

Attitude and Perception of Mothers of Under-Five Children Towards Immunization Services Uptake in Rural Communities of North Senatorial District of Delta State, Nigeria

Running Title: Immunization of Children under-5 years

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ABSTRACT

This study empirically investigated the attitude of caregivers towards immunization among under-5 children in Delta North Senatorial District of Delta State, Nigeria using a well self-structured questionnaires drawn from caregivers of under-5 children who were disposed to immunization in the nine (9) local government areas in Delta North senatorial district of Delta State, Nigeria, which include Aniocha North, Aniocha South, Ika North East, Ika South, Ndokwa East, Ndokwa West, Oshimili South, Oshimili North and Ukwuani. The questionnaires were distributed to 3843 caregivers across the Nine (9) local government areas in Delta North senatorial district but the researcher was able to successfully retrieve 3624, which constituted about 94% of the sample size. The researcher used the 3624 (94%) successfully retrieved questionnaires for analysis. The findings shows that the attitude of caregivers, Perception of caregivers and enablers are respectively statistically significant in the immunization

of under-5 children in Delta North senatorial district of Delta State, Nigeria. It is therefore recommended amongst others that female gender equality on education training be more encouraged and more awareness about the danger of non-immunization of under-5 children should be extended to rural environment.

1. Introduction

Immunization is considered to be one of the most successful and cost-effective public health sustainable interventions for human beings against diseases that affect their health¹. Routine immunization plays a key role to significantly reduce child mortality due to vaccine preventable diseases. WHO revealed that immunization has been estimated to prevent 3 million deaths globally every year². Between the years 2000 and 2016, a decrease of 84% in the measles mortality rate was recorded worldwide due to measles vaccination³. Likewise, a reduction in pertussis mortality was also recorded globally from 390,000 deaths in 1999 among children younger than 5 years of age to 160,700 deaths in 2014 as a result of vaccine effectiveness against pertussis².

According to the Expanded Programmed on Immunization (EPI), every child in Africa must receive one dose of Bacillus Calmette Guerin (BCG) oral Polio Vaccine (OPV0) and Hepatitis B Vaccine (HBV1) at birth, Penta1 & OPV1 at 6 weeks of age, Penta2 and OPV2 at 10 weeks of age, Penta3 & OPV3 at 14 weeks of age and measles and yellow fever at 9 months of age². Despite the benefits of childhood immunization, routine vaccination coverage for all recommended EPI vaccines has remained poor in some African countries such as Nigeria (31%; 2018), Ethiopia (43%; 2019), Uganda (55%; 2016) and Ghana (57%; 2014)². The coverage is higher in some of the African countries, such as in Tanzania in the year 2016 and Kenya in 2014 (75% and 78%, respectively)².

According to the report of the 2018 Nigeria Demographic and Health Survey, Diphtheria Pertussis and Tetanus (DPT3) coverage is also low in African countries such as Nigeria (50%)⁴. However, these coverages are still below the targets endorsed by WHO in the 2015 Global Vaccine Action Plan, which aimed to ensure delivery of universal access to immunization with associated targets reaching 90% of the national vaccination coverage and at least 80% vaccination coverage in every district. Previous observational studies conducted among African countries and other parts of the world highlighted various factors that influenced childhood immunization uptake¹. These factors are socio-demographic factors including maternal age, maternal educational status, paternal educational status, mother's marital status, maternal occupation, family income, wealth index and ethnicity and obstetric factors including antenatal care follow-up, postnatal care follow-up, preceding birth interval and place of delivery¹.

1.1. Vaccines preventable conditions and recorded mortalities

A study conducted by the World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF), reported that an estimate of 29% deaths among children aged 1- 59 months were due to vaccine preventable diseases (WHO & UNICEF, 2019). In the past years, there were 24.1 million reported cases of pertussis, with the African region accounting for the highest proportion of 7.8 million (33%) cases².

According to Frenkel et al. (2021), immunization is amongst the most cost-effective public health interventions for reducing childhood morbidity and mortality. Frenkel et al. (2021) further asserted that globally, 9 million deaths of children occur as a result of vaccine-preventable diseases in which 4.4 million are from the sub-Saharan region⁵.

Furthermore, vaccine preventable diseases are major threats to the health and well-being of children under five years of age. They contribute a great deal to childhood illnesses and disabilities and are accountable for a high percentage of childhood mortality worldwide. In Nigeria, the government has made a lot of effort to provide immunizations against these childhood diseases. It is however sad to note that many children still do not complete their routine immunization⁶.

1.2. Conceptual framework

A conceptual framework as presented in Figure 1 was adapted to establish the association between the determinants of low immunization uptake in the study area. It was however modified based on the study and location. Four (4) main components of the framework are discussed in relation to the factors influencing immunization uptake for under-5 year's children as identified from literature⁷. These are the health system, community, interpersonal and the individual characteristics (**Figure 1**). The health system factors include but not limited to quality of services, health workers attitude, vaccine shortages, accessibility, cost, equity and inadequate resources. The community related factors included but not limited to traditional/cultural norms, community mobilization and gender role⁷.

