
Vaccination Decision-Making among Mothers of Children Under-5 in Nigeria: A qualitative study

[Gbadebo Collins Adeyanju](#) * and [Cornelia Betsch](#)

Posted Date: 6 September 2023

doi: 10.20944/preprints202309.0325.v1

Keywords: Vaccination decision; Decision-making; Vaccination behavior; Nigeria; Vaccine hesitancy; Immunization demand; Immunization uptake; Vaccination; Caregivers; Mothers; qualitative research; focus groups



Preprints.org is a free multidiscipline platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Article

Vaccination Decision-Making among Mothers of Children Under-5 in Nigeria: A Qualitative Study

Gbadebo Collins Adeyanju^{1,2,3,4} and Cornelia Betsch^{1,2,4,5,6}

¹ Media and Communication Science, University of Erfurt, Erfurt, Germany

² Centre for Empirical Research in Economics and Behavioral Science (CEREB), University of Erfurt, Erfurt, Germany

³ German Alliance for Global Health Research (GLOHRA)

⁴ Psychology and Infectious Disease Lab (PIDI)

⁵ Bernhard Nocht Institute of Tropical Medicine (BNITM), Hamburg, Germany

⁶ Institute for Planetary Health Behaviour, University of Erfurt, Erfurt, Germany

* Correspondence: Gbadebo Collins Adeyanju Center for Empirical Research in Economics and Behavioral Science (CEREB) University of Erfurt, Erfurt, Germany Email: gbadebo.adeyanju@uni-erfurt.de_Orchid ID: 0000-0002-5398-0183

Abstract: Background: Since 2000, vaccine coverage in Sub-Saharan Africa (SSA) has surpassed multiple milestones. Its contribution to global health, especially in low-middle-income countries is one of the achievements in global governance of modern medicine, averting 2-3 million child deaths every year. However, in Nigeria, vaccine-preventable-diseases still account for one in eight child deaths before their fifth-year birthday and remains one of the ten countries where 4.3 million children under five are without complete immunization. The reasons for declining childhood vaccine demand are unclear. Therefore, the goal of this contribution is to shed light on the reasons to set a foundation for future interventions. **Methods:** Four focus group discussions were conducted. The primary targets were mothers of children 0 – 12 months old in Nigeria. A simplified quota sampling approach was used to select mothers in four geographical clusters of Nigeria's Federal Capital Territory. At least six mothers from each cluster were randomly included, giving a total of 24 participants. An interview guide developed from the 5C psychological antecedence model was used (assessing confidence, complacency, calculation, constraints, collective responsibility); two additional variables were included that had proved meaningful in previous work (religion and masculinity). The data were analyzed using meta-aggregation approach such as framework synthesis, which summarized data in a stepwise fashion. **Results:** The sample was generally relatively positive towards vaccination. Still, mothers reported low trust in vaccine safety and the healthcare system (confidence). Yet, they had great interest in seeking additional information during antenatal visits (calculation), difficulties in prioritizing vaccination over other equally competing priorities (constraints) and were aware that vaccination translates into overall community health and wellbeing (collective responsibility). They had a bias towards God as ultimate giver of good health (religion) and reported that their husbands played a dominant role in vaccination decision-making (masculinity). Mothers perceived their children vulnerable to disease outbreaks, which motivated them to get them vaccinated (complacency). **Conclusion:** The 5C model and the added determinants provided a useful qualitative tool for understanding mothers' vaccination decision-making in low resources settings.

Keywords: vaccination decision; decision-making; vaccination behavior; Nigeria; vaccine hesitancy; immunization demand; immunization uptake; vaccination; caregivers; mothers; qualitative research; focus groups

INTRODUCTION

Since start of the new millennium, vaccine coverage in Sub-Saharan Africa (SSA) for vaccine-preventable-diseases (VPDs) has surpassed multiple milestones and expectations, although serious works are still to be done to meet targets [1]. Nonetheless, the contribution of vaccination to global health, especially in low and middle-income countries (LMIC) is one of the achievements in global governance of modern medicine, averting over 4 million deaths every year [2,3]. Besides the protection from vaccine-preventable-diseases (VPDs), immunization services had indirectly brought vulnerable children and families into contact with healthcare systems, which has created avenues for the delivery of other primary healthcare services such as family planning, maternal healthcare services, counseling, patient education, diagnosis and treatment of acute and chronic illnesses and many others.

