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Barriers and enablers to childhood immunization in high zero-dose burden communities in Kano and Lagos states, Nigeria

Oladimeji Akeem Bolarinwa [a], Ganiyu Adekunle Salaudeen [a], Luret Lar [b], Mervat Alhaffar [c], Nada Abdelmagid [c,*], Catherine R. McGowan [c], Olatunde Adesoro [d], Paula Valentine [e], Tahlil Ahmed [e], Andrew Clarke [e], Sostine Makunja [e], Tanimola Makanjuola Akande [a]

[a] Department of Epidemiology and Community Health, University of Ilorin, Ilorin, Nigeria
[b] Department of Community Medicine, Faculty of Clinical Sciences, University of Jos, Jos, Nigeria
[c] Department of Infectious Disease Epidemiology and International Health, Faculty of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, London, United Kingdom
[d] Save the Children International, Abuja, Nigeria
[e] Save the Children UK, London, UK

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ABSTRACT

Background: Reducing the number of zero-dose children in Nigeria requires a context-specific understanding of the factors driving under-immunization at individual and community levels. This study identifies barriers and enablers to immunization uptake among caregivers of children under two in high-burden zero-dose communities in Kano and Lagos States, Nigeria.

Methods: We followed a qualitative methods approach, conducting 40 focus group discussions (FGDs) among caregivers in the urban communities of Ungogo and Alimosho in Kano and Lagos states, respectively, peri-urban communities of Gezawa in Kano state and rural communities of Ikorodu in Lagos state. Vignettes, gender analysis, and concept-testing of interventions were integrated into the FGD guides to minimize social desirability and explore gendered factors. FGDs were pretested, translated into local languages, audio-recorded, transcribed, and back-translated into English. Thematic analysis was performed using NVivo software.

Results: We identified high recognition of the importance of childhood immunization among our study communities, despite inadequate immunization uptake. The main barriers to immunization uptake found in this study were gender-skewed decision-making in childhood vaccination between caregivers, prevalent misconceptions about immunization, prioritization of unmet socio-economic needs over immunization, and past negative experiences with immunization and health services. Enablers included effective community mobilization, involvement of religious and traditional leaders, positive attitudes of well-trained health workers, reliable fixed and outreach immunization services, and material incentives for caregivers. Caregivers preferred community-based strategies, especially those engaging community and religious leaders.

Conclusion: While similar barriers and enablers are inherent in global vaccine rejection, two-way community engagement for collective action, vaccination awareness campaigns, and engagement of cultural and traditional leaders, including fathers, offer promising strategies for improving immunization uptake in Nigeria.

1. Introduction

Nigeria has the highest number of under-immunized children globally, with an estimated 2.1 million unvaccinated children under one year of age in 2024 [1]. In 2024, 29 % of children under one year of age had not received their first dose of the diphtheria-tetanus-pertussis-containing vaccine (zero-dose) [1,2], and, in 2021, only 23.5 % of children aged 12–23 months had received all the basic antigens, far

* Corresponding author.
E-mail addresses: bolarinwa.oa@unilorin.edu.ng (O.A. Bolarinwa), salaudeen.ag@unilorin.edu.ng (G.A. Salaudeen), luret_shown@yahoo.com (L. Lar), mervat.alhaffar1@lshtm.ac.uk (M. Alhaffar), nada.abdelmagid@lshtm.ac.uk (N. Abdelmagid), catherine.mcgowan@lshtm.ac.uk (C.R. McGowan), olatunde.adesoro@savethechildren.org (O. Adesoro), p.valentine@savethechildren.org.uk (P. Valentine), t.ahmed@savethechildren.org.uk (T. Ahmed), a.clarke@savethechildren.org.uk (A. Clarke), s.makunja@savethechildren.org.uk (S. Makunja), akandetm@unilorin.edu.ng (T.M. Akande).

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below the 90 % national target [3]. Recent evidence indicates that the determinants of vaccination status among zero-dose and missed children in Nigeria include access to health facilities, socioeconomic status, fears and misconceptions about vaccination, vaccine availability, maternal education and literacy and giving birth in a health facility [3]. Under-immunization drives child morbidity and mortality, reduced life expectancy [4], lower educational attainment [5], increased inequity [6] and increased healthcare expenditure [3,7].