The interpersonal factors include but not limited to spouse/family related issues and communication level (family disposition). This particular factor is the major crux of this study. The last, is the individual factors which include but not limited to health belief, socio-economic status, knowledge level/awareness, educational level, physical health/health status, age of mother/child, distrust of health services, place of residence and religion of the caregiver/parent⁸. However, Immunization coverage can only be improved if the identified problems are tackled by levels since the factors are organizationally related to all these levels, from the recipient to the health care delivery system. This implies that the study for the intervention strategies needs to consider these different levels as separate entities. This is summarized in (**Figure 1**).

1.3. Knowledge of caregivers of under-5 years children immunization

Knowledge of parents have been studied to determine its association with compliance to immunization for children 0-5 years⁹. Ali et al. (2020) did a cross-sectional survey which was conducted in three villages in 2016 with all mothers having at least one child below the age of 5 years were included¹⁰. Data were collected by interviews using a self-structured questionnaire. Descriptive statistics were displayed and chi-square test was used to assess associations. A total of 127 mothers of 191

children were included. The results of the study showed that the mean knowledge score about the names of vaccines/diseases prevented was 3.47 out of 10. The mean knowledge score about the timing of doses was 4.12 out of 5. The most correctly timed dose by the mothers was the dose at 6 weeks ‘dose 1’ (96.1%) and the least one was the dose at birth ‘dose 0’ (60.6%)¹⁰.

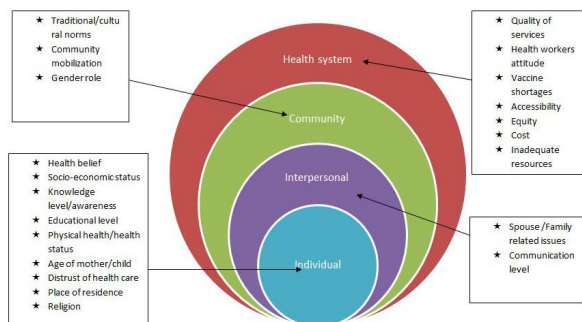


Figure 1: Conceptual framework showing the determinants of low immunization uptake for under-5 years children in Delta State. Source: Kuuzarg et al. (2018).

In a systematic review, Galadima et al. (2021) sought to collate evidence on the factors that influence childhood immunization uptake in Africa, as well as to provide evidence for future researchers in developing, implementing and evaluating intervention among African populations which will improve childhood immunization uptake. This was achieved by using various keywords and searching multiple databases (Medline, PubMed, CINAHL and Psychology and Behavioral Sciences Collection) dating back from inception to 2020. The review included only 51 eligible studies. Results of the study revealed that maternal knowledge was statistically significant modifiable factor found to influence childhood immunization uptake².

In Yaounde, Cameroon, Chiabi et al. (2017) did a Cross-sectional study using a sample of 400 respondents and pre-tested questionnaire and children’s vaccination booklets before using it for data collection. The study results showed that paternal education and paternal occupation affect uptake of immunization for children 0-5 years. The study further established a statistically significant association between maternal educational status (P = 0.001), paternal employment status (P = 0.004) and immunization uptake for children 0-5years respectively¹¹.

A structured questionnaire was used in a case-control study by Aregawi *et al.* (2017) to collect data from 270 participants in Laelay Adiabo District, Northern Ethiopia. The results of the study established that maternal knowledge (AOR = 3.3, 95% CI:1.87– 7.43), lack awareness about vaccine 7.80%; and not knowing the date to return for 2nd and 3rd dose 7.80% can affect the uptake of immunization for children 0-5years. This really showed a statistically significant association between the variables¹².

In a cross-sectional study, semi structured questionnaire and child immunization record were used to collect data from a sample of 630 respondents by a team of researchers (Animaw et al., 2014) in Arba Minch town and Zuria District, Southern Ethiopia. The study results reflected that maternal educational status (which is a reflection of knowledge level of care giver) can influence under-5years children immunization (AOR = 2.22; 95% CI 1.31,3.76)¹³.

A mixed method study (quantitative and qualitative) was

conducted by Negussie et al. (2016) in Arbegona district, southern Ethiopia using structured questionnaire and focused group discussion with a sample size of 548. The results of the study depicted that knowledge on the benefits of immunization (AOR = 5.51; 95% CI:1.52, 19.94) had a statistically significant association with caregivers’ adherence to under-5years children immunization (p = 0.009); perception about vaccine side effects (AOR = 1.92; 95% CI:1.01, 3.70) and knowledge on EPI schedule had a statistically significant association with caregivers’ adherence to under-5years children immunization (p = 0.001)¹⁴.

