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Perceived Patterns of Vaccine-Preventable Diseases and Barriers to Immunization Uptake in Isoko North and South LGAs Of Delta State

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ABSTRACT

Introduction: Many nations have accepted and executed mass vaccination since it has been shown to be the most effective measure for containing pandemics of infectious diseases. This study is aimed at uncovering the community-specific perceptions of vaccine-preventable diseases and identifying the prevailing barriers to immunization in the Isoko region of Delta State.

Methodology: The study design adopted for this study is a cross sectional study. A multistage sampling technique was adopted to ensure a representative selection of participants from Isoko North and South LGAs of Delta State. Data was analyzed using SPSS Version 22. Descriptive statistics (means, frequencies and percentages, as appropriate) were computed for all variables. These data were reviewed to check for outliers, missing data, and "cells" with low frequencies that might hinder stable statistical analysis.

Results: The demographic distribution revealed that the majority of respondents were between 28 and 37 years old (35.7%). In terms of education, 67.6% had attained either secondary or tertiary education, suggesting a relatively well-educated population. A majority of respondents (57.7%) feel that vaccine-preventable diseases (VPDs) frequently occur in their community. The logistic regression model revealed that religious or cultural beliefs, fear of vaccine side effects, and the unavailability of vaccines were statistically significant predictors of perceived barriers to immunization in Isoko LGAs

Conclusion: High community involvement, a high proportion of women, and a favorable opinion of vaccines are highlighted in the report, but it also emphasizes enduring obstacles including false information, societal influences, and unequal access that prevent complete immunization coverage.

INTRODUCTION

The world community has responded to the success of vaccination with ambitious targets, such as the Global Immunization Vision and Strategy (2006–2015) envisioned by the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF). Since the 18th century, when Edward Jenner developed the first vaccine for smallpox, vaccination has been a foundation of public health (Okesanya et al., 2024). Immunization is one of the least expensive public health initiatives in history, having helped save millions of lives worldwide and substantially decreases the global burden of infectious diseases (Cherian et al., 2020; Okesanya et al., 2024). With a focus on lowering deaths and morbidity from vaccine-preventable diseases (VPDs), increasing coverage, and incorporating vaccination services with larger healthcare initiatives, this project sought to guarantee universal access to vaccines by 2030 (MacDonald et al., 2020).

Social mobilization is "a strategy that engages and encourages a wide range of supporters and collaborators at national and local levels to raise consciousness of and demand for a specific improvement target through discussion," according to the United Nations Children's Fund (UNICEF). When combined, to put it simply, mass social mobilization is just one of many strategies that can help create demand for vaccinations. It can be argued that social mobilization for immunization is the successful endeavor by various stakeholders to guarantee optimal vaccination uptake in a target population by creating and maintaining demand for vaccines using community-based participatory approaches (Jalloh et al., 2019). Mass mobilization for vaccinations can be planned and carried out differently for routine vaccinations, SIAs, humanitarian crises, VPD outbreak responses, and the introduction of new vaccines (Deutsch et al., 2017).

According to Bangura et al. (2020), vaccination serves as a preventative measure against infectious diseases. Childhood vaccination continues to be one of the most effective public health interventions, lowering childhood mortality and morbidity from infectious illnesses at a little cost (Obasoha et al., 2018). It has been shown to prevent over 1.2 million infant deaths annually and is a fundamental child survival strategy (Malande et al., 2019). According to Bangura et al. (2020), it is a crucial tactic for achieving Sustainable Development Goal (SDG) number 3, which is to lower the under-five mortality rate to fewer than 25 per 1000 live births by the year 2013. Vaccine-preventable diseases continue to be a leading cause of childhood illnesses and fatalities despite recent advancements, especially in low-income nations (Bangura et al., 2020).