Persistent challenges to equitable immunization in Nigeria suggest a combination of factors. Service provision is undermined by underinvestment, vaccine shortages, inequitable health worker distribution, poor service quality, and inadequate linkages to communities served [8]. A recent review identified the most common health system bottlenecks, including inaccessible health facilities; shortages in vaccines and vaccinators; costs of vaccination, including illicit payments and bribes; and long waiting times at vaccination services [3]. Another study reported that inadequate transportation, cold chain, and financing barriers were prevalent in all states, while bottlenecks in some states related to inequitable disbursement of immunization funding, and governance issues affecting vaccine supply and service delivery [9]. Politics, religious beliefs and cultural practices have historically played significant roles in reducing vaccination uptake in Nigeria. Mistrust towards the government, vaccines and vaccination have constituted important barriers [10]. In some settings, lack of knowledge and awareness about vaccines remains common [9].

Recent research provides insights into the enablers of immunization uptake among zero-dose communities in Nigeria [11–13]. For example, caregivers' social networks, including family, friends, experienced mothers, husbands, and in-laws, influence immunization acceptance through conversations, advice, and shared experiences [14]. Community outreach and house-to-house immunization campaigns conducted by trained volunteers are important enablers of immunization uptake. Community gatekeepers like formal, traditional and religious community leaders, such as members of Ward Development Committees (WDC), are also major influencers of caregivers' immunization decisions [14].

Recent evidence also established institutional enablers of immunization uptake in Nigeria, especially the geographical and financial accessibility of service delivery points, the clinical and infrastructural environment at the health facilities, and health workers' attitudes [14]. Nigeria's free immunization services policy is the most important identified enabler [14].

Most of the available evidence is based on quantitative methods, limiting the depth of findings. Furthermore, national analyses show that immunization barriers and enablers vary widely across states, highlighting the need for research to explore these differences [15]. For Nigeria to scale up immunization and reduce the burden of zero-dose children, there is a need for a contextualized understanding of the drivers of under-immunization at individual and community levels. This study aimed to identify the behavioural, cultural, economic, social and health system barriers and enablers to immunization services uptake among caregivers of children under two years of age, in sites with a high number of zero-dose children in Kano and Lagos States. Findings informed the design of a multi-year intervention to improve equitable immunization coverage.

2. Methods

2.1. Study setting

The study sites were jointly selected for project implementation by Save the Children, the National Primary Healthcare Development Agency (NPHCDA) and the Ministry of Health for a multi-year intervention to improve equitable vaccination coverage. The research was conducted to inform the design of the intervention. The main criterion was the burden of zero-dose and under-immunized children.

Lagos and Kano States of Nigeria were purposively selected for this study. Both are highly populated states with projected populations in 2022 of 13.5 million in Lagos and 15.5 million in Kano [16]. Lagos' demographic profile is diverse, with the Yoruba people being the predominant group, alongside other Nigerian ethnicities such as the Igbo, Hausa, Edo, and Ijaw. In Kano, the primary residents are Hausa and Fulani, with Islam as the dominant religion. While Lagos state has shown fair immunization performance over time, Kano state remains one of the states with the poorest immunization performance in the country. As of 2021, Lagos State had 4.6 % of infants who were zero-dose, 72.2 % of eligible children completed basic antigens, and 66.1 % of infants completed all year-one antigens [17]. In the same year, 30.2 % of infants in Kano State were zero-dose, and only 32.5 % and 23 % of infants had completed basic and all year-one antigens, respectively [17].

In Lagos, two Local Government Areas (LGA), Alimosho (11 wards, the smallest unit of governance in Nigeria) and Ikorodu (19 wards), with respective populations of 3,082,900 and 1,000,000, were included in the study. The two LGAs are located in the mainland of Lagos. While Alimosho is predominantly urban with many slums, Ikorodu LGA has some rural and remote populations with riverine settlements. In Kano State, Ungogo (11 wards) and Gezawa (11 wards) with populations of 369,657 and 282,069, respectively, were included. Both LGAs are in the central senatorial zone of the state, with Ungongo predominantly metropolitan, while Gezawa is mainly rural with some peri-urban communities. These LGAs were selected because they have the highest burden of zero-dose children in Lagos and Kano States.

2.2. Study design

We conducted a formative study using qualitative methods. We used focus group discussions (FGD) to identify and understand the drivers, opportunities, challenges, barriers, and solutions for zero-dose and under-immunized children. We conducted forty FGDs with an average of 10 caregivers per FGD.

2.3. Study participants

Caregivers of zero-dose, under-immunized and fully-immunized children were purposively selected from the study population. Caregivers were mothers, fathers, young mothers aged 15–17 years, in-laws, and grandparents. Community and religious leaders eligible as caregivers were also enrolled as participants. Non-consenting caregivers were excluded from the study. All the aforementioned groups were organized into FGDs according to the geographical setting (urban/rural/peri-urban) and immunization coverage in the community served by the primary healthcare facility (high/medium/low). These data were obtained from the NPHCDA and LGAs. The composition of each FGD aimed for participant homogeneity in terms of gender, age, and their children's immunization status (zero-dose/under-immunized/fully-immunized). We present our findings by gender, immunization status, and geographical location.