Mohamed et al. (2020) did a study aimed at assessing barriers for complete vaccination coverage among under five years children in Mogadishu, Somalia. A communitybased cross-sectional study was conducted between April to July 2019 in Mogadishu Somalia¹⁵. Twostage cluster sampling with systematic random sampling was used to select a sample of 820 households. Data was collected through a structured, interviewer administrator questionnaire¹⁵. In a case where more eligible children found at a single selected household, one child was randomly selected and the information related to immunization was interviewed from their caregiver. Results from the study showed that immunization was found to increase by having good knowledge on immunization (AOR = 1.125, 95% CI = 1.070– 1.181, P-value = 0.001), having good practice on immunization (AOR = 2.756, 95% CI = 2.233–3.402, P-value = 0.001) and having good perception on vaccine (AOR = 4.976, 95% CI = 2.183–11.340, P-value = 0.001)¹⁶.

Konwea et al. (2018) did a study to determine factors which influence mothers’ compliance with childhood immunization. This was a descriptive study carried out among 600 mothers of under-five children randomly selected from nine postnatal clinics in Ekiti State between January and August 2016. A self-structured validated questionnaire containing items to explore demographic characteristics of respondents, compliance with child immunization (Cronbach’s α $\frac{1}{4}$ 0.92) and determinants of compliance (Cronbach’s α $\frac{1}{4}$ 0.83) was the instrument for data collection. Multiple regression analysis was used to identify determinants of mothers’ compliance with childhood immunization. The study documented that the two factors which contributed significantly to mothers’ compliance were the mothers’ knowledge of childhood immunization (β weight $\frac{1}{4}$ 0.243) and mothers’ educational status (β weight $\frac{1}{4}$ 0.169) where mothers with tertiary education had the highest level of compliance (76.8 percent). The study concluded that having good knowledge of childhood immunization and a high educational status positively influence a mothers’ compliance with child immunization⁶.

1.4. Types of vaccines for the immunization of children under-5years

There are various types of vaccines necessary for the immunization of children from the age of 0 to 5years and different researchers have studied it. A cross-sectional survey was conducted by Ali et al. (2020) in three villages in 2016 with all mothers having at least one child below the age of 5 years were included. Data were collected by interviews using a self-structured questionnaire. Descriptive statistics were displayed and chi-square test was used to assess associations. A total of 127 mothers of 191 children were included. The finding from the study showed that the most correctly named vaccines by the

mothers were measles (87.4%) and polio (86.6%), whereas the least ones were hepatitis (7.1%) and diphtheria (8.7%)¹⁷.

In a review by Ali et al. (2020), it was documented that since 2001 in Sudan there has been introduction of additional vaccines to its immunization schedule, including hepatitis B (HepB), Haemophilus influenzae type b (Hib) and pneumococcal vaccine and also introduced rotavirus vaccine and meningococcal vaccine (MenAfriVac), in 2011 and 2016, respectively. This, currently is not different in Delta State as the programme offers seven routine vaccines: Bacillus Calmette Guerin (BCG) oral polio vaccine (OPV), pentavalent vaccine (DTP/HepB/HiB), rotavirus vaccine, pneumococcal vaccine (PCV), measles vaccine and meningococcal vaccine¹⁷.

1.5. Number of under-5years children immunized world over

Compliance to immunization has been a thing of worry not just to healthcare providers but also to researchers and this is why so many studies have been carried out across the globe to determine the level of immunization coverage for children 0-5 years. A cross-sectional descriptive study was carried out by Ali et al. (2020) in three villages in 2016 with all mothers having at least one child below the age of 5 years were included. Data were collected by interviews using a self-structured questionnaire. Descriptive statistics were displayed and chi-square test was used to assess associations. A total of 127 mothers of 191 children were included. The finding from the study showed that the majority (99.2%) of the mothers had a positive attitude and about half (48.7%) of the children were completely immunized, 46% were only missing their 'dose 0', mostly because of closed vaccination units on the day of birth (73.6%) and 5.3% were incompletely immunized¹⁷.

In a study by Ismail et al. (2014) to assess the routine immunization coverage in nyala locality, reasons behind incomplete immunization in South Darfur State, Sudan, the results from the study showed that children from urban areas were found to be more likely to complete their immunization schedule than those from rural areas¹⁸. The estimated global vaccination coverage in 2019 according to WHO and UNICEF and other researchers, were: 47% of Bacilli Calmette Guerin (BCG), three doses of Oral Polio Vaccine (OPV)-85%, Hepatitis B vaccine (HBV)-84%, three doses of Hemophilus Influenza B (Hib) vaccine (22%), three doses of Diphtheria, Pertussis and Tetanus (DTP3) vaccine (86%), one dose of Measles vaccine (86%), two doses of measles vaccine (69%), Rotavirus vaccine (35%) and 49% of Yellow fever vaccine¹⁹.

