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Evaluating Health-System Responsiveness and Structural Predictors of Childhood Immunization Defaulting Among Nursing Mothers in Ila Local Government Area, Osun State, Nigeria

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Abstract:

This study examined routine-immunization compliance among nursing mothers in the Ila Local Government Area (LGA), Osun State, Nigeria, and explored the interaction between maternal demographics, attitudes, and compliance. A descriptive cross-sectional design was used, and 302 mothers of children aged 3–24 months were surveyed across five primary health centres. Most respondents were young, educated mothers, and husbands emerged as influential decision-makers, underscoring the value of targeted, family-oriented education. Attitudes toward immunization were largely favourable: 63.9% strongly agreed and 32.1% agreed that vaccines are beneficial. Reported barriers included religious restraints (25.2%), distance from facilities (52.3%), unfriendly staff encounters (52.0%), time constraints (42.4%), cost (33.8%), vaccine unavailability (45.4%), and limited partner support (28.1%). Age, marital status, and education were significantly associated with compliance, while willingness to pay (8.2%), prioritising the child's well-being despite opposition (30.6%), assured uptake of all available vaccines (17.7%), and acceptance of designated immunization days (28.0%) were each associated with better compliance. The study recommends carefully designed educational campaigns, active collaboration with religious leaders, integration of trading mothers' work schedules, equitable access to affordable services, and mitigation of cultural barriers. Overall, improving immunization compliance requires a comprehensive strategy that combines education, stakeholder engagement, and the removal of financial and cultural obstacles.

Keywords: Routine immunization, Nursing mothers, Compliance, Attitudes, Demography, Immunization adherence,

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Background

In modern public-health practice, immunity or resistance to infectious diseases is conferred by immunization. Vaccines markedly enhance the body's natural defences (World Health Organization [WHO], 2017), enabling the immune system to combat disease from external pathogens. The message of the value of immunization is continued by its ongoing recognition as a cost-effective health intervention that provides significant benefits to individuals and to society. In the UK and other wealthy countries, vaccines have helped wipe out diseases like diphtheria, pertussis and polio, and are estimated to save 2-3 million lives globally every year. Immunization significantly lowers the mortality rate in children younger than 5 years old for vaccine preventable diseases (VPDs) like measles, tetanus, tuberculosis, poliomyelitis, pertussis, diphtheria, yellow fever and hepatitis B. This is particularly significant in Nigeria where vaccines preventable diseases contribute 22% of under-five mortality and 17% of under-five morbidity (Abdulraheem et al., 2011). Throughout the world, nearly 2 million people die annually due to infectious diseases, including 1.5 million children under age 5, and immunization against preventable diseases is an important intervention especially in resource-limited settings (Abdulraheem et al., 2011).

In 2019, Nigeria was among top 10 countries with over 60% of children not receiving DPT3 vaccine (WHO 2019). The DTP3 coverage rate is a measure of the effectiveness of the routine-immunisation programme in a country. In 2017, Nigeria contributed 20% of the world's absolute number of infants who were not immunized with DPT (WHO, 2017). In 2015, of the 8.9 million infants in the WHO African Region not vaccinated against measles, some three million were born in Nigeria, which also represented over 40% of the 28,279 confirmed measles cases reported in the Region in 2016.

In 1974, the World Health Organization introduced the Expanded Programme on Immunization (EPI) and urged all countries to adopt and fully implement the EPI to achieve full child protection. EPI was introduced in Nigeria in 1979 and re-introduced in 1984 (National Population Commission of Nigeria [NPCN] & ICF Macro, 2014). Routine immunization through public and private health facilities, community outreach, mass campaigns to target high risk groups, home visit, "reaching every district" in remote areas, and supplementary immunization activities (SIAs) to address drop-outs and missed opportunities are its main service delivery strategies.

According to the current immunization schedule, a child is considered to be fully immunized when he/she has received the BCG vaccine, at least three doses of pentavalent vaccine (diphtheria, tetanus, pertussis, hepatitis B and Haemophilus influenzae type b) and at least three doses of oral polio vaccine, one dose of inactivated polio vaccine, one dose of measles vaccine, and one dose of yellow fever vaccine. Low-income countries like Nigeria have had difficulties achieving the standards and timing for immunization coverage required by WHO from the beginning; initial commitments to coverage for low-income countries have been increasingly difficult to sustain, particularly in rural areas (Ayinde et al., 2014).