Community mobilizers and WDC chairmen were engaged to recruit and mobilize study participants. Two community mobilizers per LGA, trusted in their communities, worked with the research team to identify, select, and obtain consent from the participants.

2.4. Data collection

The research team conducted advocacy visits to the administration and immunization managers of the State Primary Healthcare Boards and LGA officials. They provided administrative approval and facilitated community entry and mobilization for the study. Twenty-two Research Assistants (RAs), who were university graduates of health-related programmes, had prior experience in conducting qualitative studies and were fluent in local languages (Yoruba and Hausa), were trained in each state to conduct the FGDs. A coordinator was employed and trained for

each state to oversee the research work and coordinate the RAs during fieldwork. Both coordinators were public health physicians and lecturers with years of experience in conducting qualitative research. The coordinators reported to the co-investigator in charge of the state. Research logistics and data storage were managed centrally by a Research Manager and stored on the University of Ilorin servers. A four-day training for the RAs and coordinators was organized in March 2024 in Kano and Lagos by the research team. The training topics were: the background of the study, study methods, data collection tools and methods, responsible research conduct, ethics, data quality assurance, and data protection.

The FGD guide had two sections: (i) vignettes to explore behavioural, social, cultural, and economic barriers to vaccination, and (ii) gendered barriers and inequalities related to health care seeking for children under 5, with an emphasis on vaccination (Supplementary material 1). Vignettes tell short stories about imaginary characters in specific contexts, with questions that invite people to respond to the story in a structured way [18]. They are useful for eliciting participants' social expectations through a hypothetical scenario [19], and for reducing social desirability bias [18,20]. Most vignettes in our study were hypothetical stories about a mother or parents with a newborn baby encountering behavioural, social, cultural and economic barriers or enablers to vaccination. Questions for gender-related barriers were guided by a Gender Equality Program Guidance and Toolkit [21]. Co-authors OAB, GAS and TMA, who are experts in Hausa and Yoruba, validated translated versions of the FGD guide. The FGD guide was pretested in Alimosho LGA with the catchment communities of Ipinlerere primary healthcare centres (PHC) in Lagos State and with the catchment communities of Muritala Mohammed PHC in Kano Municipal LGA, Kano State. In both sites, heterogeneous groups of 10 to 12 male and female caregivers participated. Feedback from these sessions informed adjustments to the guide, mainly to refine the translation. The RAs in each state were divided into two teams for data collection in each LGA. The most experienced and qualified RA was selected as the LGA team lead. The leads supervised the field work and were responsible for the logistics and payment of the mobilizers and the participants.

Data was collected between March and May 2024. The RAs were paired (a moderator and note-taker) to conduct the FGDs in Hausa in Kano and Yoruba in Lagos. Written informed consent was obtained from each participant after study information was explained in the local languages. The FGDs were carried out in both enclosed and open places within the selected communities. The open venues were either in front of the traditional leader's house or palace, or in a central location in the community, such as under a large, shaded tree. The mobilizers facilitated the venue choices. The recordings of the interviews conducted in the open places were enhanced with the use of wireless microphones to reduce ambient noise and interference. The FGDs lasted an average of two hours with snack breaks after the first hour of discussion. The participants were reimbursed for the transportation, and free snacks were provided. The FGDs were audio-recorded with participant permission and consent. Two Android phones were used for each FGD recording. Observation notes were taken for insight into group dynamics.

2.5. Data analysis

The FGD recordings were sent daily to the state coordinator for quality checks and transmission to the Research Manager, who allocated recordings to the transcribers. The transcribers were experts in Hausa and Yoruba languages. They transcribed and back-translated the transcripts into English. NVivo software (QSR International Pty Ltd.) version 12 plus, 2018, was used to organize the transcribed data, which was summarized into overarching themes using a reflexive thematic framework approach [22]. The phases of this approach were: (i) familiarization, generating initial codes and coding data; (ii) data interpretation, which included searching, reviewing, and defining themes. The codes were sorted into themes, which were then linked to the overall research objective.

2.6. Ethical considerations

Ethical approvals were obtained from the London School of Hygiene and Tropical Medicine's Research Ethics Committee, the National Health Research and Ethics Committee of Nigeria and the University of Ilorin's Research and Ethics Committee with approval numbers 29,802, NHREC/01/01/2007–04/12/2023 and UERC/ASN/2024/2673, respectively. Administrative approvals were obtained from Kano and Lagos States' Primary Healthcare Boards before community entries. Written informed consent was obtained from all participants. For young mothers aged 15–18 years, assent was obtained, and consent was obtained from the husbands or parents.