Nigeria's immunization coverage has made significant progress in the last years, ensuring that children under five years old (under-5) have access to health and routine immunization services [4]. This has resulted in a significant shift compared to the decade before, e.g., the uptake of three doses of Diphtheria, Tetanus, and Pertussis (DTP) increased from 44% in 2015 to 57% in 2020 [4]. This is a good progress, especially when considering that vaccination coverage of children 12 – 23 months had dropped in the prior decade (2008 – 2013) by 10% [5]. While these gains are seen in recent data [4], Nigeria remains one of the 10 countries in the world where 4.3 million children under-5 are without complete immunization [6]. UNICEF classifies the country as one of the worst places in the world to raise a child or infant, or to be a mother [7]. Thus, to develop and implement suitable interventions to foster uptake, maternal vaccine hesitancy, i.e., the drivers and barriers of vaccination decision making [2,8,9], need to be understood [10,11].

The vaccine hesitancy conceptual framework

The Strategic Advisory Group of Experts (SAGE) on Immunization defines vaccine hesitancy as a “delay in acceptance or refusal of vaccines despite availability of vaccination services” [12,13]. This definition suggests that vaccine hesitancy is a demand rather than a supply-side problem, focusing on several individual behavioral factors such as the risks related to vaccinating, concerns about adverse events, religious compatibility, or lack of trust in general [14]. Most of the research on vaccine hesitancy and interventions to reduce it stems from high-income countries (HIC) [8,9,15-20]. Yet, one of such models that have been validated in several settings including LMIC is the 5C psychological antecedence model [1,15,9,21-23].

The 5C Psychological antecedents of vaccination decisions

The 5C model of vaccines hesitancy composed of five psychological antecedents of vaccination behavior: confidence, complacency, constraints, calculation, and collective responsibility [8]. *Confidence* is the trust in effectiveness and safety of vaccines. *Complacency* denotes low risk perception of vaccine-preventable diseases and vaccination deemed not a necessary preventive action. *Constraints* exist when physical availability, affordability, or geographical accessibility negatively affect immunization uptake. *Calculation* refers to individuals' engagement in extensive information search and assessment of cost-benefit analysis of vaccination decisions. *Collective responsibility* is the willingness to protect others by one's own vaccination decision or action. In addition to the 5C, two additional measures proved relevant in previous work in Nigeria: religion (i.e., compatibility with religious beliefs) and masculinity (i.e., importance of father's approval) were related to less vaccine uptake [8].

The goal of the study is to gain deeper insights into vaccination decision-making or behavior among mothers of children 0 – 12 months old in Nigeria using the 5C model. The 5C model has been tested and validated in quantitative settings only. This study will use the model as a framework for a qualitative approach. This allows building upon existing theoretical knowledge but at the same time enables an open process supporting a broader understanding of relevant factors affecting vaccine decision making in the SSA region.

METHODS

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by Nigerian Health Research Ethics Committee (reference number FHREC/2018/01/99/03-09-2018/19). Written informed consent was obtained from all participants.

Study Design and Sampling

Four focus group discussions (FGD) were conducted. Primarily target group were mothers of children 0 – 12 months old in Nigeria's Federal Capital Territory. The territory was divided into four clusters. One healthcare facility was randomly selected from each cluster, from which participants (mothers attending antenatal services) were randomly selected. Of the four clusters, two were urban (Maitama and National hospital areas), while the other two were suburban/rural (Karu and Garki area). A simplified quota sampling approach was used to select eligible mothers. The selected clusters had consideration for geographical representation and areas that offers immunization services since a year before the study was conducted. Six (6) mothers whose children were between 0 – 12 months old were randomly included from each cluster, giving a total of 24 participants. I.e., each FGD consisted of 6 randomly selected eligible participants.

Data collection process

Study participants were provided with an information sheet stating the goals and expected outcomes of the study. Informed consent was obtained from all study participants. The data collection was conducted between September 20 – 27, 2019 in the Nigeria's Federal Capital Territory. The FGDs were audio recorded and explored perspectives of caregivers on factors that influence vaccination decision-making for their children.

