



## Family Predispositions of Immunization: An Analysis of the Relationship between Family Disposition and the Immunization of Children Under-5 Years in Delta North Senatorial District of Delta State, Nigeria

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### Abstract

**Background:** Families, particularly mothers, play a crucial role in their children's immunization, as they are the basic unit of society and their first point of contact with the world.

**Methods:** This study empirically investigated the family predispositions of immunization: an analysis of the relationship between family disposition and the immunization of children under-5 years 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 researchers were able to

successfully retrieve 3624, which constituted about 94% of the sample size. The data from the 94% of the questionnaires were analyzed and presented, which covered socio-demographic details of respondents and family dispositions militating against the immunization of children under-5 years. The hypothesis was analyzed using descriptive

statistics (percentage and frequencies) and ANOVA regression analysis to make an inference on the variables using Software Package for Social Scientists (SPSS), version 25.

**Results:** It was found that family disposition is statistically significant in the immunization of under-5 children in Delta North senatorial district of Delta State, Nigeria.

**Conclusion:** It is recommended among others that health facilities should be properly decentralized to different local communities and towns to easy access of mothers (family) for the immunization of their children under-5.

**Keywords:** Family, Family disposition, Immunization, Under-5 years, Vaccines

## 1. Introduction

Families, especially mothers are the major role players with regard to their children's immunization. Family is the basic unit of society. This is the most important component of a society. The family is a child's first point of contact with the world. According to Ibnoufet *al.* (2017), the family is where a father, mother and children live. It may be alternated to the word 'house or home' but a house is more appropriately referring to the material structure, whereas 'home' refers to the intangible things that bind together the family members. The home or family has also been thought of as the preparation ground for a child's moral, psychological and spiritual life which is highly essential for the cognitive development process of a child and future achievement (Adamet *al.*, 2015). Immunization is the first line of action against vaccine-preventable diseases and one of the most effective health benefits available to children for reducing under-5 mortalities (Basheeret *al.*, 2018). However, families play a great role in its compliance. Therefore, its predisposition can affect immunization decisions for children 0-5 years. Especially, family disposition factors such as level of busy schedule, forgetfulness, ignorance, funding, freedom of spouse and distance of health facilities from home has strong influence on the immunization decisions for children 0-5 years.

Globally, more than 2.7 million children die annually, even when existing immunization would have prevented 2 to 3 million deaths (WHO, 2016). In Africa, the under-5 mortalities are caused by malaria, pneumonia, diarrhea, and other vaccine-preventable diseases like pertussis, measles, and meningitis and one of the utmost public health challenges today is suboptimal vaccine uptake rates (WHO, 2018). Moreover, the reduction of under-5 mortality rate in Nigeria is important because among the lower-middle-income country (LMC) in West Africa Nigeria has the highest under-5 child mortality rate (U5MR) with 714 000 deaths occurring every year, and that accounts for 13% U5MR globally (World Bank, 2020).

The World Health Organization (WHO) has made it clear that immunization is one of the most cost-effective health investments all over the world and more interest is paid to the most susceptible groups especially children 0-5 years but family dispositions may be a hindrance to achieving the primary goal of immunization which is to prevent vaccine-preventable conditions (WHO, 2020). The WHO launched the Expanded Programme on Immunization (EPI) in 1974 with the aim of immunizing children throughout the world and the programme uses proven strategies, like outreach services, to ensure delivery of vaccines even to the most hard-to-reach and vulnerable populations (WHO, 2020). The United Nations Children's Education Fund (UNICEF) has pointed out that the worldwide implementation of this programme has resulted in

more than 100 million infants being immunized each year, saving two to three million lives annually (UNICEF, 2020).