40% of all deaths in the under-five age group occur in Africa, which has the highest under-five mortality rate in the world. The primary cause of this is infections that can be prevented by vaccination (Bangura et al., 2020). Although African immunization efforts have improved over the last few decades, coverage of some advised children immunizations is still low (Bangura et al., 2020). The Global Vaccine Action Plan criterion of 80% or more coverage of the diphtheriatetanus-pertussis vaccine (DTP3), a metric used to assess the effectiveness of routine vaccine delivery systems, was only predicted to have been reached by Zimbabwe in the Sub-Saharan area in 2014 (Bangura et al., 2020). One in five African youngsters did not receive life-saving vaccinations in 2016. The majority of African nations struggle to reach the most vulnerable children in isolated and rural areas (Porth et al., 2019).

STATEMENT OF PROBLEM

Many nations have accepted and executed mass vaccination since it has been shown to be the most effective measure for containing pandemics of infectious diseases (Fisher et al., 2020). Even though vaccines have saved many lives, vaccine hesitancy and its permeation into popular culture pose a threat to the continued effectiveness of vaccination initiatives. The "delay in acceptance or refusal of vaccines notwithstanding availability of vaccination services" is what the World Health Organization (WHO) defines as vaccine hesitancy (WHO, 2019). The World Health Organization has identified this problem as one of the ten dangers to global health. Social media is frequently used to promote untrue rumors regarding vaccine side effects. Furthermore, mistrust of the government and bad experiences with the healthcare system have created the ideal environment for vaccine-hesitancy sentiments throughout Africa (Ackah et al. 2022).

The lack of adequate health facilities in rural areas is one of the biggest obstacles to vaccination (Akanpaabadai et al., 2024). Rural areas have few well-equipped health centers, and many of the small clinics that do exist lack basic facilities such a water supply, electrical supply, or a suitable cold chain for vaccines (Saeed et al., 2024). Since many vaccinations must be delivered and stored at low temperatures, typically between 2°C and 8°C, the cold chain plays a crucial role in maintaining the effectiveness of vaccines. In remote locations, inadequate cold chain systems have been identified as a significant danger to vaccination, mostly due to the fact that improperly stored vaccines are useless. This problem is particularly severe in remote locations without roads and with limited or no transportation options to facilitate prompt vaccination administration (Saeed et al., 2024). Health workers, particularly qualified immunization professionals, are an issue in Nigeria's health care delivery system, particularly in rural areas (Saeed et al., 2024). The lack of healthcare providers in rural areas forces the government to turn to individuals who are not specially trained to work as vaccine providers, albeit for a brief period of time. This staffing shortage is a major issue that lowers the standard of immunization services (Salako et al., 2024). Inequalities in immunization coverage result from these healthcare gaps, and this is especially true in situations when there are interruptions brought on by things like employee turnover, absenteeism, or the need to move employees to different locations (Adeyanju & Betsch, 2024)

AIM OF STUDY

To identify the perceived patterns of vaccine-preventable diseases and barriers to immunization uptake in Isoko north and south LGAs of Delta State

RATIONALE OF STUDY

The impact of immunization on global health outcomes is profound, contributing substantially to achieving Millennium Development Goal 4 by reducing under-five mortality rates by 47% between 2000 and 2019 (Li et al., 2021). Between 2000 and 2019, vaccination averted approximately 37 million deaths across 98 LMICs, reflecting a 45% reduction in mortality from 10 vaccine-preventable diseases (Cohen et al., 2021). Economic analyses indicate substantial returns on investment, with immunization

programs projected to avert significant illness costs and generate substantial economic benefits (Okesanya et al., 2024). Between 2019 and 2022, the vaccination rate in the WHO African Region increased significantly (Okesanya et al., 2024)

Although Africa's healthcare system faces limitations beyond immunization, efforts to enhance vaccine coverage have led to positive outcomes. The continent is making strides in increasing access to immunization services, which are pivotal to addressing child mortality and controlling infectious diseases (Sinumvayo et al., 2024). Diseases such as polio and maternal and neonatal tetanus are close to being eradicated, and the introduction of new vaccines is helping combat long-standing illnesses (Okesanya et al., 2024). Efforts to improve immunization coverage in sub-Saharan Africa (SSA) have yielded positive results. This study is crucial for uncovering the community-specific perceptions of vaccine-preventable diseases and identifying the prevailing barriers to immunization in the Isoko region of Delta State. Understanding these dynamics is essential for guiding the design and implementation of culturally sensitive and context-specific immunization programs.