2.7. Reflexivity statement

Among the numerous definitions and perspectives of reflexivity in research, we drew on the work of Palaganas et al. [23], Berger [24] and Kralik [25] to guide our writing of the methods and discussion sections. These scholars emphasize the importance of reflexivity in enabling researchers to acknowledge their position, the nature of their research, and how their situations and experiences influence the research process. The research team comprised epidemiologists and public health physicians with extensive experience in immunization programmes and related research. The researchers also brought a deep understanding of Nigeria's cultural and political landscapes, further strengthened by high-level engagements with policymakers and cultural leaders during the study. These professional experiences enriched the analysis and provided a critical lens; however, they may also have influenced assumptions and interpretation of the barriers and facilitators of under-immunization and zero-dose in Nigeria. The RAs, who carried out the data collection, were all university graduates in health-related programs, had prior experience conducting qualitative studies and were fluent in the local languages, Yoruba and Hausa. They underwent four days of training to enhance reliability and minimize potential bias. In addition, data analysis and findings reporting were led by LL, who was not part of the core study team, to ensure independence and objectivity.

3. Results

3.1. Characteristics of the study participants

Forty FGD sessions were conducted (Table 1), of which a quarter were with men, and each included 10 participants.

During study recruitment, we found zero-dose children mostly among the migrant communities in Lagos and the indigenous communities in Kano. In this study, migrants are defined as families who are not indigenous to Lagos but originated from northern Nigeria, primarily of Hausa and Fulani background. They moved to Lagos, a predominantly Yoruba community, in search of better livelihood opportunities. Despite settling in Lagos, they maintain strong ties to their places of origin and often return during festivals and ceremonies. Zero-dose children are

Table 1
Number of focus group discussions (FGD) by LGA and State.

Scope of FGD	Kano State		Lagos State	
	Ungogo LGA	Gezawa LGA	Alimosho LGA	Ikorodu LGA
Vignettes + gender box	5	8	5	6
Vignettes + gender box + concept testing of interventions	3	4	4	5
Total by LGA	8	12	9	11
Total by State	20		20	

primarily male and female children of parents who are tightly bound to family traditions and culture and are believers in traditional medicine for the prevention of diseases.

We present findings below under the following themes: (i) caregivers' perceptions and awareness of vaccination, (ii) barriers to immunization uptake for caregivers, (iii) enablers of immunization uptake for caregivers, and (iv) gender dynamics within households affecting immunization uptake.

(i) **Caregivers' perceptions and awareness of vaccination**

We found widespread acknowledgement of the importance of childhood immunization, even among zero-dose communities, largely attributed to sensitization efforts by healthcare workers and community and religious leaders. Awareness was higher among women than men. Despite this, immunization uptake was low. Across FGDs in Gezawa, Alimosho and Ikorodu, caregivers from fully-immunized, zero-dose, and under-immunized communities reported that family traditions and beliefs still prevented children in their communities from being vaccinated.

"We live in a village, so we are accustomed to traditional medicine, so I would forget about vaccinating my children and take what our forefathers have used (traditional medicine)." Female caregiver, Zero-dose, Gezawa, Kano.

Many family heads viewed immunization as unfamiliar, but most zero-dose fathers in Gezawa, Kano, firmly believed it was unnecessary due to their personal experiences.

"[We] were not vaccinated in childhood, and nothing happened [to us], so nothing will also happen now to [un-immunized] children". Male caregiver, Zero-dose, Gezawa, Kano.

(ii) **Barriers to immunization uptake**

The barriers reported by participants were broadly categorized into four areas: socio-cultural barriers, misconceptions about immunization, socio-economic barriers and past experiences with immunization.

a. **Socio-cultural barriers**

Non-consenting male heads of households were a significant barrier to immunization uptake, particularly in Kano, where it is customary to seek approval from the father or eldest male family member. During analysis, a recurring pattern suggested that this challenge was more pronounced in polygamous households, more common in Kano, where fathers might refrain from vaccinating younger children if older children from another wife were not vaccinated, as a way of maintaining family harmony. Although no single participant described this directly, the theme emerged from piecing together multiple caregiver accounts and field observations. Most respondents in Kano believed that a child could not be immunized without the father's consent.

"*I will not follow (vaccinators') instructions because I am under the control and care of my husband, not them; if I disobey him, God will punish me; so, I will not go until my husband gives me the go-ahead". Female caregiver, Zero-dose, Gezawa, Kano.*

"I was not vaccinated in my childhood, my children too were not vaccinated, and now, because [my wife] is trying to introduce entirely strange behavior into my family, I would not agree". Male caregiver, Zero-dose, Gezawa, Kano.