In Nigeria and Delta State in particular, the EPI (which was changed to National Programme on Immunization NPI in 1996) and Oral Rehydration Therapy (ORT) were launched in Nigeria in 1979 (Ekerete, 2017). The goal of EPI was Universal Childhood Immunization (UCI) 1990, that is, to vaccinate 80% of all children age 0-2 years by 1990, and 80% of all pregnant women were also expected to be vaccinated with Tetanus Toxoid Vaccine (Esangbedoet *al.*, 2012). The ORT was designed to teach parents with children age 0-5 years how to prepare and use a salt-sugar solution to rehydrate children dehydrated by diarrhoea (Basheeret *al.*, 2018). Currently, through collaboration between the Nigerian Federal Ministry of Health, the WHO, the United Nations Children's Fund and the Global Alliance for Vaccines and Immunization (GAVI), the programme is considered as one of the leading immunization programmes in Africa (UNICEF, 2020; WHO, 2020).

According to Centre for Disease Control and Prevention (CDC), children before the age of 2 years should be fully immunized against 14 potentially deadly diseases which include polio, rubella, hepatitis, measles, yellow fever, tuberculosis, pertussis tetanus, and rotavirus among others (CDC, 2017). Furthermore, WHO planned a 9-month vaccine plan for infants at their priming age of life such as Bacilli Calmette Guerin (BCG), Oral Polio Vaccine (OPV), Hepatitis B vaccine (HBV), Haemophilus Influenza B vaccine, Diphtheria, Pertussis and Tetanus (DPT), inactivated polio vaccine (IPV) Measles vaccine and Yellow fever vaccine (WHO, 2012; WHO, 2014).

The underlying goal of the immunization schedule is to achieve effective, lasting immunity against vaccine-preventable diseases (Shettyet *al.*, 2019). Currently, it is recommended that all children when born should be vaccinated with the appropriate vaccine (Umoke *et al.*, 2021). At birth, children should be given Bacille Calmette–Guerin (BCG), Oral Polio Vaccine (OPV0), and Hepatitis-B (Hep-B0), at 6th weeks-Pentavalent 1 (DPT1, Hep B, and Hib), PCV1, OPV1 and Rota1, at 10weeks-Pentavalent 2 (DPT, Hep B, and Hib), PCV2, OPV2 and Rota 2. At 14weeks-Pentavalent 3 (DPT, Hep B and Hib), PCV3, OPV3, and IPV. At 6months the children should receive Vitamin A 1st dose. In the 9th month, each surviving child should be given 1st dose measles, yellow fever, and meningitis vaccines. At their age 1 to 23months a child should be vaccinated with measles second dose (Umoke *et al.*, 2021). Therefore, a fully immunized child must have had the above (Adokiyaet *al.*, 2017). These vaccines for children 0-5years are administered in five doses from the day of birth to the age of 9 months (Basheeret *al.*, 2018). The programme implements global initiatives such as the eradication of poliomyelitis, and elimination of measles and neonatal tetanus (Esangbedoet *al.*, 2012). All of these immunization schedules in Nigeria are provided for free, yet over 20% of Nigerian children are not fully immunized each year (WHO, 2019; UNICEF, 2019). Despite all of these laudable gains of the immunizations, there are still challenges to achieving its primary goal. One of which that is paramount is family dispositions. This study therefore investigates the relationship between family dispositions and the immunization of children under-5 years in Delta North Senatorial District of Delta State, Nigeria.

This research is anchored on the theory of Health Belief Model (HBM) (Rosenstock, 1974). This 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

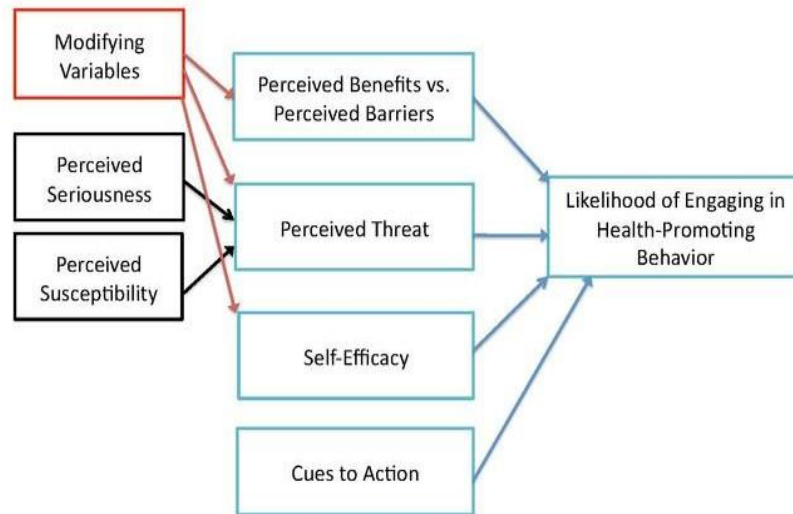
HBM suggests that a person's belief in a personal threat of an illness, disease or event together with a person's belief in the effectiveness of the recommended health behaviour will trigger actions.