Focus Group Discussion guide

An FGD guide was used to lead the discussions (see <https://osf.io/aqzk4/>). It explored main topics such as: *Confidence* ("In your experience as a mother, how would you assess your level of trust in the safety and effectiveness of vaccination? Follow-Up: How about the general health system delivering it?"); *Complacency* ("In your view, how would you consider continuing polio vaccination for your child, despite very few cases around you?"); *Calculation* (In your experience, how useful is searching for more information helpful in deciding whether to vaccinate your child or not?"); *Constraints* ("In your experience, what makes getting vaccinated easy, what makes it hard? Follow-up: if hard...why and how did you overcome them and if easy, what makes it easy?"); *Collective responsibility* ("In your view, how does vaccinating your child affect other children in the neighborhood?"); *Religion* ("How does your religion perceive vaccination? Follow-up: what do you think about prayers to prevent diseases?") and *Masculinity* ("How would you describe the role of your husband when it comes to vaccination? Follow-up: how important is husband's approval?").

Data analysis

The data were analysed using meta-aggregation approach such as framework synthesis, which seek to summarize data in a stepwise fashion and assess themes based on predefined concepts [24,25]. Convergence and divergence of views based on each of the variables or measures were identified (second-order data) after analysing each individual transcript (first-order data) and categorised based on the aggregation of subject outcomes (third-order data). All recorded discussions were transcribed verbatim and stored in a password protected drive. The transcribed data were coded based on name of the clusters (e.g., Garki as G001-6, at Karu as K001-6, at Maitama as M001-6 and at the National Hospital area/Heinrich Böll Stiftung (HBS) centre as HBS001-6).

RESULTS

Participants

Out of the participants, 42% were first time mothers, while 58% were mothers who have had at least one previous child. The youngest participants were 21 years old, while the oldest was 38. All participants were married. A large number of the mothers had tertiary education (83%), while 17% have attended secondary school. In terms of geographical distribution, majority of the participants were from the North-Central (29%) and South-East (25%), while none participated from the North-East. Others are: South-South (4%), South-West (17%), North-West (17%), while 8% of the participants did not indicate regions of origin. The employment status indicated that 17% of the participants were civil servants, 13% works for non-government institutions or companies, 25% of the mothers were self-employed, 17% were unemployed and 25% were housewives.

Drivers of childhood vaccine uptake

The analysis revealed the following factors driving mother's vaccination decision-making or behavior. Besides the model-based factors (5C plus religiosity and masculinity) we coded attitudes and knowledge as extra categories to better understand the content and ideally also the reasons why mothers had the particular attitude or knowledge. Theoretically, attitudes and knowledge about the effectiveness of vaccines belong to the confidence construct [8].

Positive attitude toward immunization

Many mothers had a positive attitude towards childhood immunization, even prior to childbirth. Most of the mothers mentioned the importance and advantages of childhood vaccination. Antenatal clinic attendance during pregnancy was mentioned in relation to the positive attitude.

"My opinion about immunization has always been the same because I don't play with it. In fact, I go to the extent that if they say they don't have that particular vaccine, I will go to a private hospital to make sure my child gets immunized" (M001).

"Before the child was born, I knew I would be taking her for immunization in town...and so far, we have been good. My opinion has not changed" (HBS001).

"[...] before I had my baby, I was curious and not sure about immunization, especially when I see how they cry. I will ask, is immunization necessary or important? I felt like they were just stressing the children, not until I started antenatal care (ANC). In antenatal class I got to know why immunization is important and I don't object to it anymore [...]" (K004).

Increase but insufficient knowledge of immunization

While mothers' knowledge was enhanced because of ANC attendance, the knowledge provided may be insufficient. Many caregivers associated immunization with important preventive measure against viral, airborne, local diseases outbreaks or all childhood diseases. Palpable disappointment occurs, when caregivers found out that immunization cannot protect their children from all childhood diseases, contrary to earlier assumption. Many mothers assumed that the chances of contracting any childhood disease (vaccine preventable or not) are lower once children are vaccinated.

"The first thing that comes to my own mind is that immunization prevents diseases 100%. I know even if there is a disease breakout, the chances that my child will be infected will be low...he has immunity, that's what I know" (HBS001).

"Anytime I hear immunization it means protection of my child from diseases like chicken pox, malaria, measles, diarrhea, meningitis...it saves my child from so many sicknesses." (G001).

"When I hear the word immunization...it is a way of preventing the baby from diseases" (K001).

Confidence

While trust in the vaccine effectiveness was high, the trust in safety and the government or the healthcare system was low among mothers. However, there was lower trust in the government due to politics/rumors, general distrust in politicians, as well as monetization of vaccines at the health facilities. Similarly, lower trust in the healthcare system was associated with perceived lower competencies of the HCWs, as well as corruption at the health facilities.