Millennium Development Goal (MDG) 4 aimed to cut the under-five mortality rate (U5MR) from 191 in 1990 to 64 in 2015, a target that Nigeria has fallen short of: U5MR is 89, 28% away from the target. In line with this, the IMR has reduced from 91 per 1,000 live births in 1990 to 58 in 2014, compared to the target of 30 in 2015 (Ayinde, 2016). More recent estimates indicate a continuing decline from 60.66 per 1,000 live births in 2019 to 54.74 per 1,000 in 2023. The need to reduce the number of deaths from vaccine preventable illness

would be strengthened by a further reduction in under-five and infant deaths towards attaining Sustainable Development Goal (SDG) 3, particularly SDG 3.2 to end neonatal mortality and under five mortalities by at most 12 deaths per 1,000 live births and 25 deaths per 1,000 by 2030.

Several studies have been conducted to determine the challenges to achieving high immunization coverage in Nigeria. Adedokun et al. (2017) and Ayinde (2016) identified health-system factors and maternal knowledge as the key factors that contribute to poor childhood immunization rates. Full coverage is still a significant public health challenge in resource-limited settings, and the reasons for the partial adherence of mothers to the routine schedule for their children need to be understood. Vaccination is the most effective primary prevention measure to protect children from serious diseases, but there is still a lack of understanding as to why some mothers do not complete the recommended routine immunisation programme. This study thus sought to examine these factors influencing routine-immunization compliance of nursing mothers in Ila LGA.

The results could help health planners allocate resources more optimally to the immunization initiatives, such as reach vehicles, electricity, cold-chain equipment and training for personnel, and develop effective immunization campaigns targeting caregivers to increase immunization rates. The study also explores how much children are immunized when their mothers are aware and emphasizes the importance of education to increase and sustain immunization coverage; this will serve as a benchmark for future studies on immunization coverage.

The specific objectives of the study were:

i. to evaluate parental attitudes toward routine immunization in the Ila Local Government Area, Osun State;
ii. to identify the key factors influencing parental compliance with routine immunization in the Ila Local Government Area, Osun State; and
iii. to examine the correlation between parents' attitudes toward routine immunization and their level of compliance in the Ila Local Government Area, Osun State.

Methods

Study Area

The study was conducted in the Ila Local Government Area of Osun State, Nigeria. The area lies between longitudes 3°45′ and 4°00′ East and latitudes 7°15′ and 7°30′ North, at elevations of 150–210 metres above mean sea level. It is among the more densely populated LGAs of Osun State and comprises largely residential and commercial zones, with economic activity both formal and informal, including street vending concentrated along major roads. Principal commercial markets within the area include the Ila Central Market (Oja Ila) and the Obajoko Market.

Study Design

A descriptive cross-sectional design was adopted. The design was favoured for its capacity to clarify the research problem by revealing the variables of interest and by estimating, predicting, and analysing associative relationships among them.

Study Population

The study population comprised all nursing mothers of children aged 3 to 24 months in the Ila Local Government Area of Osun State.

Sampling Procedure

A two-stage sampling approach was used. In the first stage, simple random sampling was applied to select five health centres located in and around the Ila LGA: Oke Ola Primary Health Centre (PHC), Isaac Adebayo PHC, Okejigbo PHC, Gaa Obalumo PHC, and Ita Sapon PHC. In the second stage, purposive sampling was used to select mothers of children aged 3 to 24 months at each facility, yielding a total of 302 mothers who were surveyed and analysed.

Data Collection

On the designated days, the researcher distributed self-administered questionnaires to mothers at the primary health centres. Participants were informed of the study's purpose and given a brief overview of the questionnaire; they were assured that participation was voluntary and that their responses would be kept confidential. Mothers completed the questionnaires independently.

Data Analysis

Data were coded and entered IBM SPSS Statistics version 26. Descriptive statistics (frequencies and percentages) were used to summarise the data and were presented in tables, and inferential statistics specifically the chi-square test were used to assess associations between selected independent and dependent variables, with statistical significance set at $p < 0.05$.