Umoke et al. (2021) did a study to investigate factors associated with immunization incompleteness of children under 5 years in Ebonyi State, South-eastern part of Nigeria. A cross-sectional and a cluster sampling design were implemented; 400 women of childbearing age in families with children between 0 to 59 months of age were interviewed in Ebonyi State. Demographic characteristics of the child and mother, the child's immunization history and reasons for partial immunization were obtained with the use of a self-administered questionnaire. Data were analyzed using descriptive statistics of mean, standard deviation, t-test and ANOVA with SPSS version 23 and hypothesis tested at P=2.50). Results of the study showed that immunization coverage was low²⁰.

Mohamed *et al.* (2020) did a study aimed at assessing barriers for complete vaccination coverage among under five

years children in Mogadishu, Somalia. A communitybased cross-sectional study was conducted between April to July 2019 in MogadishuSomalia. Twostage cluster sampling with systematic random sampling was used to select a sample of 820 households. Data was collected through a structured, interviewer administrator questionnaire. In a case where more eligible children found at a single selected household, one child was randomly selected and the information related to immunization was interviewed from their caregiver. Results from the study showed that the overall, fully vaccinated under 5 years children were found to be 45.2%²¹.

Konwea et al. (2018) did a study to determine factors which influence mothers' compliance with childhood immunization. This was a descriptive study carried out among 600 mothers of under-five children randomly selected from nine postnatal clinics in Ekiti State between January and August 2016. A self-structured validated questionnaire containing items to explore demographic characteristics of respondents, compliance with child immunization (Cronbach's α $\frac{1}{4}$ 0.92) and determinants of compliance (Cronbach's α $\frac{1}{4}$ 0.83) was the instrument for data collection. Multiple regression analysis was used to identify determinants of mothers' compliance with childhood immunization. The study documented that the level of compliance of mothers with childhood immunization was high 80 percent⁶.

1.6. Health Belief Model (Rosenstock, 1974).

The Health Belief Model (HBM) was developed in the early 1950s by social scientists at the United States Public Health Service in order to understand the failure of people to adopt disease prevention strategies or screening tests for the early detection of disease. Later uses of HBM were for patients' responses to symptoms and compliance with medical treatments and immunizations (Rosenstock, 1974). The HBM suggests that a person's belief in a personal threat of an illness, disease or event together with a person's belief in the effectiveness of the recommended health behavior will trigger actions²².

The HBM derives from psychological and behavioral theory with the foundation that the two components of health-related behavior are: the desire to avoid illness or conversely get well if already ill; and, the belief that a specific health action will help in changing behavior like in the case of choice of taking immunizations. Ultimately, an individual's course of action often depends on the person's perceptions of the benefits and barriers related to the suggested health behavior.

1.6.1. Perceived susceptibility: This refers to perception of respondents on risk of complications resulting from not taking the necessary vaccines for under-5 years children. Here, there is usually a wide variation in a respondent's feelings of personal vulnerability to the condition²³.

1.6.2. Perceived severity: This second construct looks at the perceived magnitude of the complications of not presenting under-5 years children for immunization. This refers to a person's level of feelings on the seriousness of the consequences which will trigger their action to prevent it from happening by adhering to imm schedules. There is wide variation in a person's feelings of severity and often a person considers the health consequences/ complications and social consequences (e.g., family life, social relationships, loss of income, infant mortality) when evaluating the severity.

1.6.3. Perceived benefits: This refers to a respondent’s perception of the effectiveness and gains of the various actions available resulting from completing immunization schedules for under-5 years children. This is as well a strong force as the thought of good health may trigger compliance²³.

1.6.4. Perceived barriers: This refers to a person’s feelings on the obstacles of accepting or complying to immunization schedules for under-5 years children like having to battle with all the determinants of non-compliance to immunization schedules. There is wide variation in a person’s feelings of barriers or impediments, which lead to a cost/benefit analysis. The person weighs the effectiveness of the actions against the perceptions that it may be expensive, dangerous, unpleasant (e.g., painful, side effect), time-consuming or inconvenient or not being feasible. These barriers must be identified to be eliminated so that actions can yield the expected results²⁴.

1.6.5. Cues to action: This is the stimulus needed to trigger the decision-making process to accept a recommended health action. These cues can be internal (e.g., convenience in executing the actions towards accepting immunizations for children 0-5 years) or external (e.g., advice/support from family members, partners and others including healthcare workers). These include all motivators/motivations²⁵.

1.6.6. Self-efficacy: This refers to the level of a person’s confidence in his or her ability to successfully perform a given behavior. In the context of this study, the self-efficacy included respondents believing in the fact that despite their busy schedules they can keep to immunization dates for their children. The individual must have confidence in the vaccines, the workers and the process. This construct was added to the model most recently in mid-1980²⁵.