The HBM derives from psychological and behavioural theory with the foundation that the two components of health-related behaviour 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 behaviour 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 behaviour. There are six constructs of the HBM. The first four constructs were developed as the original tenets of the HBM, while the last two were added as research about the HBM evolved.

- i. 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 condition.
- ii. 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.
- iii. 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 compliance.
- iv. 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 results.
- v. 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/motivations.
- vi. Self-efficacy - This refers to the level of a person's confidence in his or her ability to successfully perform a given behaviour. In the context of this study, the self-efficacy will include 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-1980.

Self-efficacy is a construct in many behavioural theories as it directly relates to whether a person performs the desired behaviour like believing that they can actually ensure that their children

complete their immunization. This particular construct puts emphasis on the need for people to believe in their ability to act. This model is found justified and significant for this study because, its constructs would guide the researcher in designing the instrument for data collection and the data collection process. More so, the model highlights the constructs which participants will first identify in the course of ensuring under-5 years’ children are made available to completely get their immunizations despite the challenges or barriers. The summary of this model is presented in Figure 2.2.



**Figure 2: The Health Belief Model (HBM)**

Source: Rosenstock (1974)

The empirical literature reviewed showed the nature of family dispositions militating against the immunization of children under-5 years. There are so many variables including family dynamics or dispositions that can determine compliance to immunization for children 0-5years. 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 hospital delivery, availability of vaccination card and good socio-economic status were associated with complete immunization status, with p-values equal to 0.00, 0.00 and 0.03, respectively. This is to say, there is a statistically significant association between hospital delivery, availability of vaccine card, good socio-economic status and complete immunization status for children 0-5years.

Zaffran *et al.* (2013) reported that many developing countries have inadequate cold chains – meaning the optimal temperature control for the transport, storage and handling of vaccines – or they are not able to manage vaccine stocks effectively, leading to insufficient vaccine supply to immunize all children and remote locations of health facilities and weak health services are also

adding to the problem. 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 areas. All of these problems can be compounded by family dispositions.

Maternal factors, as mothers are considered to be the primary care givers of their children, have also been elaborated in many studies. In a study by Ibnoufet *et al.* (2017) on factors influencing immunization coverage among children under five years of age in Khartoum State, Sudan, it was presented that illiteracy, poverty and other sociodemographic factors affect the knowledge, attitude and practice with regard to children's immunization. This was shown also in a study conducted in Sudan, in River Nile State by Adamet *et al.* (2015) on socio-economic factors influencing measles immunization coverage in Shendi and Almatama localities-Sudan which reported that children of highly educated mothers were more likely to be correctly vaccinated than the children of illiterate mothers.

Umoke *et al.* (2021) investigated the 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 one of the factors affecting incompleteness of immunization is far location of health facility away from where people live or work. Other reasons included long waiting time, far distance, attitudes of health workers, inconvenient schedules of immunization, and beliefs (Umoke *et al.*, 2021).

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 & Behavioral Sciences Collection) dating back from inception to 2020. The review included only 51 eligible studies. Results of the study revealed that statistically significant factors found to influence childhood immunization uptake were classified into modifiable and non-modifiable factors and were further categorized into different groups based on relevance. The modifiable factors include obstetric factors, maternal attitude, self-efficacy and maternal outcome expectation, whereas non-modifiable factors were sociodemographic factors of parent and child, logistic and administration factors (Galadima *et al.*, 2021).