Results

Attitudes of Nursing Mothers Toward Routine Immunization

Table 1. Attitudes of nursing mothers toward the uptake of routine immunization (n = 302)

Attitude item	Strongly agree N (%)	Agree N (%)	Disagree N (%)	Strongly disagree N (%)
I consider vaccinations to be beneficial	193 (63.9)	97 (32.1)	0 (0.0)	12 (4.0)
I am ready to immunize my child even if it requires payment	204 (67.5)	66 (21.9)	9 (3.0)	23 (7.6)
I ensure my child receives all immunizations available at the health centre	180 (59.6)	101 (33.4)	9 (3.0)	12 (4.0)
Even when my husband says I should not go, I still take my child for immunization for his/her well-being	213 (70.5)	42 (13.9)	23 (7.6)	24 (7.9)
I am ready to accept immunizations given on immunization-plus days	229 (75.8)	61 (20.2)	0 (0.0)	12 (4.0)
I advise my friends and relatives to immunize their children	139 (46.0)	128 (42.4)	23 (7.6)	12 (4.0)

As shown in Table 1, a substantial majority of respondents (63.9%) strongly agreed that vaccines are beneficial, while 32.1% agreed and a minimal fraction dissented. Most mothers (67.5%) strongly agreed that they were willing to pay for immunization, with a further 21.9% in agreement and only 3.0% in disagreement. Concerning the uptake of available vaccines, 59.6% strongly agreed that they ensured their child received all immunizations available at the health centre and 33.4% agreed. Despite potential opposition, 70.5% remained committed to securing their child's immunization for its welfare even when discouraged by a

spouse, with 13.9% in agreement. A clear majority (75.8%) indicated willingness to accept immunizations on designated days, and 46.0% strongly agreed that they advise friends and relatives to immunize their children, with a further 42.4% in agreement.

Level of Compliance with the Infant Immunization Schedule

Table 2. Level of compliance with the infant immunization schedule (n = 302)

Item	Yes N (%)	No N (%)
Have you ever delayed your child's immunization for a reason other than illness or allergy?	124 (41.1)	178 (58.9)
Have you ever decided not to have your child vaccinated for a reason other than illness or allergy?	157 (52.0)	145 (48.0)
Is the recommended immunization schedule good for your child?	279 (92.4)	23 (7.6)
Do you trust the information you receive about your children's vaccination?	278 (92.1)	24 (7.9)
Only very serious circumstances would prevent me from bringing my child for immunization	267 (88.4)	35 (11.6)

Source: Field survey.

Table 2 shows that 41.1% of respondents had delayed their child's immunization for reasons unrelated to illness or allergy, while 58.9% had not, and 52.0% had at some point decided against vaccinating their child for non-medical reasons. A large majority considered the recommended schedule beneficial for their children (92.4%) and trusted the information they received about vaccination (92.1%), while 88.4% indicated that only very serious circumstances would prevent them from immunizing their child.

The mean aggregate score for the items on adherence to the immunization schedule was 3.80 ± 0.993. Respondents scoring below the mean were classified as having poor compliance and those scoring at or above the mean as having good compliance. On this basis, 139 mothers (46.0%) exhibited poor compliance and 163 (54.0%) demonstrated good compliance, as illustrated in Figure 1.

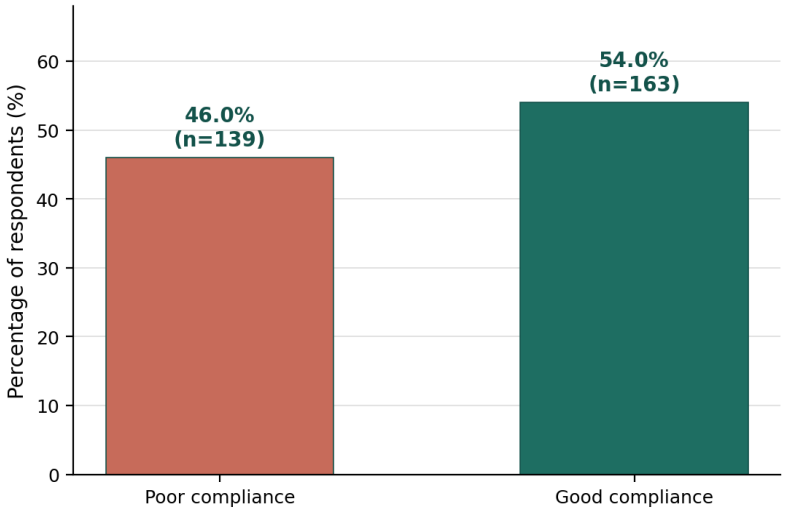


Figure 1. Compliance with the infant immunization schedule (n = 302).