"[...] We can't say the trust is 100%, but more than 60%. The reason is vaccine safety concerns...has it expired...when did they produced it...how long was it in the warehouse...how was it handled...and so many questions? So, for all those things, it gives a little doubt" (HBS001).

"[...] my advice is that mothers should go to a good hospital where HCWs are well trained" (HBS003).

"For the government, I think I will give them 55% trust, because immunization services were supposed to be free and compulsory, yet they charge money...so, government must make immunization free as they claim, so that parents can have access to it"....For the HCWs, they should get experienced and well-trained ones...more mother will receive immunization if the HCWs are perceived to be well trained" (HBS003).

"[...] don't trust government because they always put politics ahead of our wellbeing" (M004, Maitama).

Complacency

Contrary to the findings in HIC, where complacent behavior was associated with perceived low risk of VPDs [8], most mothers in this study recognized the risk associated with VPDs. The awareness that herd immunity was low and the consequent vulnerability of their children to disease outbreaks was discussed as a motivation for vaccinating.

"We immunize for polio or any other disease because it may come back, or the child may contract polio because we are not 100% sure that the disease is gone completely" (HB002).

"[...] so, it is good to keep immunizing, just in case you happen to travel with your child to a place where it is prevalent, " (K006).

"[...] even though I do not travel, someone else might travel and return with a vaccine-preventable disease" (G002).

"it's very necessary to continue to vaccinate as many children as possible even though it is not common anymore, because there are places that might still have it" (G004).

Calculation

While the efforts put into seeking information may differ between mothers, it was a very important activity. Several mothers referenced the health facilities especially the ANC health talks as a significant source of information on immunization. Besides the health talk, advice from relatives, friends and peers in their community were equally useful sources of vaccination information. One of the reasons for information search was usually the desire to have a better understanding of certain health conditions and to know more about the right dosage of the vaccines.

"Most of the information I get are from the hospital. Although, it is not everything. I also enquire from other mothers in the community who are more experienced (M004).

"Before I got married and had my child, I use to follow one of my aunties to the hospital to seek information about childcare. From that experience, I learnt a lot about ANC, immunization and vaccine dosage beforehand" (G003).

"I am always curious; I just want to know more before giving my child vaccines...it is good to search for more information" (K004).

Constraints

A frequently reported barrier to vaccination was a tight schedule of the mothers, which made it hard to fit vaccination appointment into their daily routines and to prioritize immunization ahead of other equally competing duties. Other constraints that influenced vaccination decision-making or behavior of mothers were long waiting hours at the clinic, disrespectful attitude of HCWs, and the difficulty in dealing with adverse events from immunization (AEFI).

"[...] most of us who have other children...we have to prepare the older ones for school, prepare food for the family, prepare the new baby, and then prepare oneself in order to meet the vaccination appointments and so on. Thereafter, we will return and still go to work. So, it is very stressful to juggle everything" (K001).

"It is a very challenging because sometimes you have to leave your work. More so, sometimes after immunization injections, the child cries the whole day. Your day won't go as planned." (G003).

"On immunization days, I have to wake up at 04:30 to prepare breakfast, bath the other children and go to the clinic early, so that I will be among the first mothers to arrive on the queue. If I cannot be among early arrivals to queue, I will spend the whole day at the clinic due to long waiting hours" (HBS004).

"[...] the poor attitude of the HCWs, especially the Nurses', discourages mothers from attending immunization...the nurses insults and disrespect mothers at the slightest provocation. They can say anything to you" (HBO002).

Collective responsibility

While mothers saw the benefits of vaccinating their children, they were equally conscious of the communal benefits if everyone does so. They saw one's own vaccination as a responsibility to protect other children in the community.

"I think it is the responsibility of every parent to immunize their children because if they do not, it might affect everyone. E.g., if there is a measles outbreak, my child will go to school and mingle with other children and can be infected" (HBS001).

"[...] so, if your own child is immunized, you have reduced the consequences" (K004).

"The essence of vaccination is to equally help my neighborhood, because when I vaccinate my child, indirectly I am immunizing everybody in my neighborhood" (M002).

"I will vaccinate my child to protect other children around" (G003).

Religion

Mother's perception of immunization was in line with their religious beliefs. They assumed that praying to God was also relevant as He is the ultimate giver of good health. The perception that prayers prevent diseases differed among mothers. Some viewed prayers as an important health addition to immunization. Prayers alone were yet not viewed as protection against VPDs.