In Lagos, however, female caregivers of immunized children appeared to have greater autonomy.

"I do not really need permission from my husband to take my child for vaccination. I know he would not stop me from doing so". Female caregiver, fully immunized, Ikorodu, Lagos.

Some respondents noted that lower literacy, younger age, and unemployment among mothers were linked to reduced agency to influence immunization decisions.

"*In our community, a woman caregiver could have taken her babies for immunization if she was older, educated, and empowered". Female caregiver, Zero-dose, Gezawa, Kano.*

b. **Misconceptions**

Rumours, and misconceptions, driven partly by distrust in the government, and religious beliefs, particularly among men, were barriers to immunization uptake among zero-dose and under-immunized caregivers.

"There are some things people heard about this immunization, some people said it spoils blood, and they are looking for means to reduce the population of the people in Nigeria and thus they don't want their children to take the immunization because they don't want them to die". Female caregiver, Zero-dose, Ikorodu, Lagos.

"I also want to take my children for vaccination, but my husband would say, 'if the vaccines.

are effective, why are there thousands of people lying in health facilities being ill, why didn't.

the vaccines cure them?'. He says he doesn't understand why they would insist on taking.

children for BCG while they are healthy". Female caregiver, Zero-dose, Gezawa, Kano.

"[…]in our community, Jehovah Witness (of Christian sect) and Teblik (of Islamic sect) won't accept vaccination for their children". Male caregiver, Zero-dose, Alimosho, Lagos.

c. **Socio-economic barriers**

In some cases, caregivers perceived a disconnect between government immunization policies and their immediate socio-economic needs. For example, a few zero-dose fathers in Kano expressed that their priority was securing daily sustenance rather than immunization for their children.

"It is a mixed feeling. Some have trust but people like me do not trust government. We are looking for food, but they are disturbing us with immunization." Male caregiver, Under-immunized, Ungogo, Kano.

In some instances, caregivers prioritized social amenities like good roads, potable water, electricity, schools, and better living conditions over immunization. This observation was more prominent among zero-dose communities in Kano.

"….. I am living in a place where we are not provided with social amenities like potable water, electricity, hospitals and roads, and let us say at the same time there is a breakout of measles and all other diseases……..how do you think I will be motivated to present my child for vaccination? The authority concerned has not provided me with what will relieve my pain or make life better for me." Female caregiver, Zero-dose, Gezawa, Kano.

In addition to a lack of social amenities and poor living standards, some caregivers proposed negotiating vaccinating their children in exchange for services and infrastructural development in their community.

"If the government want us to receive immunization services in this community, the government should try to build us a health facility and also construct a road and if this is done whatever the government would bring in terms of healthcare services, the community would be happy to embrace it" Female caregiver, Zero-dose, Gezawa, Kano

d. **Past experience with immunization and immunization services**

Caregivers with negative experiences related to adverse events following immunization or illnesses around the time of vaccination may be deterred from returning for future doses or from vaccinating their future children.

"There's a particular child at Ipaja; after the vaccination, the child became very feverish, the child couldn't hear well up till now". Female caregiver, Under-immunized, Alimosho, Lagos.

"*It happened to my friend's daughter. She received vaccination and her ankle became twisted and has remained twisted ever since*" *Female caregiver, Zero-dose, Alimosho, Lagos.*

In some cases, vaccine refusal is linked to negative experiences shared across generations.

"[…] in the past, there were cases of disability following immunization, so it is this same reason that will make us still not accept it or some can say my grandfather didn't accept it so I see no reason why I should accept it too. We have a lot of them that think this way even if the hospital is in their room [i.e. close to them] they won't go [for vaccination]". Female caregiver, Fully-immunized, Ungogo, Kano.

Some caregivers also reported experiencing guilt and regret when adverse reactions occurred.

"[…] but the main problem is the onset of fever after immunization. Some children cry profusely leading those that don't accept [vaccination] to say 'jarabar kuce taja maku yaro na zamansa kunja masa cuta' meaning it is you that cause it, the boy/baby is staying very well and healthy, you went and got him sick. That is the only constraint we face after immunization". Female caregiver, Under-immunized, Ungogo, Kano.

For some caregivers, particularly in Lagos, the attitude of health workers at immunization and other health services is a significant barrier to returning for vaccinations, both for their current and future children.

"It is the attitude and character of the health workers that determine whether I will take my child for immunization or not, even if they place incentives or millions of naira on immunization, if I'm not convinced to go, I won't go. I won't accept embarrassment. They should address the nurses". Female caregiver, Under-immunized, Alimosho, Lagos.

Some shared personal experiences of unpleasant and painful experiences with vaccination staff.