Determinants of Routine-Immunization Adherence

Table 3. Determinants of routine-immunization adherence among nursing mothers in Ila LGA (n = 302)

Factor influencing compliance with the infant immunization schedule	Yes N (%)	No N (%)
My religion prohibits children's immunization	76 (25.2)	226 (74.8)
I live very far from the immunization centre	158 (52.3)	144 (47.7)
The healthcare staff are not friendly and welcoming	157 (52.0)	145 (48.0)
A lot of my time is wasted at the healthcare centre	128 (42.4)	174 (57.6)
Immunization charges are costly	102 (33.8)	200 (66.2)
Vaccines are not usually available at the healthcare centre	137 (45.4)	165 (54.6)
My husband prohibits children's immunization	85 (28.1)	217 (71.9)

Source: Field survey.

Adherence to the infant immunization schedule in the Ila LGA was shaped by multiple factors (Table 3). About a quarter of respondents (25.2%) stated that their religion forbids children's immunization, while 52.3% reported living far from the immunization centre. Slightly more than half (52.0%) expressed concern about unfriendly or unwelcoming healthcare personnel, and 42.4% felt that considerable time was wasted at the facility. Cost was a barrier for 33.8% of respondents, 45.4% reported frequent unavailability of vaccines, and 28.1% indicated that their husbands prohibited children's immunization.

Association Between Demographic Characteristics and Compliance

Table 4. Association between respondents' demographic characteristics and level of compliance

Variable	Poor compliance	Good compliance	χ^2	p-value
Age			**9.588**	**0.048***
20 years and below	2	8		
21–25 years	14	30		
26–30 years	60	58		
31–35 years	33	43		
36–40 years	30	24		
Marital status			**9.038**	**0.090†**
Single	—	—		
Married	38	115		
Divorced	10	8		
Separated	2	8		
Level of education			**10.417**	**0.050***
No formal education	15	16		
Primary	12	18		
Secondary	22	47		

Variable	Poor compliance	Good compliance	χ^2	p-value
Tertiary	80	28		
Family type			**0.128**	**0.721**
Monogamous	104	119		
Polygamous	35	44		
Religion			**19.258**	**<0.001***
Christianity	78	100		
Islam	46	61		
Traditional	200‡	—		

The analysis of demographic factors revealed significant associations in several domains (Table 4). Age was significantly associated with compliance (χ^2 = 9.588, p = 0.048), as was level of education (χ^2 = 10.417, p = 0.050) and religion (χ^2 = 19.258, p < 0.001). Family type showed no significant association (χ^2 = 0.128, p = 0.721). The association for marital status (χ^2 = 9.038, p = 0.090) did not reach the 0.05 threshold.

Association Between Attitudes and Compliance

Table 5. Association between respondents' attitudes and level of compliance

Respondents' attitudes	Poor compliance N (%)	Good compliance N (%)	χ^2	p-value
I am ready to immunize my child even if it requires payment	23 (8.2)	255 (91.2)	—	0.004*
Even when my husband says I should not go, I still take my child for immunization for his/her well-being	85 (30.6)	193 (69.4)	11.299	0.010*
I ensure my child receives all immunizations available at the health centre	49 (17.7)	229 (82.3)	31.082	<0.001*
I am ready to accept immunizations given on immunization-plus days	—	—	—	0.001*

The association between attitudes and compliance was strong (Table 5). A readiness to pay for immunization (poor compliance 8.2%) and a willingness to prioritise the child's welfare despite opposition (poor compliance 30.6%) were each significantly associated with compliance (p = 0.004 and p = 0.010, respectively). Assured uptake of all available immunizations (poor compliance 17.7%) and readiness to accept immunizations on designated days were likewise significantly associated with compliance (p < 0.001 and p = 0.001, respectively). Collectively, these findings underscore the influence of favourable attitudes on adherence to the immunization schedule.