In a cross-sectional study Mwamba *et al.* (2017) used structured interviews to elicit data from a sample of 1,224 in Kinshasa, Democratic Republic of Congo. The results of the study showed that part of the reasons for poor uptake of immunization for children 0-5 years were distance to health facility ( $p = 0.04$ ) and mothers thought that child vaccine is up-to date ( $p < 0.001$ ). A structured questionnaire was used in a case-control study by Aregawiet *et al.* (2017) to collect data from 270 participants in Laelay Adiabo District, Northern Ethiopia. The results of the study established that post-natal care follow-up (AOR = 5.2, 95% CI: 2.36–11.46), participation in women's developmental groups (AOR = 3.3, 95% CI: 1.54–7.08), health extension worker visit (AOR = 2.68, 95% CI: 1.30–5.51), and distance to health facility (AOR = 3.56, 95% CI: 1.58–8.01)

can influence uptake of immunization for children 0-5 years. Other reasons for defaulting were child illness 21.1%; forgetfulness 17.80%; inconvenience time 8.9%; Vaccine not available 5.60% and fear of side effect 4.40% (Aregawi *et al.*, 2017).

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 (Animawet *et al.*, 2014) in Arba Minch town and Zuria District, Southern Ethiopia. The study results reflected that accessible vaccination site (AOR = 4.54; 95%CI:2.34,8.77) and nearest vaccine site (that is proximity or closeness) (AOR = 1.89; 95% CI: 1.07,3.33) can influence under-5years' children immunization.

Negussie *et al.* (2016) carried out a mixed method of study (quantitative and qualitative) in Arbegona district, southern Ethiopia using structured questionnaire and focused group discussion with a sample size of 548. The case-control findings showed that maternal Age (AOR = 9.54; 95% CI: 5.03, 18.09) had a statistically significant association with caregivers' adherence to under-5years' children immunization ( $p = 0.001$ ). Other caregivers' or family disposition included maternal migration, fear of vaccine side effect, and unavailability of vaccines. Birth order (AOR = 5.27; 95% CI:2.20, 12.64) was also established to have a statistically significant association with caregivers' adherence to under-5years' children immunization ( $p = 0.002$ ).