METHODOLOGY

STUDY DESIGN

The study design adopted for this study is a cross sectional study.

STUDY AREA

Isoko North and Isoko South Local Government Areas (LGAs) are located in Delta State, in the southern region of Nigeria (PENGlobal, 2023).

STUDY POPULATION

Adults above the age of 18 who are parents or guardians to children that are eligible to recive routine immunization. These adults, parents or guardians shoud be residing in Isoko North or Nouth LGA of Delta State.

INCLUSION CRITERIA

Adults above the age of 18 who are parents or guardians to children that are eligible to recive routine immunization and have given informed consent o participate in the study.

EXCLUSION CRITARIA

Adults above the age of 18 who are parents or guardians to children that are eligible to recive routine immunization who are unavailable and have refused them or ther wards to participate in the study.

SAMLE SIZE

The sample size for this study was derived using Cochrane's formula;

Cochrane's formula was used to calculate the sample size; $n = \frac{Z^2 P(1-P)}{d^2}$

Where:

Z=1.96 (Standard normal deviate for 95% confidence level)

P=0.562 (56.2%; proportion of respondents citing disease prevention as the reason for immunization in a study by Oli *et al.*, 2021)

d=0.05 (Margin of error) $n = \frac{(1.96)^2 \times 0.562 \times (1-0.562)}{0.05^2}$

n= 378

Adjusting for Two LGAs Using a Design Effect (DE)

Since the study covers two LGAs, we apply a design effect of 2:

$n_{adjusted} = 378 \times 2 = 756$

Further adjusting for 15% Non-Response Rate; $n = \frac{756}{1-0.15}$

n= 890

Thus approximated to 900 participants

Proportional Distribution by LGA

Using 2006 census data:

Isoko North Population: 143,559

Isoko South Population: 235,147

Total Population: 143,559 + 235,147 = 378,706

Isoko North = $\frac{143,559}{378,706} \times 900 = 341$

Isoko South = $\frac{235,147}{378,706} \times 900 = 559$

SAMPLING TECHNIQUE

A multistage sampling technique was adopted to ensure a representative selection of participants from Isoko North and Isoko South Local Government Areas (LGAs) of Delta State, Nigeria. This approach was designed to reflect population differences and enhance the generalizability of findings across both LGAs.

In the first stage, cluster sampling was employed to purposively select Isoko North and Isoko South LGAs. These LGAs were chosen based on their notable health challenges, varying levels of immunization coverage, and distinct population characteristics, making them relevant for the study's focus on vaccine-preventable diseases.

During the second stage, stratified sampling was utilized to categorize the wards within each LGA according to population size and accessibility. This ensured a balanced representation of both urban and rural communities. Out of the 10 wards in Isoko North, five were randomly selected, while six were chosen from the 12 wards in Isoko South, resulting in a total of 11 wards for the study.

In the third stage, simple random sampling was conducted to select two communities from each of the previously chosen wards. This process led to the inclusion of 10 communities from Isoko North and 12 communities from Isoko South, bringing the total to 22 communities.

Subsequently, in the fourth stage, systematic random sampling was applied to select households within each community. A sampling interval was determined based on the number of households in each area, and every 10th household was selected to participate in the study.

Finally, in the fifth stage, convenience sampling was used to identify one eligible respondent per household, typically a parent or caregiver. In instances where more than one eligible individual was present, a simple random method was used to select a respondent to ensure fairness and avoid bias.

METHOD OF DATA COLLECTION

The study employed a descriptive cross-sectional survey design, allowing data to be gathered at a single point in time to provide a snapshot of community perspectives on immunization. To achieve this, structured questionnaires were administered to a diverse group of respondents, including parents, caregivers, pregnant women, healthcare workers, and community leaders. These participants were selected to capture a broad range of insights regarding their awareness, attitudes, and the barriers they face concerning immunization practices within the community.