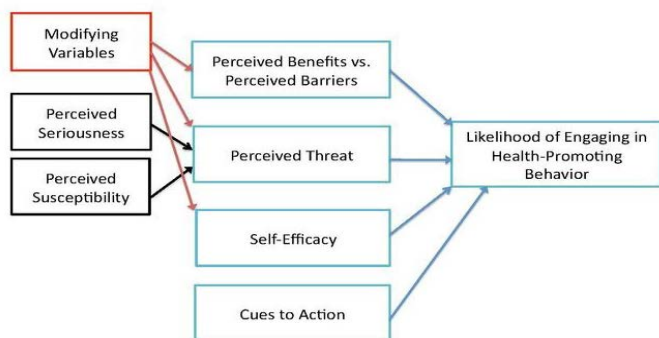


Figure 2: The Health Belief Model (HBM)²⁵.

2. Methodology

2.1. Study Area

This study will be carried out in Delta North Senatorial District of Delta State, Nigeria which covers nine (9) Local Governments Areas namely; Aniocha North, Aniocha South, Ika North East, Ika South, Ndokwa East, Ndokwa West, Oshimili South, Oshimili North and Ukwuani. Delta North Senatorial District is located in the Delta State. It lies between latitudes 50°9’ and 60°3’ North of the Equator and Longitudes 50°30’ and 60°12’ East of the Greenwich Meridian. It is bounded in the North by Edo State, South by Bayelsa and Rivers States, in the East by Warri Central and to the West by Anambra State (Figure 3.1). The size of the region is about 3,700km². The population is estimated to be 2,032,707 people; that is according to Nigeria Population Census, 2007²⁶.

Though it is an oil producing community, *agriculture* constitutes the primary income generating activities of the indigenes. The area is characterized by tropical equatorial climate with mean annual temperature of 28°C and rainfall amount of 3000mm²⁷. Rainfall period ranges from January - December, with the minimum value of 20.4mm in January and over 499.1mm in September. However, double rain maxima between the months of July and September are observed. There is a little dry spell in the month of August called -August break. Convictional type of rainfall is predominant in the community²⁷.



Figure 3: Map of Delta State showing the three Senatorial Districts (Zones) Source: Facts about Delta State of Nigeria²⁸.

2.2. Study Design

The present study will adopt a descriptive cross-sectional survey for the purpose of eliciting information from caregivers of under-5 years children in the study area. This type of study design helped to investigate or observe the situation the way it was as at the time of data collection. That is, the study design will strictly take a quantitative approach and data source of using only questionnaire for data collection. The researcher decided to adopt this study design to enable her quantitatively analyze and determine the variables under study.

2.3. Study population

The study population will involve the households with women of child-bearing age who have under-5 years children in Delta North Senatorial District of Delta State, Nigeria.

2.4. Sample size determination

The sample for the study is determined using Cochran formula as stated below²⁹.

$$n = \frac{Z^2pq}{d^2}$$

Where;

n = Sample size

Z = Z-score which is a constant (1.96) at 95% confidence limit

p = 0.5 (50%) estimated precision.

q = 1-p = 1-0.5 = 0.5

d = accepted margin of error (5% = 0.05)

Therefore;

$$n = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2} = \frac{0.9604}{0.0025} = 384$$

Assuming a non-response rate of 10% (0.1)

$$= \frac{n}{1 - \text{non-response rate}} = \frac{384}{1 - 0.1} = \frac{384}{0.9} = 427$$

i.e. A total of 427 under-5 years children's caregivers (mothers) will be used in each LGA.

2.5. Ethical considerations/approval

2.5.1. Inclusion criteria: This study will include all caregivers of under-5 years children in the study area. This will as well include males and females (parents or caregivers who are knowledgeable about the child's immunization status especially mothers if present) who reside in the study area at the time of this study. This will also include all respondents who will give their consent to participate in the study.

2.5.2. Exclusion criteria: This study will exclude all children above five years. It will exclude all households and individuals who do not have children under-5 years. It will also exclude those who are not resident in the study area at the time of the study and respondents who refuse to give their consent or not willing to participate in the study.

2.6. Sampling procedure

A multi-stage sampling procedure will be used as follows:

2.6.1. Selection of Local Government Areas: The entire nine (9) Local Government Areas in Delta North Senatorial District of Delta State will be sampled. This is an all-inclusive sampling to give a wide coverage for the study.

2.6.2. Selection of communities: All the communities will be selected from each Local Government Area in the study area. This again is an all-inclusive sampling to ensure all communities are captured.

2.7. Selection of households

A total of at least 427 households will be selected from each Local Government Area. This will give a total of 4,248 households to be sampled from the entire study area. This will also systematic random sampling where the first household is selected conveniently, thereafter, other households to be selected will be by systematic approach in the interval of 2. This process is to give every household in the LGA equal opportunity to be part of the study. In a case where the eligible household do not have under-5 years children, the immediate next household becomes eligible, thereafter the systematic sampling continues.