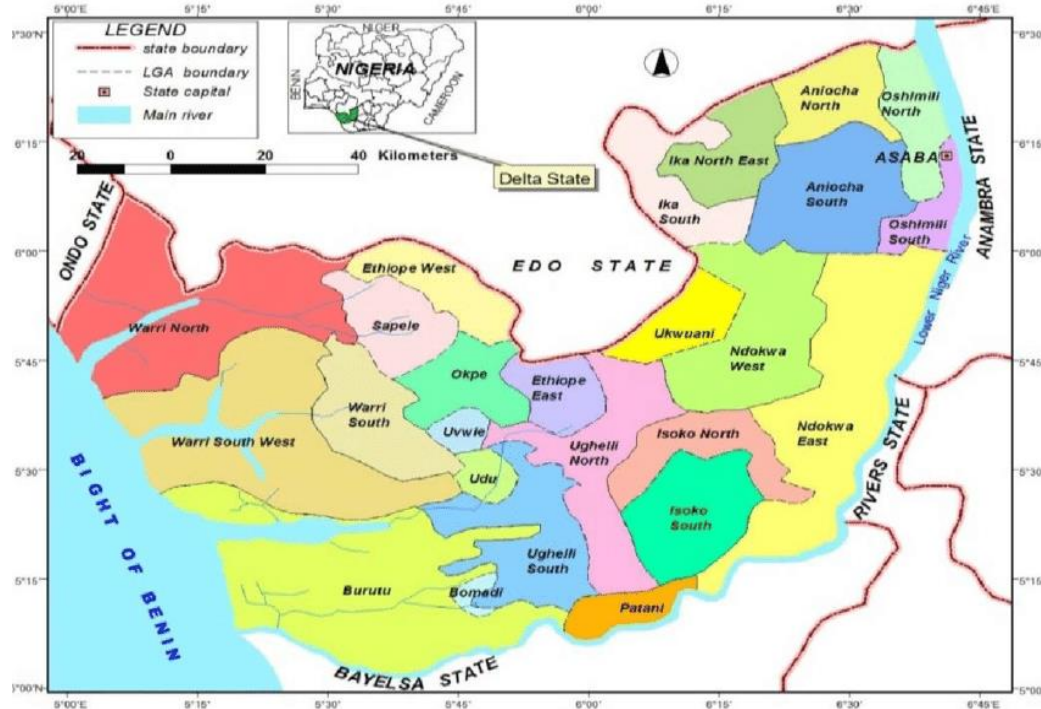
Mohamed *et al.* (2020) did a study aimed at assessing barriers for complete vaccination coverage among under five years' children in Mogadishu, Somalia. A community-based cross-sectional study was conducted between April to July 2019 in Mogadishu-Somalia. Two-stage cluster sampling with systematic random 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 immunization was found to be increased by being a younger caregiver ( $\beta = -0.024$ ,  $P$ -Value=0.019) being father with secondary and above education (AOR = 1.755, 95% CI = 1.161–2.655,  $P$ -value = 0.008), being a young child ( $\beta = -0.018$ ,  $P$ -value = 0.011), being children from birth order of fifth and above (AOR = 1.539, 95% CI = 1.011–2.343,  $P$ -value = 0.044), being a married caregiver (AOR = 4.101, 95% CI=1.062-15.835,  $P$ -value = 0.041), increased monthly family income ( $\beta = 0.003$ ,  $P$ -value = 0.000), availability of vaccine at the time of visit (AOR = 6.147, 95% CI = 1.943–19.441,  $P$ -value = 0.002), cost affordability of vaccine (AOR = 1.951, 95% CI = 1.238–3.076,  $P$ -value = 0.004), and being born at health facility (AOR = 1.517, 95% CI = 1.104–2.086,  $P$ -value = 0.010). Given the variability of findings and the nature of these studies, gives us the impetus the further examine family dispositions militating against the immunization of children under-5 years in Delta north senatorial district of Delta State, Nigeria.

## Research Methods

### Study Area

This study was carried out in Delta North Senatorial District of Delta State, Nigeria which covers nine (9) Local Governments Areas (Aniocha North, Aniocha South, Ika North East, Ika South, Ndokwa East, Ndokwa West, Oshimili South, Oshimili North and Ukwuani). The senatorial district lies between latitudes  $50^{\circ}9'$  and  $60^{\circ}3'$  North of the Equator and Longitudes  $50^{\circ}30'$  and  $60^{\circ}12'$  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

(Figure3.1). The size of the region is about 3,700km<sup>2</sup> and the population is estimated to be about 2,032,707 people (Nigeria Population Census, 2007).



**Figure 3: Map of Delta State showing the three Senatorial Districts (Zones)**

Source: Facts about Delta State of Nigeria

### 3.2 Study Design/Population

This study adopted 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 researchers decided to adopt this study design to enable the researchers quantitatively analyze and determine the variables under study. The population of the study involved the households with women of child-bearing age who have under-5 years’ children in Delta North Senatorial District of Delta State, Nigeria.

### 3.3 Sample size

The sample for the study is determined using Cochran formula as stated below (Cochran, 1963).

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

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 caregivers (mothers) will be used in each LGA.

**Sampling procedure**

A multi-stage sampling procedure was adopted thus: the entire nine (9) local government areas in Delta North Senatorial District of Delta State were selected as sample. From each of the local government areas, all the communities were selected also. This is an all-inclusive sampling to give a wide coverage for the study. 427 households were selected from each of the local government areas, which gives a total of 4, 248,248 households. A total of 4,248 children under-5 years were sampled from respective households.

**Instrument for Data Collection/Analysis**

The researchers used well-structured questionnaire for data collection. The data obtained were checked for inconsistency and incompleteness, thereafter sorted, coded and analyzed using Statistical Package for Social Sciences (SPSS) software. Numbers were assigned to responses which were coded into the software. The hypothesis was tested using ANOVA analysis to determine the level of significance of the variables.