VALIDITY AND RELIABILITY OF INSTRUMENT

Prior to the main data collection, a pre-test of the research instruments was conducted in Ughelli, a community within Delta State that shares similar demographic and socio-cultural characteristics with Isoko North and South Federal Constituency but was not included in the final study population. A total of 100 participants, including parents, caregivers, healthcare workers, and community leaders, were selected for the pre-test using a convenience sampling technique. The pre-test aimed to evaluate the clarity, validity, and reliability of the questionnaire and interview guide. It helped identify ambiguous questions, assess the time required for completion, and determine the ease of comprehension by respondents.

DATA ANAYSIS

Data was analysed using SPSS Version 22. Descriptive statistics (means, frequencies and percentages, as appropriate) were computed for all variables. These data were reviewed to check for outliers, missing data, and “cells” with low frequencies that might hinder stable statistical analysis. Unadjusted/Adjusted associations were next assessed using binary logistic regression models with odds ratios at 5% alpha level and 95% confidence interval. The choice of binary logistic regression was due to the dichotomous nature of the outcome variable.

ETHICAL APPROVAL

Participants had the right to withdraw at any time without consequences. Cultural sensitivity was maintained by involving trained research assistants and respecting local customs. Permission was also obtained from local health authorities and community leaders before data collection.

RESULTS

Table 4.1. Socio-demographic Characteristics of Respondents (n=887)

Variable	Frequency (n)	Percentage (%)
Age		
18-27	175	19.7
28-37	317	35.7
38-47	252	28.4
48-57	121	13.6
58-67	19	2.1

>68	3	0.3
Gender		
Male	335	37.8
Female	552	62.2
Marital Status		
Single	254	28.6
Married	553	62.3
Divorce	33	3.7
Widowed	34	3.8
Separated	13	1.5
Religion		
Christianity	772	87.0
Islam	22	2.5
Traditional	65	7.3
Others (Eckankar, Church of Christ) Celestial	28	3.2
Education		
No formal education	10	1.1
Primary	79	8.9
Secondary	329	37.0
Undergraduate	272	30.6
Postgraduate	197	22.2
Occupation		
Civil servant	247	27.8
Farmer	111	12.5
Trader	286	32.2
Artisan	146	16.5
Unemployed	97	10.9
LGA		
Isoko North	334	37.3
Isoko South	553	62.3
No of Children		
1	204	23.0
2	268	30.2
3	196	22.1
4	149	17.8
>5	70	7.9

Out of an initial sample of 900 participants, the study successfully obtained responses from 887 individuals, reflecting a high response rate of 98.5%. The demographic distribution revealed that the majority of respondents were between 28 and 37 years old (35.7%), followed by those aged 38 to 47 years (28.4%), indicating a predominantly youthful population. Females constituted a larger proportion (62.2%) compared to males (37.8%), and most of the respondents were married (62.3%). A significant majority identified as Christians (87.0%), reflecting the religious composition of the study area.

In terms of education, 67.6% had attained either secondary or tertiary education, suggesting a relatively well-educated population. Occupation-wise, the most common livelihoods were trading (32.2%) and civil service (27.8%), pointing to an economically active demographic. Geographically, more respondents were drawn from Isoko South LGA (62.3%) than from Isoko North LGA (37.3%). Regarding family structure, most participants reported having one to three children, with two children (30.2%) being the most frequent response. These findings collectively depict a population that is youthful, fairly educated, economically engaged, and strongly family-oriented.