"I hate insults and aggression, if the health workers are not polite, I won't go back to them. I lost a daughter 13 years ago, the father is Igbo, and the father didn't allow me to take the child for immunization, but I did. After the vaccination, the child started convulsing till she died in my hand, it was the vaccination that killed her. The matron was not polite when I reported that my child was having a fever. So, I went back with my child and gave her paracetamol. The following day, the child started convulsing, and they rushed to the hospital and brought her back home dead! Since then, I stopped going to the health centre" Female caregiver, Under-immunized, Alimosho, Lagos.

"Some time ago, my child was sick, so she was rushed to a health centre, the next thing was that the nurse said this child is already dead and why I was just bringing the child. She said I should just go and bury my child…. that is insulting!". Female caregiver, Under-immunized, Alimosho, Lagos.

"*My own experience was that we took a child for immunization, and the nurse slapped a woman because the baby was using feeding bottle. That is not fair, it is this type of insult that stops some people from going for immunization". Male caregiver, Under-immunized, Alimosho, Lagos.*

Missed opportunities also featured as a barrier to completing immunization.

"…what I noticed is that [vaccinators] did not want to open vaccine bottle if it is just for a child, unless children are many" Female caregiver, Fully-immunized, Alimosho, Lagos.

(iii) Enablers of immunization uptake for caregivers

Respondents reported that immunization uptake is driven by effective community mobilization and the support of religious and traditional leaders. In Lagos, property landlords were also identified as potential key influencers for promoting immunization.

"Actually, what is happening is that the Imams do announce in the mosque that people should take their children to the health facility or palace [community leaders' houses] of the village head for vaccination. And sometimes the village head and the ward head call people and educate them about immunization and lastly the health care workers do go house to house to give information to people about immunization". Female caregiver, Zero-dose, Gezawa, Kano.

A variety of incentives, provided by some of the PHCs in both States, including diapers, free medication (e.g. post-vaccination paracetamol), mosquito nets, and food, were reported to motivate caregivers to bring their children for immunization.

"*Recently, women were given one thousand Naira at the facility after vaccination, and they are happy; that one thousand Naira is motivating caregivers, especially women, to take their children to the clinic for vaccination" Male caregiver, Fully-immunized, Gezawa, Kano.*

"Other encouragements to mothers from the government are gifts they used to give us before, like mosquito nets, and diapers. In the olden days, baby foods were gifted to children at 3, 6 or 9 months. These served as encouragement to other mothers in the community that are not interested in immunization". Female caregiver, Zero-dose, Ikorodu, Lagos.

However, some fathers in Kano cautioned that incentives might be counterproductive. They reported that offering incentives can lead to suspicion of government motives for child immunization.

Other important enablers include well-trained health workers in Lagos and reliable fixed and outreach vaccination services in both states. The immunization clinics serving the study populations have both fixed and outreach posts. The fixed posts are located within the PHC and are open every morning of the working week or on designated days. The outreach sessions are carried out on specific days to bring the services closer to the communities. Community leader participants noted that house-to-house outreach campaigns by healthcare workers significantly boost immunization uptake, and that community mobilizers and healthcare workers play a crucial role in raising awareness and reminding caregivers about the importance and benefits of immunization.

"For people who don't go to the health centre, they used to do outreaches, sometimes, they stay at Baale's place, or near the palace. They will inform the Chairman of Community Development Committee to mobilize the people, sometimes they go to school, church, mosque during 'Asalatu' (congregational prayer), and the Chairman will inform them of the location. In some private schools, they used to refuse, however, they will tell them to come back and call Parent Teacher Association meetings to inform the parents of the pupils before allowing them to be vaccinated in the schools". Male caregiver, Fully-immunized, Ikorodu, Lagos.

In Kano, some fathers noted that they were motivated to vaccinate their children due to the perceived health benefits observed in vaccinated children. Most participants agreed that fully-immunized children appear healthier, and some noted they are less likely to fall ill compared to those who are not vaccinated.

"*There is a difference in health status between vaccinated children and unvaccinated ones. The vaccinated ones are healthier than the unvaccinated ones". Male caregiver, Fully-immunized, Gezawa, Kano.*

(iv) Gender dynamics within households affecting immunization uptake

Although some cultures give preferential treatment to boys over girls, there is a consensus from the discussions that boys are not preferentially immunized.

"Whether the child is a girl or a boy, they are all from God and they are the same thing but usually some husband prefers to have a male child first, they don't know how that child will become in future, but the statement of male preference for immunization is not true". Female caregiver, Zero-dose, Gezawa, Kano.