**Data/Analysis**

**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 researchers were able to successfully retrieve 3624, which constituted about 94% of the sample size (see Table 4.1). The researcher used the 3624 (94%) successfully retrieved questionnaires for analysis because it was considered to be adequate and sufficed for statistical analyses.

**Results and Discussion**

**Table 1. Rate of Response from Survey**

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

**Table 2. Socio-Demographic Details of Respondents**

Social and Demographic Data	Frequencies (N)	Percentages
<b>Gender</b>		
Male	544	15.0%
Female	3030	85.0%
<b>Age</b>		

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%
<b>Marital Status</b>		
Single	399	11.0%
Married	2573	71.0%
Widowed	254	7.0%
Divorced	398	11.0%
<b>Level of Education</b>		
No former education	834	23.0%
Primary Education	689	19.0%
Secondary Education	978	27.0%
Tertiary Education	1123	31.0%
<b>Religion</b>		
Christianity	2428	67.0%
Islam	616	17.0%
Others	580	16.0%
<b>Employment Status</b>		
Employed	1051	29.0%
Unemployed	2573	71.0%
<b>Types of Employment Status</b>		
Self-Employed	295	28.0%
Private Sector	350	33.30%
Government Sector	406	38.70%
<b>Monthly Income</b>		
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%
<b>Number of Under-5 Children</b>		
None	544	15.0%
1 Child	1486	41.0%
2-3 Children	1123	31.0%
Above 3 Children	471	13.0%

**Source: Author's (2024)**

In table 2, the data showed that 3030, representing about 85.0% of the respondents were mothers while the remaining 544 (15.0%) were male (fathers) with under-5 children in Delta North Senatorial District.

In age distribution, (n=1776; 49.0%) of the mothers and fathers with under-5 children were in the age range of 26 to 33 years, (n= 1232; 34.0%) of the mothers and fathers fell in the age bracket of 18 to 25 years, followed by (n=399; 11.0%) of them between 34 to 41 years. Next were (n= 109; 3.0%) who were below 18 years and (n=108; 3%) of the them above 41 years. These data

showed that most mothers and fathers with under-5 children predisposed for immunization in Delta North Senatorial District were in their 20s and early 30s.

As regards to marital status, (n=2573; 71.0%) with under-5 children were married, followed by those (n=399;11.0%) who were single, then those (n= 398; 11%) who were divorcees and those (n=254;7.0%) who were widows. These data may uncover that most of mothers and fathers with under-5 were legally married in the senatorial district.

On educational attainment, a good number of the respondents (n= 1123; 31.0%) have had their tertiary education, followed by those (n= 978; 27.0%) with secondary education. Next are those (n= 834; 23.0%) with no former education and then (n=689; 19.0%) with primary education. The data may show that majority of the mothers and fathers with under-5 children predisposed to immunization had their tertiary education in the senatorial district.

In considering the religion of the participants, (n=2428; 67.0%) were Christian, followed by those (n=616, 17.0%) who were Muslim and others (n=580; 16.0%) who may be traditional worshippers and humanists. These data may point to the fact that majority of the mothers and fathers with under-5 children predisposed to immunization were Christians.

The employment status of the respondents showed that (n= 2573; 71.0%) were unemployed while the remaining (1051; 29.0%) were gainfully employed. This outcome may be a reflection of high level unemployment in the country (Egole, 2023; Nwachukwu, 2023). However, out of the 1051 respondents who were employed, a good number of them (n=406; 38.70%) were employed in government sector, followed by those (n=350; 33.30%) who were engaged in the private sector while the remaining ones (n=295; 28.0%) were self-employed. The data obtained may confirm that government still remains the largest employer of labour in Nigeria despite her policies to make the economy private-sector driven and consequently boost employment, productivity and growth (Ajakaiye et al., 2016).