"I pray to God, but I do my own duty as well, i.e., I go for immunization" (HBS002).

"Prayers work against diseases, but also, receiving immunization is the right thing" (G002).

"I don't believe prayers prevent diseases; you have to take immunization" (M002).

"The act of getting your child vaccinated is also an act of faith in vaccines" (K004).

Masculinity

Mothers reported that husbands or the child's father played a dominant role in the vaccination decision-making process of their children. Immunization of children were most likely when husbands or fathers had positive attitude towards vaccination. Mothers need approval of the husbands for vaccination of their children.

"I need his approval whether I like it or not, because I cannot go if he tells me not to go" (M004).

"Obedience comes first...but he has been supportive because, he is the one that even reminded me to go and register for immunization" (HBS002).

"The husband is also in charge of the transportation and pays for the vaccines...even when I forget, he will wake up in the morning and do house chores, take me to the clinic, give me transport money and then he goes to work" (G001).

DISCUSSION

The study has provided an extended understanding of vaccination decision-making and behavior of mothers of infants in Nigeria using the 5C model in a qualitative study. The sample was generally relatively positive towards vaccination. Still, mothers reported low trust in vaccine safety and the healthcare system (confidence). Yet, they had great interest in seeking additional information during antenatal visits (calculation), difficulties in prioritizing vaccination over other equally competing priorities (constraints) and were aware that vaccination translates into overall community health and wellbeing (collective responsibility). They had a bias towards God as ultimate giver of good health (religion) and reported that their husbands played a dominant role in vaccination decision-making (masculinity). Mothers perceived their children vulnerable to disease outbreaks, which motivated them to get them vaccinated (complacency). The study outcome can be very valuable to the Expanded Program on Immunization (EPI) in Nigeria, because it generated an improved understanding of mother's perception of healthcare services delivery and mother's behavior or decision-making determinants in Nigeria.

Previous quantitative work using the 5C model in Nigeria has shown that not all components of the model were relevant [1,15]. Yet, the present results suggest that cultural adaptation may be promising and allow a quantitative use of an extended 5C model in LMICs in SSA [1,15]. In the previous quantitative 5C study in Nigeria vaccination behavior was influenced by confidence, collective responsibility, constraints and mothers' religious belief [1]. In this study, perhaps due to the possibility to answer freely to the questions at hand, the results suggest that confidence, calculation, constraints, collective responsibility, religion and masculinity may be relevant – while complacency was not a relevant barrier. Thus, the results converge, but more factors than before appear relevant.

As issues related to confidence, mother's low trust in the government or healthcare system, general distrust of politicians, as well as the perceived corruption at the clinics came up. Building trust, not necessarily in the government, but in the healthcare system should be at the center of new interventions as trust has proven to be a significant determinant of effective behavior change and management of public policy [26,27]. The EPI should be proactive about the fact that some HCWs are financially exploiting mothers using the recommended immunization that is supposed to be free. It would be almost impossible for vaccination demand to improve or to counter vaccine hesitancy in Nigeria if the current distrust between the demand and supply sides of immunization are not addressed. A potential strategy could be to consider a stronger relationship that reconnects the healthcare system and the community gatekeepers [2]. This could reduce the communities' overt suspicion and lack of trust of the healthcare system including HCWs and government. Moreover, the regulatory authorities need to ensure adequate monitoring of the healthcare facilities to prevent abuse and exploitation of caregivers, especially on services that are supposed to be free such as the nationally recommended childhood vaccines.

In addition, HCWs should be routinely trained not just on knowledge of immunization to prevent mis- or inaccurate information about the effectiveness of vaccines, but also on general healthcare practices and ethics, to shore-up confidence of mothers in the healthcare system and on diseases vaccines can prevent and those they cannot.

Most mothers in this study were not complacent. They were rather aware of low herd immunity in communities and the consequent vulnerability of their children to disease outbreaks. The fear that their children could bear the burden if a VPD outbreak occurs motivated mothers to immunize their children. This finding may be credited to the strength of the current Nigerian immunization

campaigns that stress the severity of the diseases, although it needs to be noted that this has not (yet) translated into an increased vaccination uptake. This finding reflects a high concern for and awareness that children need protection from VPDs using immunization.

