush meat consumption [28]. This, along with the extensive mangrove forests and marshes, enhances the danger of Mpox outbreaks. Delta State, located in the Niger Delta, has a population of roughly 5.6 million people and is notable for its blend of urban and rural areas [29]. The rural population, in particular, engages in activities such as hunting and fishing, which might increase exposure to wildlife and dangerous zoonotic illnesses like Mpox [3]. The state's terrain, with its creeks and swamps, also encourages the transmission of diseases [29].

This study was conducted in two randomly selected local government areas in each of the four states. From each of the eight LGAs, one community was selected after consultation with primary health facility managers and approval received from local community leaders.

2.3 Data collection procedure

FGDs and IDIs were conducted by eight trained research assistants Research Assistants went through an intensive 5-day refresher didactic and practical training on FGD facilitation, note taking, and interviewing techniques including role-playing sessions during the last 2 days. The IDIs were conducted after the FGDs to elicit more information from participants who had more information to offer and those who were not comfortable having discussions in a group setting. Prior to the data collection, a focused interview guide (supplementary files) which contained open-ended questions and probes was developed and designed by research team members through a literature review and was tested for its clarity and content validity.

Eligible and consenting participants were assured of confidentiality and that no harm would come to them by choosing to participate in the study. Participants were also informed that the conversations would be recorded, however, no identifying information was recorded. Before the commencement of the interviews, willing participants gave a written consent to participate in the study and an oral consent to record the sessions. Also, a socio-demographic form was used to collect participants' socio-demographic details such as age, gender, religion, occupation, and educational status. In each FGD group, there was a moderator, a notetaker, and a timekeeper. Each FGD lasted for about 1 to 1 h 30 min, while the IDI lasted about 40 to 75 min. The interviews were recorded using a digital voice recorder and notes were taken to highlight participants' non-verbal communication cues during the conversation.

2.4 Data analysis and data management

The audio recordings from the interviews were transcribed into English by translators proficient in the English and local languages. The analytical process involved two qualitative analysis experts who independently conducted a comprehensive thematic analysis of the interview transcripts utilizing a separate codebook. This analytical process adhered to the method outlined by Guest et al. [30], involving a multi-step approach. The initial steps included a thorough perusal of textual data, during which themes within the data were identified and subsequently coded.

Following this, the structure and content of these themes were interpreted, guided by the framework proposed by [30].

The data analysis adopted an inductive and cyclical approach, comprising a meticulous review and re-review of each transcript. This iterative process involved the identification of emerging patterns, the coding of data with appropriate labels, and the generation of overarching themes and sub-themes. In the final stages of mapping and interpretation, pivotal contents were pinpointed across and within the data, accompanied by preliminary explanations of their associations. Notably, relevant data extracts were employed to illustrate and substantiate key findings derived from thematic analysis.

2.5 Rigor and quality control

The study's credibility was bolstered through prolonged engagement with participants and community members, allowing for a deeper understanding of their perspectives and building trust over time. To enhance transferability, we provided detailed descriptions of the study context, and descriptions of participants' perspectives, facilitating applicability to other settings. Additionally, we ensured quality control by (1) using a voice recorder and taking notes during data collection, (2) recruiting experienced RAs who underwent thorough theoretical and practical training on data collection, (3) having data collectors work in pairs, (4) using an interview guide that was translated into the local language, (5) reviewing notes and voice recordings each day after the interviews and (6) ensuring two experienced qualitative data analysts independently analyze the transcripts. Lastly, we ensured ongoing reflexivity and triangulation of findings to help mitigate biases and enhance the rigor of the research process.

2.6 Ethical approval

Ethical approval for this study was sought and received from the National Ethics and Health Research Committee, Federal Ministry of Health, Abuja, Nigeria (NHREC/01/01/2007-21/03/2024B). Our study adhered to the Declaration of Helsinki. Furthermore, the study team got approval from community leaders and informed consent from participants.

3 Results

3.1 Characteristics of study participants

From a total of 164 participants, consisting of 71 males and 93 females, there were 31, 45, 48 and 40 participants from Lagos, Delta, Bayelsa and Rivers respectively. More information on the socio-demographic characteristics of the participants is in Table 1 below.

3.2 Awareness of Mpox

Majority of participants across all four states had poor awareness and incomplete knowledge about Mpox. Some participants associated it with diseases like chickenpox and measles, indicating potential confusion or lack of clarity regarding the distinct characteristics of Mpox.