In Kano, the issue of non consenting fathers or male family heads in polygamous households where older children from other spouses were

not vaccinated, is rooted in family beliefs and traditions and can be misinterpreted as a gender bias when it involves female children. Furthermore, the cultural expectation of wives to seek permission from their husbands, but not vice versa, before vaccinating their children underscores the gender imbalance in household decision-making.

4. Discussion

Participants' narratives revealed how zero-dose children were embedded within specific demographic and social contexts in Kano and Lagos States. In Lagos, zero-dose children were often linked to migrant communities from northern Nigeria, including Kano, who had moved in search of employment and economic opportunities in the commercial hub [26]. In Kano, zero-dose children were more commonly situated within indigenous communities where parents expressed strong adherence to cultural and religious beliefs and a preference for traditional medicine for disease prevention.

Our study revealed strong recognition of the importance of childhood immunization within communities, despite low immunization uptake. Key barriers were gender-skewed decision-making in childhood vaccination between caregivers, misconceptions about vaccines, competing livelihood demands, and negative past experiences with immunization and immunization services. Effective community mobilization involving religious and traditional leaders, incentives, and well-trained health workers with reliable services are crucial for improving uptake.

While female caregivers of zero-dose children generally recognized the importance of immunization due to awareness efforts by healthcare workers and community leaders, male heads of families, who often hold traditional beliefs, had lower awareness. This disparity, consistent with other studies [3,27], poses a significant challenge to vaccination efforts in patriarchal cultures. In Kano, fathers' non-consent is a major obstacle, reflecting findings that women with limited decision-making power are less likely to fully-vaccinate their children if their husbands do not agree [15,28].

Nigeria's patriarchal culture, where decision-making is centralized in male heads of families, reinforces this pattern [29]. Major religions in Nigeria, like Christianity and Islam, typically assign leadership roles to men, and men also play a key role in preserving traditional knowledge and cultural practices [29,30]. Consequently, family traditions of vaccine rejection often lead to unvaccinated children.

While a study in Ibadan, Nigeria, linked child sex to incomplete immunization [31], no participant accounts suggested that boys were preferentially immunized in our findings. In Kano, children in polygamous households may face barriers if the father or family head does not consent, especially if older children are not vaccinated. This issue, rooted in family beliefs and traditions, can appear gendered when involving female children.

Research on immunization in Nigeria highlights the importance of maternal factors such as literacy and antenatal care in addressing under-immunization. However, this focus often overlooks the significant role of male decision-makers. To improve immunization coverage, it is crucial to direct demand generation efforts towards fathers and male heads of households. Promoting women's employment and challenging gender-discriminatory attitudes are also essential. Evidence from a study of 165 countries shows that national gender inequality impacts childhood immunization coverage [32], underscoring the need to address gender barriers. Further research is needed to explore the role of men in vaccination decisions.

Rumours, misconceptions, and religious beliefs were significant barriers to immunization in Kano and Lagos. Several studies in Nigeria have reported these factors, although with a wide range of conclusions [11,13,33,34]. These were more commonly noted among female caregivers in Kano than in Lagos. Misconceptions and rumours often become family traditions, potentially leading to continued vaccine refusal across generations [12]. Our study identified specific rumours and misconceptions that could be addressed through contextualized two-way dialogue and community engagement efforts.

Our findings also featured the prioritization of survival needs over immunization, particularly in Kano. Olaniyan et al. reported similar findings from Lagos, where caregivers reported that meeting basic necessities, such as food, takes priority over immunization [13]. The respondents perceived a policy imbalance, where free immunization is offered amidst broader neglect of essential services and infrastructure in their communities – a finding that was also reported by Bell et al., in Nigeria in 2019 [35]. Our findings suggest a need for a broader overhaul of the primary healthcare system as the vehicle for immunization services, such as strengthening the health workforce, supply chains, and management systems, and alongside coordinated investment in health, education, water and sanitation, and poverty-reduction programs.

The perceived unprofessional conduct of vaccination workers was identified as the primary health system driver of under-immunization among caregivers. Discussions revealed numerous distressing experiences, including hostile and dismissive behavior from health workers. The attitude of healthcare workers is a key indicator of care quality and patient satisfaction [11,13,33,36]. Studies from various regions in Nigeria have highlighted negative attitudes of health workers as major barriers to immunization. [11,13,34,36]. Further research is needed to investigate the root causes of health workers' poor treatment of caregivers seeking immunization services. Negative experiences with immunization, such as adverse events and vaccine reactions, are significant barriers to uptake. Some reports included genuine safety concerns mixed with misconceptions and rumours shared within trusted social networks. These issues often deter caregivers from returning for subsequent doses or from vaccinating future children.