On monthly pay, majority of the respondents (n=1706; 47.07%) said they do not earn any monthly salary, followed by those (n=1504; 41.51%) whose salaries were above N30,000, then very few of them (n=262; 7.23%) whose income were within N18,000-N30,000 and finally those (n= 152; 4.19%) whose income were below N18,000.

Amongst the respondents, majority of them (n= 1486; 41.0%) disclosed they had 1 child who was under-5, followed by those (n=1123; 31.0%) with 2 or 3 under-5 children, and then few of them (544; 15.0%) with no under-5 children and finally those (n= 471; 13.0%) with over 3 under-five children. This data is an indication that most of respondents predisposed to immunization in the senatorial district had 1 under-5 children and then those with 2 to 3 under-5 children.

**Table 3. Family dispositions militating against the immunization of children under-5 years**

No. Item	Variable	SA	A	D	SD
39	I only take my child for immunization only when I am free (busy schedules).	399 (11.0%)	1341 (37.0%)	1631 (45.0%)	253 (7.0%)
40	I only take my child for immunization only when I remember (forgetfulness).	217 (6.0%)	290 (8.0%)	1993 (55.0%)	1124 (31.0%)
41	When I travel to where my child was not registered, I wait until I return before taking the child for immunization.	1703 (47.0%)	1160 (32.0%)	435 (12.0%)	326 (9.0%)
42	When I do not have transportation, I miss	422	326	1703	1173

	my child's immunization.	(11.6%)	(9.0%)	(47.0%)	(32.4%)
43	Ignorance of people could be one of the reasons why people do not go for HIV testing.	1087 (30.0%)	1848 (51.0%)	435 (12.0%)	254 (7.0%)
44	Any day my spouse refuses to permit me, I do not take the child for immunization.	290 (8.0%)	616 (17.0%)	1341 (37.0%)	1377 (38.0%)
45	Sometimes the distance to the facility discourages me from taking my child for immunization	295 (8.1%)	611 (16.9%)	1350 (37.3%)	1368 (37.7%)

**Source: Author's (2024)**

In table 4.3, the data uncovered most caregivers (n= 1631; 45.0%) disagreed that they do not only take their children for immunization only when they are free, followed by those (n= 1341; 37.0%) that agreed that they only take their children for immunization when they are free. Few of them strongly agreed and strongly disagreed respectively. Thus, it can be concluded that most caregivers take their under-5 children to immunization only when they were free. On the converse, most of them disposed their children to immunization regardless of busy schedule. The former finding correlates with the finding that inconvenience schedule negatively influenced mothers towards immunization (Umoke *et al.*, 2021).

Also, majority of the respondents (n= 1993; 55.0%) disagreed while (n= 1124; 31.0%) strongly disagreed with the statement that they only take their children for immunization when they remember. On the converse, very few of the caregivers concurred with the statement. Most caregivers respectively ( n= 1703; 47.0%) agreed and (n= 1160; 32.0%) strongly agreed that they only immunize their children in their registered centers, and even they travel, they still wait until they were back. However, few caregivers disagreed and vehemently disagreed with the statement, implying that they can take their children for immunization, regardless of centers where they got registered.

Furthermore, a good number of caregivers (n= 1703; 47.0%) and (1173; 32.4%) disagreed and strongly disagreed missing child immunization because of transport fare while the remaining few agreed and strongly agreed. Thus, it can be inferred that caregivers do not miss immunization of their under-5 children because of transport fare. This finding disagrees with the findings obtained in another study that incompleteness of immunization is due to location of health facility. They argued that when hospital is far, there is high propensity that caregivers may be discouraged from immunization (Bangura *et al.*,2020; Umoke *et al.*, 2021).

Additionally, majority of them agreed and strongly agreed that they do not undergo HIV testing due to ignorance while the remaining few countered the statement. Thus, it sensible to deduce that most caregivers do not undergo HIV testing because they were ignorant. This finding construes the finding that 18 million people have undiagnosed HIV due to ignorance and prejudice both in Nigeria and Russia (Fowler, 2014).