> "…I thought the pox only affects monkeys but it is later that I realized that it is a disease that affects human beings."—IDI 1,40 years, Male, Delta.
> " …I do not know much about that but one thing I know is that it's a viral disease, one needs to be careful not to contact it because we were once told that some viral diseases are not curable…" FGD 1, 52 years, Female, Rivers.

A few participants are not aware of the existence of Mpox disease until the day of the focus group discussions. One participant candidly admitted;

Table 1 Sociodemographic characteristics of participants

Socio-demographic characteristics	Frequency (n = 164)	Percentage
States		
Lagos	31	19
Delta	45	27
Bayelsa	48	29
Rivers	40	24
Sex		
Male	71	43
Female	93	57
Age groups		
19–25	16	9.8
26–35	46	28.1
36–45	45	27.4
46–55	24	14.6
56 and above	33	20.1
Occupation		
Business	17	10.4
Civil servant	26	15.9
Trader	17	10.4
Student	15	9.0
Health worker	16	9.8
Self employed	11	6.7
Others	62	37.8

> "As for me, I have not heard about this monkeypox. Today is the first time I am hearing about it." FGD 3, 35 years, Female, Bayelsa.

Contrary to the majority of participants, some participants (especially those from Lagos) who participated exhibited good awareness about Mpox.

> "I heard about Monkeypox while in secondary school, during my Biology class, my thought then was that it is a diseases that affect monkeys but the teacher told us that it is a viral disease that affects human beings and may be one of the symptoms is rashes" FGD 1, 30 years, Male, Lagos.

When discussing the population at risk of Mpox, participants had inadequate knowledge about the risk of Mpox. While many did not know of therisk factors, some participants highlighted that the major Mpox risk factor they were aware of was the hunting and consumption of bush meat, especially from unknown sources.

> "Because we buy meat that we don't know the source, we buy meat that we don't know how it has been killed or gotten from…, I will say majority of us are at risk of Mpox but those that are mostly at risk or affected as respondent one said are those in the rural areas that hunt more for bush meat." FGD 2, 39 years, Female, Lagos.

However, A few participants had good knowledge of Mpox risk factors as they highlighted that Mpox may spread from bodily contact with an infected person.

> "Contact is one area where monkeypox can easily get to the next person such as clothes. Those that like to give clothes or borrow clothes, it get easily get contacted through that means. Then through animals or any other sharp object that have been used by an infected person that you use without being sterilized you can also get it from there". FGD 4, 29 years, Male, Bayelsa.
> "From my own perspective, I think the main cause of the spread of Monkeypox virus is through physical contact because I may be holding somebody and the person is infected with Monkeypox, they don't immediately know that they are infected and could have contact with people." FGD 2, 24 years, Female, Lagos.

3.3 Mixed sentiments among Nigerians on the potential Mpox vaccine rollout

Participants in the study presented a range of opinions regarding their willingness to receive the Mpox vaccine when it becomes available in Nigeria. While some expressed readiness to take the vaccine for preventive measures, some participants exhibited reluctance, citing concerns about side effects, skepticism towards new vaccines, and the perceived low prevalence of Mpox in their communities.

Some participants who were willing to take the Mpox vaccine emphasized the importance of prevention and the perceived ease with which the virus could be controlled through vaccination.

"…I think I would want to take the vaccine. I don't have to wait for the symptoms to start, to take the vaccine."—FGD 2, 36 years, Female, Rivers.
"If the vaccine is available in Nigeria, I will be willing to take it in the sense that the monkeypox can be killed easily."—FGD 1, 37 years, Female, Bayelsa.
"…Of course, if it will prevent me from having the disease, of course, I will take the vaccine."—IDI 16, 29 years, Female, Delta.

However, some participants insisted they would not take the vaccine.

"No, I won't, I won't take the vaccine."—IDI 1, 45 years, Male, Delta.

Despite their willingness to receive the vaccine, some participants expressed hesitancy about recommending it to others. Concerns about potential problems or uncertainties about the vaccine's safety were factors influencing their decision.

"I will take the vaccine but I will not tell another person to go and take it. I don't want a problem."—FGD 3, 30 years, Female, Bayelsa.
"I can't recommend it to anybody; doing that I will be a wicked person because something I can't take, I can't recommend to anybody…"—IDI 12, 30 years, Male, Bayelsa.