The importance of seeking additional information to support mother's vaccination decision was a novel finding. Mothers reported that the health talks provided during antenatal visits at the clinics were a primary source of vaccination information. Thus, targeting pregnant women with immunization information seems effective. Yet, it also implies that those women who do not attend such classes are hard to be reached. Mothers also mentioned other important sources of vaccination information including non-medical sources such as relatives and peers in their communities. Therefore, further vaccination education should move beyond targeting mothers alone, but the entire households and communities. The current data did not reveal clear evidence on which sources led women towards or away from vaccination, however, attendance at ANC seemed to support a positive view on vaccination.

As obtained in HIC, mothers in Nigeria were also inundated with frequently reported constraints such as prioritizing vaccination ahead of other equally competing priorities within their everyday schedule. Also, the long waiting hours at the health facilities makes working mothers' immunization planning very difficult. Interventions addressing this (e.g., a day off at the vaccination day) may be helpful to improve compliance.

Another noticeable factor linked to constraints was the perceived poor attitude of HCWs. There is a noticeable ethics problem with conducts and practices among HCWs in the healthcare facilities. This requires urgent administrative intervention. Therefore, the federal and state ministries of health, National Primary Healthcare Development Agency (NPHCDA) and other institutions responsible for deploying HCWs to healthcare facilities across the country must rise to this trend. Among others, it should include retraining of HCWs on code of conducts of healthcare professionals.

Even though religion did not turn out to be a major barrier, GOD was seen as a major source of health and wellbeing. The notion of prayers as prevention of VPDs did not have the strongest support among participants. Yet, it was also not completely discarded and rather seen as an additional intervention.

Similarly, participants appreciated the support of their husbands or child's father. However, to the extent that some of their husband's role in immunizing children was commendable, they played a dominant role in the vaccination decision-making process of the children. Most participants reported that they need approval of the husbands for vaccination of their children. This study findings validated a previous one that revealed that childhood vaccination was more likely when it is in line with father's attitude and vice versa [1].

This study found generally positive attitudes towards immunization among Nigerian mothers. However, knowledge about vaccines and the diseases that they prevent was still inadequate. This is similar to some studies in the SSA, where caregivers have the wrong assumptions that, childhood vaccination can prevent all childhood diseases [14,28]. There seems inadequate knowledge among caregivers on distinctions between VPDs and other diseases in general. This inadequacy of knowledge about immunization fuels the assumption that immunization will prevent all childhood diseases. Therefore, when a child is ill with a disease, whether vaccine-preventable or not, mother's confidence in immunization may drop. Since the antenatal visits appeared a relevant source of information for mothers, care should be taken to properly educate the mothers about the benefits and limitations of vaccination and which diseases are vaccine-preventable and that there are many which are not.

CONCLUSION

The study has allowed a deeper insight into understanding what lies behind relevant antecedents of maternal vaccination behavior in Nigeria. Using the 5C model for setting up the guide for a FGD provided multiple opportunities for adapting the measurement model towards understanding vaccination decision-making, especially in Sub-Saharan African (SSA) setting. In addition, the use of the 5C model in qualitative research can play a significant role in generating an

improved understanding of caregiver’s perception beyond some predefined judgements in quantitative studies.

Author’s Contribution: Conceptualization: GCA and CB. Methodology: GCA and CB. Investigation: GCA. Result Analysis: GCA. Writing – original draft: GCA and CB. Writing – review & editing: GCA and CB. Acknowledgments: The study acknowledges the management and staff of Maitama District Hospital, Abuja; Karu Primary Health Centre, Abuja; Garki Primary Health Centre, Abuja. Also, acknowledgment goes to Heinrich Böll Stiftung (HBS), Abuja, for its tremendous support and use of its conference room for meetings during the study.

Funding: Not applicable.

Ethics approval and consent to participate: The study was conducted according to the guidelines of the Declaration of Helsinki and approved by Nigerian Health Research Ethics Committee (reference number FHREC/2018/01/99/03-09-2018/19). Written informed consent was obtained from all participants.

Consent for publication: All authors approved the final manuscript.

Availability of data and materials: The datasets used during the current study are available at <https://osf.io/aqzk4/>.

Competing interests: The authors declare that they have no competing interests.