2.8. Selection of respondents

A total of 4,248 children under-5 years will be sampled. In a household where there are more than one child under-5 years, data will be elicited from all under-5 years children present at the time of data collection. At the end of the study, not less than a total of 4,248 respondents will be sampled from the study area.

2.9. Data collection procedure

Data was collected within one month using the 35-items investigator-administered questionnaire. To avoid third person infiltration, the questionnaire was retrieved immediately from the respondent after he/she has been done responding to the items in the questionnaire. This was accomplished with the help of four field research assistants who will be trained by the student before data collection process commences.

2.10. Method of data analysis

The data obtained was checked for inconsistency and incompleteness, thereafter sorted, coded and analyzed using Statistical Package for Social Sciences (SPSS) (version 22) software. Numbers was assigned to responses which was also coded into the SPSS in accordance to whether the variable is continuous or discrete for analysis. All the formulated hypotheses was tested using chi-square and simple linear regression analysis at 0.05 significant level (i.e., 95% CI).

3. Results

3.1. Analysis of Response Rate

The questionnaires were distributed to 3843 caregivers across the Nine (9) local government areas in Delta North senatorial district but the researcher was able to successfully retrieve 3624, which constituted about 94% of the sample size (**Table 1**). The researcher used the 3624 (94%) successfully retrieved questionnaires for analysis because it was considered to be adequate and sufficed for statistical analyses (**Table 2**).

Table 1: Rate of Response from Survey.

Description	Frequency	Percentage
Questionnaires Retrieved	3624	94%
Questionnaire Not Retrieved	219	6%
Total	3843	100

3.2. Respondents' Socio-Demographic Data

Table 2: Socio-Demographic Details of Respondents.

Social and Demographic Data	Frequencies (N)	Percentages
Gender		
Male	544	15.0%
Female	3030	85.0%
Age		
Below 18 years	109	3.0%
18-25 years	1232	34.0%
26-33 years	1776	49.0%
34-41 years	399	11.0%
Above 41 years	108	3.0%
Marital Status		
Single	399	11.0%%
Married	2573	71.0%%
Widowed	254	7.0%
Divorced	398	11.0%
Level of Education		
No former education	834	23.0%
Primary Education	689	19.0%
Secondary Education	978	27.0%
Tertiary Education	1123	31.0%
Religion		
Christianity	2428	67.0%
Islam	616	17.0%
Others	580	16.0%
Employment Status		
Employed	1051	29.0%
Unemployed	2573	71.0%
Types of Employment Status		
Self-Employed	295	28.0%

Private Sector	350	33.30%
Government Sector	406	38.70%
Monthly Income		
No Monthly Income	1706	47.07%
Below N18,000 (Low)	152	4.19%
N18,000-N30,000 (Middle)	262	7.23%
Above N30,000 (High)	1504	41.51%
Number of Under-5 Children		
None	544	15.0%
1 Child	1486	41.0%
2-3 Children	1123	31.0%
Above 3 Children	471	13.0%

The data from Delta North Senatorial District reveals that 85.0% of respondents were mothers, with the remaining 15.0% being males. The majority of mothers and fathers with under-5 children were in their 20s and early 30s. Most were married, with 71.0% having tertiary education. The majority of respondents were Christian, with 67.0% being Christians. The employment status was high, with 71.0% unemployed and 29.0% gainfully employed. However, 38.70% were employed in the government sector, 33.30% in the private sector and 28.0% self-employed. The majority of respondents did not earn any monthly salary, with 47.07% not earning any. The majority of respondents had one under-5 child, followed by those with two or three. The data suggests that most respondents with under-5 children were Christians. The data also indicates that the government remains the largest employer of labor in Nigeria despite policies to make the economy private-sector driven (**Table 3**).

Table 3. Types of vaccines for the immunization of children under-5 years.

No. Item	Variable	Yes	No	Undecided
23	Do you know the vaccines your child is to take from 0-5 years?	652 (18.0%)	2972 (82.0%)	
		Yes	No	Undecided
24	BCG/OPV ₀ /HBV ₁ are given at birth.	290 (8.0%)	616 (17.0%)	(75.0%) 2718
25	OPV ₁ /DPT ₁ /HBV ₂ are given at 6 weeks.	556 (15.35%)	652 (17.99%)	(66.66%) 2416
26	OPV ₂ /DPT ₂ are given at 10 months.	619 (17.1%)	289 (8.0%)	(74.9) 2716
27	OPV ₃ /DPT ₃ /HBV ₃ are given at 14 weeks.	623 (17.2%)	285 (7.9%)	(74.9) 2716
28	Vitamin-A ₁ is given at 9 months.	619 (17.1%)	291 (8.0%)	(74.9) 2714
29	Measles/Yellow Fever are given at 9 months.	2605 (71.88%)	532 (14.67%)	(13.45%) 487
30	Vitamin-A ₂ is given at 15 months (1 year, 3 months).	619 (17.1%)	2711 (74.8%)	(8.1%) 294
31	Two doses of Vitamin-A can be given to children 6-59 months at least 6 months apart at any clinic visit.	319 (8.80%)	1599 (44.12%)	(52.92%) 1706