A significant number of participants expressed skepticism and opposition to compulsory vaccination. They raised concerns about the government's motives, suggesting that coercion might be perceived negatively. Participants emphasized the importance of education and personal choice over forced compliance.

"You cannot force me to take something that I… I have my right for expression, so I can't… I can't take what I don't want to take."—FGD 4, 27 years, Male, Rivers.

3.4 Concerns about vaccine effectiveness, side effects, convenience, and privacy.

Majority of participants expressed concerns about potential side effects, drawing parallels with their observations during the mass COVID-19 vaccination campaigns.

"I am always quite skeptical when there is a new coming out because when COVID-19 vaccine came out, there was quite some rumors that it triggers heart failure and other non-communicable disease, so I will take my time a little bit before going for it."—FGD 1, 30 years, Male, Lagos.
"No, I don't think I will be willing to take it…Reason being that I'm being skeptical about all these vaccines, like the production, side effects."—IDI 7, 48 years, Female, Rivers.
"Me I will not take it because when they were taking the COVID-19 vaccine, we had some side effects, even my husband told me not to take the vaccine so I will not be willing to take this monkeypox vaccine."—FGD 2, 44 years, Female, Bayelsa.

A participant expressed concerns about adding another vaccine to the existing ones, suggesting a need for caution and skepticism toward additional vaccinations.

"We already have enough vaccines we are taking, to add monkeypox to it is, you don't know what it will result in or our life span will be faulty."—IDI 5, 35 years, Male, Delta.

Some participants expressed hesitancy due to the perceived low prevalence of Mpox in their communities, questioning the necessity of the vaccine.

"I would say no. because like here in Asaba, we don't really see the rapid spread of this monkeypox… so, asking people to just take the vaccine like that, I don't think I would want to opt for that."—IDI 3, 47 years, Male, Delta.

3.5 Financial barriers to receiving Mpox vaccine

The participants' responses regarding their willingness to pay for the Mpox vaccine revealed a nuanced perspective, primarily centered around the cost and affordability of the vaccine.

A significant number of participants expressed reluctance to pay for the Mpox vaccine, indicating a strong preference for free vaccination. The perceived high cost of vaccines was a prominent factor influencing their stance.

"If it's not free, I'm not taking it" – IDI 1, 22 years, Female, Rivers.
"If the vaccine is not safe, it will limit me. Also, if the vaccine is costly that I cannot afford…"—IDI 14, 48 years, Male, Delta.
"If it is free, one will be willing to take it, but if there is a price tag to it knowing how expensive vaccines are, so many persons cannot afford, apart from the rich people."—IDI 13, 36 years, Male, Bayelsa.

On the other hand, few participants in Lagos and Delta States expressed a willingness to pay for the Mpox vaccine if the cost was reasonable and affordable. The affordability factor emerged as a key determinant in their decision-making process.

"Yes, but if the money they asked us to pay won't tear my pocket, …if it is affordable, people will be glad to take it."—IDI 5, 47 years, Female, Lagos.
"…if it is not free but the amount is reasonable, we will still pay and take it because you don't know when it will come."—IDI 13, 50 years, Female, Delta.

3.6 Physical access to Mpox vaccine can be a barrier

Participants highlighted the significance of the vaccine being available locally, suggesting that proximity to their residence influences their likelihood of getting vaccinated.

"If the vaccine or where to take the vaccine is far from where I am living, definitely it will make me not take the vaccine, but if it is close to my area of residence, it will be easier for me to take the vaccine."—IDI 1, 32 years, Male, Bayelsa.

Participants emphasized the importance of bringing the vaccine closer to the community and ensuring efficient delivery. Making the vaccination process convenient and minimizing the time individuals need to spend waiting were seen as motivators for people to take the vaccine.

"They should bring it closer to the doorstep of people so that people will not have to travel a long distance to have the vaccine. They should also ensure that there is no point allowing people to stay for so long before taking the vaccine. They should make it snappy so that people can take it and go to work, and of course, provide light refreshment so that people will be motivated."—IDI 1, 32 years, Male, Bayelsa.