Table 4.5. Perceived Epidemiological Distribution of Vaccine Preventable Diseases (n=887)

Variable	Frequency (n)	Percentage (%)
Vaccine-preventable diseases frequently occur in my community		
Strongly Agree	111	12.5
Agree	400	45.2
Strongly Disagree	196	22.1
Disagree	180	20.3
I have personally suffered from a vaccine-preventable disease		
Strongly Agree	121	13.6
Agree	279	31.4
Strongly Disagree	289	32.5
Disagree	198	22.3
My child or relative has suffered from a vaccine- preventable disease		
Strongly Agree	124	14.0
Agree	315	35.5
Strongly Disagree	222	25.0
Disagree	226	25.5
I know someone who has died from a vaccine- preventable disease		
Strongly Agree	148	16.7
Agree	329	37.0
Strongly Disagree	238	26.8
Disagree	172	19.4

I believe immunization reduces the spread of diseases		
Strongly Agree Agree Strongly Disagree	224	25.2
Disagree	421	47.4
	158	17.8
	84	9.5

A majority of respondents (57.7%) — 12.5% *strongly agree* and 45.2% *agree* — feel that vaccine-preventable diseases (VPDs) frequently occur in their community. Meanwhile, 42.4% disagree to some extent. Almost half (45.0%) — 13.6% *strongly agree* and 31.4% *agree* — report having personally suffered from a VPD, while 54.8% do not share this experience. About 49.5% — 14.0% *strongly agree* and 35.5% *agree* — say that a child or relative has suffered from a VPD, compared to 50.5% who disagree. More than half (53.7%) — 16.7% *strongly agree* and 37.0% *agree* — know someone who has died from a vaccine-preventable disease, indicating strong community exposure to serious VPD outcomes. A high proportion (72.6%) — 25.2% *strongly agree* and 47.4% *agree* — believe that immunization helps reduce the spread of diseases, with only 27.3% expressing disagreement.

The data indicate that vaccine-preventable diseases are perceived as a significant issue, with many respondents having direct or indirect experience with these illnesses. Encouragingly, most respondents trust in the effectiveness of immunization, which supports strong potential for vaccine acceptance in the community.

Table 4.8. Logistics Regression Showing Factors Militating against Immunization (n=887)

Factor	Chi-Square (Wald Test)	p-Value	df	Sig	Interpretation
Distance to immunization centers	2.179	0.536	3	Not significant	Distance is not a strong Predictor of immunization barrier.
Lack of awareness	7.739	0.052	3	Marginal	Some impact; One category (Disagree) was significant.
Religious/cultural beliefs	57.171	0.000	3	Highly significant	Strongest barrier; all levels show significant effect.
Fear of vaccine side effects	17.976	0.000	3	Significant	Strong predictor, especially among those who agree.
Vaccine unavailability	36.391	0.000	3	Significant	Strong predictor of perceived barrier.

The logistic regression model revealed that religious or cultural beliefs, fear of vaccine side effects, and the unavailability of vaccines were statistically significant predictors of perceived barriers to immunization in Isoko LGAs. These factors substantially increase the likelihood that individuals will perceive major obstacles to vaccination efforts.

DISCUSSION

The study's high response rate of 98.5% reflects strong community participation and enhances the credibility of the data collected. A substantial portion of the respondents fell within the 28–37 age group (35.7%), followed closely by those aged 38–47 years (28.4%). This predominantly youthful demographic plays a vital role in public health efforts, particularly in immunization programs, as individuals in this age range are often active parents or caregivers who make critical health decisions for their children. Their receptiveness to health information and interventions makes them a strategic target for improving immunization uptake. The notable predominance of female participants (62.2%) is consistent with sociocultural roles in many Nigerian communities, where women typically serve as the primary caregivers. This underscores the need to focus immunization outreach and educational efforts on

women, whose involvement is essential for achieving high vaccination coverage among children. Nonetheless, it is also important to recognize and address gender-based challenges that may hinder women's access to immunization services—such as restricted autonomy and limited decision-making power within households.