The majority of caregivers in the senatorial district do not know the type of vaccine their under-5 children take for immunization, with most unsure about the BCG/OPV0/HBV1 types given at birth. They are also indecisive about OPV1/DPT1/HBV2 given to under-5 children at 6 weeks, OPV2/DPT2 given at 10 months, OPV3/DPT3/HBV3 given at 14 weeks and Vitamin-A1 intake for children at 9 months. Most caregivers are unsure about the measles/yellow fever vaccine given at 9 months and most caregivers are indecisive about Vitamin-A2 given at 15 months. Most caregivers are indecisive about two doses of Vitamin-A given to children 6-59 months at least 6 months apart at any clinic visit. This data suggests that most caregivers do not

know the type of vaccines and vitamins their under-5 children are receiving during routine immunization. The majority of caregivers only have good awareness about the type of vaccine used for measles/yellow fever, which is consistent with a study in Sudan where nearly all mothers were able to correctly name vaccines used for measles (**Table 4**)¹⁰.

Table 4 disclosed that nearly all the caregivers (n= 3515, 97.0%) said yes to taken to their under-5 children for immunization while the remaining few (n= 109; 3.0%) said No. This indicates that nearly all the sampled caregivers did take their under-5 children for immunization in the senatorial district.

Table 4: Number of under-5 years children immunized.

No. Item	Variable	Yes	No
32	Has your child taken any of the immunizations meant for children 0-5 years?	3515 (97.0%)	109 (3.0%)
		BCG	OPV ₀ HBV ₁
33	At birth:	1377 (38.0%)	978 (27.0%) 1269 (35.0%)
		.	DPT ₁ HBV ₂
34	At 6 week:	1377 (38.0)	978 (27.0) 1269 (35.0)
		OPV ₂	DPT ₂
35	At 10 months	2151 (59.4)	1473 (40.6)
		OPV ₃	DPT ₃ HBV ₃
36	At 14 weeks:	80 (2.2)	35 (1.0) 1269 (35.0)
		Vitamin-A ₁	Measles Yellow Fever
37	At 9 months:	80 (2.2)	35 (1.0) 1269 (35.0)
		Vitamin-A ₂	Measles Yellow Fever
38	At 15 months (1 year, 3 months):	80 (2.2)	35 (1.0) 1269 (35.0)

Also, some of the caregivers (n= 1377; 38.0%) concurred that their child did take BCG at birth, some of them (n= 1269; 35.05) agreed to given their children HBV₁ at birth while the remaining (n= 978; 27.0%) admitted to given their children OPV₀ at birth.

vaccine was given to children at weeks of birth, followed by those (n= 1269; n=35.0%) who admitted to given HBV₂ while others remaining (n = 978; 27.0%) concurred to given their 6 week old children DPT₁ vaccine. In addition, most of the respondents (n= 2151; 59.4%) concurred that their 10-month-old children had OPV₂ vaccine while others (n= 1473; 40.6%) agreed to given DPT₂ vaccine to their 10-month-old children (**Table 5**).

Most respondents (n= 1377; 38.0%) also agreed that OPV₁

Table 5. Perceptions of caregivers towards immunization of children under-5 years.

No. Item	Variable	SA	A	D	SD
46	With or without immunization my child will still be fine.	471 (13.0%)	689 (19.0%)	1087 (30.0%)	1377 (38.0%)
47	Sometimes I get discouraged because of the distance to the facility.	978 (27.0%)	327 (9.0%)	978 (27.0%)	1341 (37.0%)
48	I select the types of immunization I allow to be given to my child.	80 (2.2%)	323 (8.9%)	981 (27.1%)	2240 (61.8%)
49	I use to refuse injectable vaccines for my child because of pains involved.	78 (2.0%)	326 (9.0%)	978 (27.0%)	2242 (62.0%)
50	Some of the vaccines use to make my baby run temperature, so sometimes I feel reluctant going for the next immunization appointment.	906		1160 (32.0%)	1305 (36.0%)
51	The attitude of the healthcare providers sometime keeps me away from bring my child for immunization.	1123 (31.0%)	978 (27.0%)	906 (25.0%)	617 (17.0%)
52	Sometime, the thought of the side effects make me refuse to go for my child's immunization.	320 (8.0%)	603 (17.0%)	1123 (31.0%)	1578 (44.0%)
53	I use to get discouraged bring my child for immunization because of prolonged waiting time.	1123 (31.0%)	978 (27.0%)	906 (25.0%)	617 (17.0%)

Table 5 shows that most caregivers in Delta North senatorial district disagree with the statement that their children will be fine with or without immunization. They also disagree with the statement that distance to health facilities discourages them from immunization. Most caregivers do not select the type of vaccine for their under-5 children and they do not refuse injectable vaccines due to pain. They also do not feel reluctant to go for immunization again even when some vaccines make their children run temperature. They also disregarded the side effects of vaccines and the time waste in hospitals during immunization. Overall, caregivers in Delta North senatorial district have a positive perception towards routine immunization for under-5 children. (**Table 6**).