3.7 Need for support from the government and healthcare institutions

Participants highlighted the government's responsibility in promoting awareness and disseminating information about the Mpox vaccine. Television was mentioned as an effective medium for reaching a broad audience. Participants recalled obtaining information about Mpox through television and radio advertisements and recommended continuing such campaigns.

"Yes, it is the work of the government that will promote the information. National Orientation Agencies are owned by the government, so they can promote the information through them."—FGD 2, 45 years, Male, Lagos.
"When it is available, the Government can start with that television advertisement; that's the first place I got the information about erm… Monkeypox."—IDI 14, 38 years, Male, Delta.

Participants acknowledged the potential impact of making the vaccine available free of charge. This was seen as a crucial step in encouraging people to come forward for vaccination.

"They may possibly give it free. And that will assist people to come out and be vaccinated."—IDI 10, 53 years, Male, Delta.

The idea of introducing incentives, even in the form of small tokens, was viewed positively. Participants believed that incentives, no matter how modest, could encourage individuals to participate in vaccination and, in turn, motivate them to influence others.

"That incentive is very important. Sometimes it might not even be much. Just a little token to encourage. You know sometimes what you give people, especially we Nigerians, we will say heeee they gave me this thing o and we will go and get more people."—FGD 2, 44 years, Female, Bayelsa.

3.8 Health facilities and health workers as catalysts for vaccine acceptance

The participants offered valuable insights into the role of health facilities and health workers in promoting willingness to receive the Mpox vaccine. Many participants emphasized creating awareness through education and fostering a positive relationship between health workers and the community. Participants acknowledged the challenge of working with individuals but highlighted the importance of health workers creating personal relationships with patients. Building trust and instilling confidence in the information provided were seen as crucial elements for increasing vaccine acceptance.

"Human beings are very difficult to work with, so try to create a personal relationship with people, create an avenue for them to trust what you are telling them. If you are certified in this area or you are a professional, telling them about it most likely they will listen."—IDI 10, 43 years, Male, Bayelsa.

Participants stressed the role of health workers in educating the public about the dangers of Mpox and the benefits of vaccination. They highlighted the need for health facilities to guarantee the safety of the vaccine and communicate this effectively to potential recipients.

"The health care workers can basically educate people who come to their clinics or their hospitals or their medical facility. Educating people, telling them about the dangers and all that. And what is available, guaranteeing them that it is safe."—IDI 6, 62 years, Male, Delta.

Participants suggested health workers should leverage various media channels, including radio, television, and social media, to disseminate information about the Mpox vaccine. Public awareness campaigns were viewed as essential for reaching a wider audience and ensuring that accurate information is accessible.

"Public awareness majorly. They should let people know about it. They should tell them the usefulness of the vaccine; also tell them the danger of having monkeypox virus. They should create awareness through all media like radio, television, and even social media."—FGD 1, 43 years, Female, Lagos.

4 Discussion

This study reported significant gaps in awareness, knowledge and understanding of Mpox among community members across four Nigerian States. There were also mixed sentiments towards the vaccine, financial barriers and physical barriers to receiving Mpox vaccine when it is available in Nigeria.

While many participants had heard of Mpox and had some knowledge about the disease, a few participants reported that they had never heard of Mpox. Some participants had the misconception that monkeypox only affected monkeys. Poor knowledge and awareness could lead to delayed diagnosis, improper self-care, and the spread of misinformation, which can hinder effective disease control measures. Studies conducted by [31] among healthcare workers in southwestern Nigeria and by [32] in Arabic regions also revealed that many participants had poor knowledge of Mpox and its symptoms. This lack of comprehensive knowledge of Mpox and its symptoms as well as poor awareness suggests a pressing need for comprehensive public health education campaigns that clearly delineate the symptoms, transmission methods, and preventive measures specific to Mpox.

The anticipated rollout of the Mpox vaccine elicited mixed reactions from participants. While some expressed willingness to receive the vaccine as a preventive measure, some expressed concerns about side effects, mistrust in new vaccines, and skepticism about compulsory vaccination were also prevalent. This is in line with the study of [33] who reported in a systematic review and meta-analysis study that only 56.1% of the participants were willing to take the Mpox vaccine. The preference for voluntary vaccination among the participants, supported by thorough education about vaccine benefits and safety, highlights the importance of respecting individual autonomy and building trust through transparent communication. This finding also supports the study of Amer et al. [34] who found that willingness to take vaccine is associated with strong education about the disease. Hence, vaccination campaigns should prioritize clear, factual information and foster public confidence without coercion.