LIST OF ABBREVIATIONS

EPI:	Expanded Program on Immunization
DTP3:	Diphtheria Tetanus Pertussis
GAVI:	Global Alliance for Vaccines and Immunization
HPV:	Human Papillomavirus
SSA:	Sub-Saharan Africa
UNICEF:	United Nations International Children’s Emergency Fund
WHO:	World Health Organization
WUENIC:	WHO/UNICEF Estimates of National Immunization Coverage
FGD:	Focus Group Discussion
RI:	Routine Childhood Immunization
Q&A:	Question and Answer
MoH:	Ministry of Health
H2R:	Hard-to-reach
VPDs:	Vaccine-preventable diseases
HCWs:	Healthcare Workers
HBS:	Heinrich Böll Stiftung
ANC	Antenatal Care
AEFI	Adverse Event from Immunization
NPHCDA	National Primary Healthcare Development Agency
HIC	High Income Countries
SAGE	Strategic Advisory Group of Experts (SAGE)
LMIC	Low and Middle-Income Countries (LMIC)

References

1. Adeyanju, G.C., Sprengholz, P. & Betsch, C. Understanding drivers of vaccine hesitancy among pregnant women in Nigeria: A longitudinal study. *npj Vaccines* 7, 96 (2022a). <https://doi.org/10.1038/s41541-022-00489-7>
2. Adeyanju, G.C., Betsch, C., Adamu, A.A. et al. Examining enablers of vaccine hesitancy toward routine childhood and adolescent vaccination in Malawi. *Glob Health Res Policy* 7, 28 (2022b). <https://doi.org/10.1186/s41256-022-00261-3>
3. World Health Organization (WHO). Immunization coverage. Geneva: 2019a.