Our study found that effective community mobilization and the involvement of religious and traditional leaders are crucial for increasing immunization uptake. Caregivers favoured community-based interventions that engage these leaders. Previous research in Nigeria has highlighted the effective roles of traditional and religious leaders in promoting immunization [37,38]. However, some respected and trusted community stakeholders remain underutilized. A randomized study in Nigeria showed that informal training can enhance the vaccination knowledge and influence of traditional and religious leaders, making them more effective advocates for childhood vaccination [37].

Various incentives, such as diapers, free medication, mosquito nets, and baby food, were reported to encourage immunization in Kano and Lagos. However, some zero-dose fathers expressed concern that these incentives might be a government attempt to harm their children, a sentiment reported during the COVID-19 vaccination rollout, where misinformation and mistrust fuelled hesitancy [39,40]. This highlights the mixed impacts of material incentives. While they may temporarily boost uptake, questions remain about their appropriateness and long-term sustainability, particularly in low-income settings where such policies may not be financially viable. In this regard, engaging cultural and religious leaders, fostering community dialogue, provision of domestic social safety nets and social health insurance schemes and ensuring consistent quality of immunization services may reduce distrust and misconceptions and provide more durable gains than short-term incentives in Nigeria [9].

Lastly, we found that well-trained health workers, particularly in Lagos, and dependable fixed and outreach immunization services are crucial enablers of vaccination uptake. These findings highlight the significant impact of the National Programme on Immunization and its partners, who have consistently implemented strategies to build health worker capacity and sustain outreach activities [3].

4.1. Study limitations

This study has several strengths. It provides in-depth insights into the experiences of zero-dose communities in Lagos and Kano, capturing the perspectives of groups that are often underrepresented in public health

research and face multiple social and health deprivations. By engaging directly with community members, we were able to generate context-specific understandings of barriers and enablers to immunization that quantitative methods alone may not have revealed.

Nonetheless, some limitations should be acknowledged. First, as with all qualitative research, the findings are not intended to be statistically generalizable but transferable. They provide nuanced explanations of why and how certain barriers exist, which can inform policy and practice in similar contexts.

Another limitation was that many migrant zero-dose communities in Lagos had relocated by the start of data collection, which may have restricted the data available on their unique perspectives. This mobility reflects an important contextual factor influencing immunization access and underscores the need for further research with hard-to-reach and transient populations. In addition, the study was conducted within a rapid timeframe to inform the overall project, which placed constraints on both the depth of data collection and the extent of iterative analysis. While the rapid approach allowed timely insights to inform ongoing immunization initiatives, it may have limited opportunities to probe emerging themes more extensively or integrate divergent perspectives as fully as possible.

Finally, a limitation of our study is that our analysis could only explore differences by gender, immunization status, and geographical location. While this means we could not capture variations across other caregiver subgroups, such as adolescent caregivers and caregivers who are religious and community leaders, the findings still provide valuable insights into key patterns and experiences that can inform future, more in-depth research in these caregiver subgroups.

5. Conclusions

Our study found that gender-skewed decision-making in childhood vaccination between caregivers, prevalent misconceptions about immunization, competing livelihood demands and past negative experiences with immunization and health services were key barriers to immunization uptake among zero-dose communities in Kano and Lagos. Enablers included effective community mobilization for collective action, the involvement of religious and traditional leaders, well-trained health workers, and quality immunization services delivered through fixed and outreach services. Various incentives were also reported to encourage caregivers to vaccinate their children. Caregivers favoured community-based strategies, particularly those engaging local and religious leaders. The findings highlight the need for adaptive interventions involving community and religious stakeholders, culturally acceptable incentives, and targeted engagement, especially towards fathers and traditional and cultural custodians.

CRediT authorship contribution statement

Oladimeji Akeem Bolarinwa: Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ganiyu Adekunle Salaudeen:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Luret Lar:** Data curation, Formal analysis. **Mervat Alhaffar:** Writing – review & editing, Methodology, Conceptualization. **Nada Abdelmagid:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization. **Catherine R. McGowan:** Writing – review & editing, Supervision, Funding acquisition, Conceptualization. **Olatunde Adesoro:** Writing – review & editing, Validation, Project administration. **Paula Valentine:** Writing – review & editing, Validation, Methodology, Conceptualization. **Tahlil Ahmed:** Writing – review & editing, Validation, Conceptualization. **Andrew Clarke:** Writing – review & editing, Validation, Conceptualization. **Sostine Makunja:** Writing – review & editing, Validation, Project administration. **Tanimola Makanjuola Akande:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data statement

Excerpts of the qualitative data supporting the findings of this study are available from the corresponding author upon reasonable request. However, full transcripts cannot be shared due to confidentiality agreements.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.vaccine.2025.127754.

Data availability

Data will be made available on request.

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