According to a 2025 report by the National Primary Health Care Development Agency and UNICEF, Nigerian women often face layered gender-related barriers, including low educational attainment and unemployment, which significantly limit their access to and use of essential health services like immunization. With 67.6% of respondents having completed either secondary or tertiary education, there's a positive correlation between educational attainment and health-seeking behavior. Educated individuals are more likely to understand the benefits of immunization, adhere to vaccination schedules, and dispel myths associated with vaccines. This finding is consistent with a study published in 2024, which found that children born to caregivers with higher levels of education were more than twice as likely to receive all required vaccines . Therefore, public health strategies should continue to promote education as a means to improve immunization coverage (Olufadewa et al., 2024). The occupational distribution, with trading (32.2%) and civil service (27.8%) being the most common, indicates a predominantly economically active population. Economic engagement can influence health behaviors, as individuals with stable incomes may have better access to healthcare services. However, it's crucial to ensure that immunization services are accessible to all, regardless of occupational status, to prevent disparities in vaccine uptake. A study in 2014 highlighted that maternal occupation significantly influences full immunization status of children, with women in formal employment more likely to have fully immunized children (Oyefara, 2014). The higher representation from Isoko South LGA (62.3%) compared to Isoko North (37.3%) may reflect differences in population density or accessibility. It's essential to ensure equitable distribution of immunization services across different regions to avoid pockets of low coverage. A 2023 study emphasized the need for targeted interventions in areas with low immunization rates, recommending the involvement of community leaders and religious figures to improve uptake (Omoleke et al., 2023).

The strong perception that vaccine-preventable diseases (VPDs) are common—and that many people have been personally affected, directly or through family and friends—mirrors recent resurgences of diseases like diphtheria in Nigeria. In early 2024, health authorities confirmed thousands of suspected diphtheria cases across multiple states, with Kano alone accounting for the majority of confirmed instances. This real outbreak underpins why community members report seeing VPDs "frequently occur" and knowing someone who died from such illnesses (Gaiya *et al.*, 2024). This prevalence aligns with documented resurgences of VPDs in Nigeria, such as the 2023 diphtheria outbreak, which highlighted the consequences of low vaccination coverage and inadequate sanitation (Adegboye *et al.*, 2023). At the same time, belief that immunization curbs disease spread remains robust, reflecting a general confidence in vaccines even when concerns about side effects persist. However, these concerns—and the fact that cultural or religious views still shape many parents' decisions—are consistent with broader patterns of vaccine hesitancy in West Africa. A 2023 systematic review found that while most caregivers understand vaccine benefits, anxiety about safety and sociocultural influences continue to deter full uptake (Adeyanju and Betsch, 2024).

Decisions on health care in rural settings are always heavily influenced by cultural views. Some cultures, for instance, may view vaccines as a Western plot or act in a way that is harmful to children because it impairs their fertility or delays their development (Bassey et al., 2024). These myths are particularly prevalent among several social, ethnic, and religious groups in northern Nigeria, where there is a significant cultural barrier to vaccination (Sallam et al., 2024). Many people continue to spread false information about the risks of vaccines, even in spite of health officials' campaigns urging people to get them. For example, some people in some parts of the world have been giving their kids the polio vaccine because they believe it is used to inject the kids in order to make them infertile or that the vaccine is poisoned and will kill the kids (Bassey et al., 2024). Ineffective community leaders, religious leaders, and occasionally the local media all promote such misconceptions. Because of these attitudes, many families choose not to get their children vaccinated, which results in persistent groups of people in rural areas who are not vaccinated (Bianchi & Tafuri, 2023).

Addressing both the real disease burden and the nuanced drivers of hesitancy requires more than simply making vaccines available. Strategies must be tailored to Nigeria's diverse linguistic and cultural landscape engaging community and religious leaders, using local languages, and directly addressing myths and fears. Recent work emphasizes that overcoming obstacles tied to culture, language, and religion is key to improving immunization rates, especially in regions experiencing outbreaks (Agbede *et al.*, 2024).

CONCLUSION

High community involvement, a high proportion of women, and a favorable opinion of vaccines are highlighted in the report, but it also emphasizes enduring obstacles including false information, societal influences, and unequal access that prevent complete immunization coverage.

RECOMMENDATION

To increase vaccination uptake and combat hesitation, tailored public health initiatives should place a high priority on culturally appropriate education, make use of reliable community and religious leaders, and guarantee equal access to immunization services in all areas.

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