4. WHO/UNICEF Estimates of National Immunization Coverage (WUENIC). Immunization coverage estimates data visualization. July 2021. <https://data.unicef.org/resources/immunization-coverage-estimates-data-visualization/>
5. Nigeria Demographic and Health Surveys (NDHS) Report 2018. <https://dhsprogram.com/pubs/pdf/FR359/FR359.pdf> (Retrieved May 20, 2022).
6. UNICEF. News note: 4.3 million children in Nigeria still miss out on vaccinations every year. 23 April 2018. Press release. <https://www.unicef.org/nigeria/press-releases/news-note-43-million-children-nigeria-still-miss-out-vaccinations-every-year>. Accessed Mar. 28, 2022.
7. UNICEF. Levels and Trends in Child Mortality. United Nations Inter-Agency Group for Child Mortality Estimation (UN IGME), Report 2020. <https://data.unicef.org/resources/levels-and-trends-in-child-mortality/#> (Retrieved Jan 3, 2022).
8. Betsch, C.; Schmid, P.; Heinemeier, D.; Korn, L.; Holtmann, C.; Bohm, R. Beyond confidence: Development of a measure assessing the 5C psychological antecedents of vaccination. *PLoS ONE* 2018, 13, e0208601.
9. Larson HJ, de Figueiredo A, Xiaohong Z, Schulz WS, Verger P, Johnston IG, et al. The State of Vaccine Confidence 2016: Global Insights Through a 67-Country Survey. *EBioMedicine*. 2016; 12: 295–301. <https://doi.org/10.1016/j.ebiom.2016.08.042> PMID: 27658738
10. Chu, HY and Englund, JA. Maternal immunization. *Clin Infect Dis*. 2014; 59; 560-568
11. Obanewa OA, Newell ML. The role of place of residency in childhood immunisation coverage in Nigeria: analysis of data from three DHS rounds 2003-2013. *BMC Public Health*. 2020 Jan 29;20(1):123. doi: 10.1186/s12889-020-8170-6.
12. WHO/UNICEF Coverage Estimates 2018 revision, July 2019. https://apps.who.int/immunization_monitoring/globalsummary/timeseries/tswucoveragedtp3.html (Retrieved April 15, 2022).
13. Piot, P., Larson, H.J., O'Brien, K.L. et al. Immunization: vital progress, unfinished agenda. *Nature*, 2019; 575, 119–129. <https://doi.org/10.1038/s41586-019-1656-7>
14. Ophori, E. A., Tula, M. Y., Azih, A. V., Okojie, R., & Ikpo, P. E. Current trends of immunization in Nigeria: prospect and challenges. *Tropical medicine and health*, 2014; 42(2), 67–75. doi:10.2149/tmh.2013-13
15. Adeyanju, G.C.; Sprengholz, P.; Betsch, C.; Essoh, T.-A. Caregivers' Willingness to Vaccinate Their Children against Childhood Diseases and Human Papillomavirus: A Cross-Sectional Study on Vaccine Hesitancy in Malawi. *Vaccines* 2021a; 9, 1231. <https://doi.org/10.3390/vaccines9111231>
16. MacDonald NE, SAGE Working Group on Vaccine Hesitancy. Vaccine hesitancy: Definition, scope and determinants. *Vaccine*. 2015; 33: 4161–4164. <https://doi.org/10.1016/j.vaccine.2015.04.036> PMID: 25896383
17. Thomson A, Robinson K, Valle e-Tourangeau G. The 5As: A practical taxonomy for the determinants of vaccine uptake. *Vaccine*. 2016; 34: 1018–1024. <https://doi.org/10.1016/j.vaccine.2015.11.065> PMID: 26672676
18. Opel DJ, Taylor JA, Zhou C, Catz S, Myaing M, Mangione-Smith R. The relationship between parent attitudes about childhood vaccines survey scores and future child immunization status: a validation study. *JAMA Pediatr*. 2013; 167: 1065–1071. <https://doi.org/10.1001/jamapediatrics.2013.2483> PMID: 24061681
19. Gilkey MB, Reiter PL, Magnus BE, McRee A-L, Dempsey AF, Brewer NT. Validation of the vaccination confidence scale: a brief measure to identify parents at risk for refusing adolescent vaccines. *Acad Pediatr*. 2016; 16: 42–49. <https://doi.org/10.1016/j.acap.2015.06.007> PMID: 26300368
20. Machida, M., Nakamura, I., Kojima, T., Saito, R., Nakaya, T., Hanibuchi, T., Takamiya, T., Odagiri, Y., Fukushima, N., Kikuchi, H., Amagasa, S., Watanabe, H. & Inoue, S. Trends in COVID-19 vaccination intent from pre- to post-COVID-19 vaccine distribution and their associations with the 5C psychological antecedents of vaccination by sex and age in Japan, *Human Vaccines & Immunotherapeutics*, 2021: 17:11, 3954–3962, DOI: 10.1080/21645515.2021.1968217
21. Adamu AA, Essoh TA, Adeyanju GC, Jalo RI, Saleh Y, Aplogan A, Wiysonge CS. Drivers of hesitancy towards recommended childhood vaccines in African settings: a scoping review of literature from Kenya, Malawi and Ethiopia. *Expert Rev Vaccines*. 2021 May;20(5):611-621. doi: 10.1080/14760584.2021.1899819.
22. Abdou M., Kheirallah, M., Aly et al. Psychological antecedents towards COVID-19 vaccination using the Arabic 5C validated tool: An online study in 13 Arab countries. *MedRxiv*. 2021.08.31.21262917. DOI: 10.1101/2021.08.31.21262917
23. Hossain, Bellal Mohammad., Alam, Zakiul., Islam, Syful., Shafayat, Sultan., Faysal, Mahir., Rima, Sharmin., Hossain, Anwer., Mamun, Abdullah Al. Health Belief Model, Theory of Planned Behavior, or Psychological Antecedents: What Predicts COVID-19 Vaccine Hesitancy Better Among the Bangladeshi Adults? *Frontiers in Public Health*, 9, 2021, 1172. DOI=10.3389/fpubh.2021.711066
24. Saini, Michael, and Aron Shlonsky, 'Methods for Aggregating, Integrating, and Interpreting Qualitative Research', Systematic Synthesis of Qualitative Research, Pocket Guides to Social Work Research Methods, 2012; online edn, Oxford Academic, 24 May 2012. <https://doi.org/10.1093/acprof:oso/9780195387216.003.0002> (accessed Aug. 5, 2022).

25. WHO Regional Office for Europe. Guide to qualitative evidence synthesis: evidence-informed policymaking using research in the EVIPNET framework. Copenhagen: WHO Regional Office for Europe; 2021. Licence: CC BY-NC-SA 3.0 IGO.
26. Adeyanju, GC., Augustine, T.M., Volkmann, S. et al. Effectiveness of intervention on behaviour change against use of non-biodegradable plastic bags: a systematic review. 2021c; *Discov Sustain* **2**, 13. <https://doi.org/10.1007/s43621-021-00015-0>
27. German Institute for Global and Area Studies Challenging Trust in Government: COVID in Sub-Saharan Africa. 2021, Number 3, ISSN: 1862-3603. <https://www.giga-hamburg.de/en/publications/giga-focus/challenging-trust-in-government-covid-in-sub-saharan-africa>
28. Light, D. W. Exaggerating the benefits of the 'decade of vaccines'. *Health Aff.* (Millwood). 2011; 30, p.2026. <https://doi.org/10.1377/hlthaff.2011.0969>.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.