Discussion

The respondents were mainly young women with the mean age of 30.1 ± 5.28 years, which means there was a need for educational activities that were geared to young women. The majority of the respondents were married (65.6%) with both mothers and their spouses indicated to influence immunization decisions, indicating the need to engage husbands to create an enabling environment for immunization. Over half of the respondents (53.6%) possessed tertiary education and this may contribute to increased immunization uptake if reliable information is provided and myths dispelled. The culture and religion were also prominent as most respondents came from monogamous families (73.8%) and were Christian (57.3%), emphasizing the importance of addressing religious and cultural beliefs when raising awareness and acceptance of immunization. There was a significant percentage of traders (57.0%), indicating that interventions (e.g., flexibility of schedules, outreach) that fit their work responsibilities are needed.

The majority of respondents (63.9%) strongly agreed and 32.1% partially agreed that there were benefits to immunization. These results are similar to a study conducted in Addis Ababa in which 96% of the respondents agreed that immunization was important to prevent child illness (Birhanu et al., 2015) and the Adefolalu et al., (2019) study where 98.8% of respondents felt that immunization was very important to protect children against disease. Many participants (67.5%) were willing to pay the price for immunization, which is similar with the finding of Taiwo et al. (2017) in Kaduna, Nigeria who reported that 65% of the participants knew the protective effect of vaccines and were willing to be immunized on the designated immunization days. Majority of parents (59.6%) ensured that all the recommended vaccination was done for their children in contrast to Angadi et al. (2013) in which only 29.98% recognised the importance of finishing the immunisation schedule. Though with some opposition, 70.5% of parents maintained the process of getting their child immunized, while 75.8% were willing to receive immunizations at the designated day, which was in line with Taiwo et al. (2017).

Importantly, 46.0% of participants actively encouraged friends and relatives to vaccinate their children and there was high confidence in vaccination information (92.1%) and with only very serious circumstances dissuading vaccination of their child (88.4%). The mean composite score of 3.80 ± 0.993 was used as the cut-off point for compliance; then the scores higher than the mean were considered as having good compliance.

The analysis revealed several barriers to compliance, namely religious prohibition (25.2%), distance from the health centre (52.3%) in line with Bangura et al., 2020 who also found distance from the health facilities and families as a barrier to complete uptake, concerns about the demeanour of healthcare staff (52.0%), wastage of time (42.4%), cost (33.8%), vaccine unavailability (45.4%) and limited partner support (28.1%). The age, marital status and education were further highlighted by the statistical analysis and showed that younger mothers, unmarried mothers and those with lower level of education had low compliance, which supports the findings of Konwea et al (2015) and further strengthens the relationship between education and compliance with routine-immunization. The association of attitudes to compliance was also strong: willingness to pay (8.2%) was positively associated with enhanced compliance, as were prioritising the child's welfare despite opposition (30.6%) and assured uptake of all immunisations on schedule (17.7%) and readiness to accept immunisations on designated days (28.0%).

Conclusion

This study highlights the importance of targeting demographics and attitudes to improve immunization adherence among nursing mothers in the Ila LGA. The participants were predominantly young, educated mothers, underscoring the need for customised educational programmes, and the influence of husbands on immunization decisions points to the value of family-oriented engagement. Favourable attitudes toward immunization, willingness to incur costs, and trust in information together indicate a positive disposition toward immunization. Compliance was significantly influenced by age, education, and religion, and was further shaped by proximity to health facilities, perceptions of staff, time constraints, cost, vaccine availability, and partner support. Favourable attitudes including willingness to pay, prioritisation of the child's well-being, assured uptake, and readiness to accept designated immunization days—were consistently associated with better compliance.

Recommendations

1. Immunization initiatives should focus on young mothers and their partners through sustained, family-oriented educational efforts.
2. Given the respondents' relatively high educational attainment, campaigns should concentrate on correcting misconceptions and disseminating accurate information.
3. Religious leaders and cultural influencers should be engaged to enhance acceptability among families with religious and cultural convictions.
4. Flexible immunization schedules and outreach initiatives that accommodate the occupational commitments of trading mothers should be introduced to raise uptake.
5. To ensure equitable access, programmes should provide affordable or free immunization services to families across diverse socioeconomic groups.
6. Health authorities should strengthen health-system responsiveness which include staff courtesy, reduced waiting times, reliable vaccine supply, and accessible facilities to remove structural barriers to compliance.

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