Table 6. Attitude of caregivers towards immunization of children under-5 years.

No. Item	Variable	SA	A	D	SD
54	Inconvenient schedules of immunization have made me miss my child's immunization appointments.	580 (16.0%)	1015 (28.0%)	906 (22.0%)	1123 (31.0%)
55	I go for my child's immunization when I like.	80 (2.0%)	101 (3.0%)	1810 (50.0%)	1633 (45.0%)
56	I take my child there when it is most convenient.	580 (16.0%)	906 (25.0%)	1015 (28.0%)	1123 (31.0%)
57	I go for my child's immunization only when the child is ill.	109 (3.0%)	181 (5.0%)	1123 (31.0%)	2211 (61.0%)
58	Most time I go late for my child's immunization.	208 (6.0%)	081 (10.0%)	1429 (31.0%)	1906 (53.0%)

Table 6 established caregivers' attitude towards immunization of under-5 children. The data showed majority of the caregivers (n=1015, 580; 28.0%, 16.0%) concurred that they have missed their children immunization due to inconvenient schedule while majority of them (n= 906, 1123; 22.0%, 31.0%) also disagreed and strongly disagreed that inconvenient schedules have not made them to miss appointment.

Most of them (n=1810, 1633; 50.0%, 45.0%) did not agree with the statement that they go for their children immunization anytime they like. A good number of them also disagreed and strongly disagreed that they did take their children for immunization at most convenient time. This may indicate they take their children for immunization to health facilities based on appointment.

Most caregivers (n=1123, 2211; 31.0%, 61.0%) respectively disagreed and strongly disagreed with the statement that they only take their immunization for immunization when they were sick. Majority of them (n= 1429, 1906; 31.0%, 53.0%) also made it known they did not go late to the immunization of their under-5 children. The data analyzed showed that caregivers exhibited positive attitude towards routine immunization of their under-5 children in the Delta North senatorial district. The finding aligns with the findings obtainable in Atakumosa West Local

Government Area (LGA) of Osun State¹⁰. It also concurred with the finding obtained in Alfatih One in Sudan³⁰.

4. Discussion

This study investigated the family predispositions of immunization among under-5 children in Delta North Senatorial District of Delta State, Nigeria using a well self-structured questionnaires drawn from caregivers of under-5 children who were disposed to immunization in the nine (9) local government areas in Delta North senatorial district of Delta State, Nigeria. Descriptive statistics (percentage and frequencies) and regression analyses (inferential statistics) were adopted for data analyses and to test formulated hypotheses of the study. The following are the major findings of the study:

That the attitude of caregivers is positive and highly significant. That is the attitude of caregivers strongly promotes the immunization of under-5 years children in Delta North senatorial district of Delta State, Nigeria.

That there is statistically significant relationship between enablers and the immunization of children under-5 years in Delta State senatorial district of Delta State, Nigeria. That is enabling factors such as caregivers' knowledge level, home visits, accessibility to care etc. promotes routine immunization of under-5 children.

5. Conclusion

This study investigated the attitude of Caregivers towards Immunization of Children under-5 years in Delta North Senatorial District of Delta State, Nigeria. The researchers used self-structured questionnaires distributed to 3843 caregivers across nine local government areas. The data from the 94% retrieved questionnaires included socio-demographic details, types of vaccines, number of immunized children, perceptions and attitude of Caregivers towards Immunization of Children under-5. The findings were analyzed using descriptive statistics and regression analyses using SPSS version 25. The study concluded that the attitude of caregivers and perception of caregivers are significant in the immunization of under-5 children in Delta North senatorial district.

6. Recommendation

This study suggests that Nigeria should promote gender equality in educational training for expected mothers, ensuring they are exposed to tertiary level education. Health officials should be made aware of the importance of immunization for under-5 children and this should be included in school curriculums and church/mosque announcements. Health facilities should be decentralized to local communities for easy access and records should be digitalized for easy access at any time and place. Additionally, sanitization/awareness policies should be created in rural areas, with health workers sent to educate people on the importance of immunization. These recommendations aim to reduce the knowledge gap among expected mothers about immunization for under-5 children.

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