The data also revealed that most respondents (n= 1341; 37.0%) and (1377; 38.0%) strongly disagreed and disagreed respectively that they can take their children for immunization, even when at their spouse refusal. Also, majority of them (n= 1350, 1368; 37.3%, 37.3%) disagreed and strongly disagreed that distance is not a barrier to their children immunization while the few remaining said otherwise.

**Hypotheses Testing**

The hypothesis testing was done to find out whether data obtained from caregivers in the sampled nine (9) local governments in Delta North Senatorial District validated the hypotheses

of no relationship between the independent variables (family dispositions) and dependent variable (immunization of under-5 years ‘children). The hypothesis was tested using linear regression analysis.

**Hypothesis (H<sub>0</sub>):** *There is no statistically significant correlation between family dispositions and the immunization of under-5 children in Delta North Senatorial District of Delta State.*

**Table 4. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.343 <sup>a</sup>	.118	.117	.16048

- a. Predictors: (Constant), Family dispositions
- b. Dependent variable: Immunization of under-5 children

**Analysis of Variance (ANOVA)**

Model		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	12.436	1	12.436	482.858	.000 <sup>a</sup>
	Residual	93.285	3622	.026		
	Total	105.722	3623			

- a. Predictors: (Constant), Family dispositions
- b. Dependent variable: Immunization of under-5 children

**Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	.844	.009		95.074	.000
	Caregivers’ family disposition	.075	.003	.343	21.974	.000

Dependent variable: Immunization of under-5 children

**Source: Author’s Computation from SPSS (2023)**

This model has R<sup>2</sup>= 0.118 and adjusted R<sup>2</sup>= 0.117 revealed that approximately 12% of the impact of immunization of under children in the sampled senatorial district is captured by family dispositions. This provides that caregivers’ family dispositions significantly influenced routine immunization of under-5 children in Delta North senatorial district.

The F-Statistic value of about 483 and accompanied P-value of 0.00 showed that the independent variable (caregivers' family disposition) well predicted the dependent variable (immunization of under-5 children). Therefore, the overall model is said to be highly significant.

This finding is further proven by the t-statistic value of about 22 and corresponding P-value of 0.00. This a clear indication that caregivers' family disposition is highly significant at 1% level and thus a concrete determinant of routine immunization of under-5 children in Delta North senatorial district. On this ground, it is deduced that caregivers have family disposition significantly enhanced routine immunization of under-5 children in the senatorial district (see Adam *et al.* 2015, Ali *et al.*, 2020). Thus, the hypothesis of no relationship between caregivers' family disposition and routine immunization of under-5 children across the local governments in Delta North is not validate.

### **Conclusion and Recommendations**

This study empirically 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, 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 researchers were able to successfully retrieve 3624, which constituted about 94% of the sample size. The researchers used the 3624 (94%) successfully retrieved questionnaires for analysis.

The data from the 94% of the questionnaires were analyzed and presented, which covered socio-demographic details of respondents and family dispositions militating against the immunization of children under-5 years. The hypothesis was analyzed using descriptive statistics (percentage and frequencies) and ANOVA regression analysis to make an inference on the variables using Software Package for Social Scientists (SPSS), version 25. From the findings of this study, the researcher therefore conclude that family disposition is statistically significant in the immunization of under-5 children in Delta North senatorial district of Delta State, Nigeria.

Based on the findings and conclusion of this study, the following recommendations are necessary:

- (1) Health facilities should be properly decentralized to different local communities and towns to easy access of mothers (family) for the immunization of their children under-5.
- (2) The health facilities (records) should be digitalized so that the family (mothers) can have complete access at any time and place. It should not be that you must visit where you registered your child before the child can be immunized.
- (3) Most mothers (families) are not aware about the dangers associated with non-immunization of under-5 children, particularly in the rural areas. It is therefore important to create sanitization/awareness policies in our rural environment by sending out health workers into rural areas as often as possible to education the people on the importance of immunization of children under-5 years.

### **Competing Interests**

The authors declare no conflict of interests.

### **Ethical Approval**

Ethical clearance was secured from the ethics committee of Novena University with the number **NU/ECNU/29/2020**).

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