Concerns about the safety and potential side effects of the Mpox vaccine were significant reflections of the COVID-19 vaccination experience. Participants were wary of new vaccines and expressed a need for caution, especially in light of rumors about adverse effects from previous vaccines. Studies by Hong et al. and Duong et al. [22, 35] and reported that the safety of COVID-19 vaccine was a major predictor of willingness to accept the vaccine. The perceived low prevalence of Mpox in certain areas also led some to question the necessity of vaccination, hence Mpox vaccines when available should be focused on at-risk population groups. These concerns point to the critical need for robust safety monitoring, transparent reporting of vaccine data, and proactive efforts to counter misinformation, which can reduce Mpox vaccine hesitancy.

The cost of the Mpox vaccine, when available, emerged as a major barrier, with a strong preference for free vaccination. Financial constraints were a significant deterrent, particularly among lower-income groups, emphasizing the need for equitable vaccine distribution strategies. A study by Hong et al. [22] among healthcare workers reported that willingness to take the vaccine is associated with financial constraints. Similarly, a study by Dong et al. [36] in China observed that only participants on high-income showed willingness to take and purchase the Mpox vaccine. Offering the vaccine at little or no cost is essential to promote its uptake. Hence, government and health organizations should provide financial support and implement policies that make the vaccine accessible to all socio-economic groups.

4.1 Recommendation

This study recommends the support of government and healthcare institutions in promoting vaccine awareness and acceptance. Our study underscores the importance of making the vaccine available free of charge to encourage uptake. Additionally, community sensitization and engagement activities are needed to promote better knowledge about Mpox, debunk misinformation, and build trust in the Mpox vaccine. Leveraging healthcare workers to educate the public and build trust through personal relationships is crucial for increasing vaccine acceptance. These strategies highlight the need for a coordinated approach that combines government initiatives, media campaigns, incentives, and active involvement of healthcare professionals to ensure the successful rollout of the Mpox vaccine.

4.2 Strengths and limitations

To our knowledge, our study is the first qualitative study on community members' perspectives and willingness to take the Mpox vaccine when available in Nigeria and Africa. Further, the study's rigorous design and collection of rich qualitative data through in-depth interviews (IDIs) and focus group discussions (FGDs), allows for a deep understanding of participants' awareness, knowledge, attitudes, and perspectives on the Mpox and Mpox vaccine. This study's conclusions are drawn from participants from four states in Nigeria, limiting the generalization of the findings to the broader African or global context. Additionally, there is a risk of response bias, as participants may have been influenced by social desirability, particularly when discussing sensitive topics like vaccine hesitancy and stigmatizing beliefs. However, our study fills a huge gap in the literature on Mpox with important findings and recommendations that can reduce vaccine hesitancy in Nigeria.

5 Conclusion

This study examined the knowledge, beliefs, and attitudes of Mpox and its vaccine in Nigeria's endemic regions. The findings suggest a considerable gap in understanding, with many participants associating Mpox with other diseases such as chickenpox and measles, and diverse opinions of Mpox risk factors. This gap is concerning as it could limit effective identification and response to outbreaks. The consequences of these findings reveal an urgent need for focused education that clearly describes the actual risk factors and transmission techniques of Mpox. Additionally, concerns regarding vaccine safety, mistrust, and financial constraints, possibly inspired by past experiences with COVID-19 vaccination, must be addressed. To overcome these difficulties, comprehensive, culturally relevant public health programs should be established to clarify misconceptions, create trust, and provide fair access to immunizations. These measures are vital for enhancing Mpox vaccination uptake and safeguarding public health in Nigeria's endemic regions.

Author contributions IIO, MAA, RIO, and TAO conceptualized and designed the study. IIO, RIO, MAA, IOM, and TAO were involved in the data collection, analysis, and interpretation. IIO, MAA, and RIO wrote the first draft of the manuscript. IIO, MAA, RIO, TAO, EO, OBD, FI, SA, EUI, JOS, IOM, and RAA, were involved in the review of various previous versions of the manuscript. All authors have read and approved the final manuscript.

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Data availability The data that support the findings of this study are available from the corresponding author (Isaac Olufadewa) upon reasonable request.

Code availability Not applicable.

Declarations

Competing interests The authors declare no competing interests.

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