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## **Barriers and Motivating Factors Influencing Timely Immunisation Completion Rates among Children Under Five in Southwestern Nigeria**

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### **ABSTRACT**

*This study examined the barriers and motivating factors that affect the timely completion of immunization among children under five in Southwest Nigeria. Identifying these factors is crucial for developing effective strategies to improve immunisation rates. A community-based cross-sectional study was conducted in Ogun and Oyo States using a multi-stage sampling technique. Data were collected from 786 caregivers of children aged 0-5 years through structured questionnaires and immunisation cards. Analyses were performed using SPSS version 25, with statistical significance set at  $p < 0.05$ . The study found 61.5% of children had received all age-appropriate vaccines, while 38.5% had not. Key motivating factors included easy access to immunisation centres, fear of infectious diseases, well-coordinated immunisation services, free immunisation, peer influence, and encouragement from healthcare providers. Significant barriers included child illness or hospitalisation, prior side effects from vaccinations, and financial constraints for transportation. To improve vaccination completion rates, targeted interventions should address these barriers and leverage motivating factors.*

**Keywords:** Vaccination, Immunisation, Barriers, Motivating Factors, Caregivers

### **INTRODUCTION**

Globally, an estimated four million children die annually from diseases that could be prevented through vaccination. Numerous millions more experienced severe illness or permanent disability because of these same diseases (Perkins, 2018). These led to the adoption and implementation of immunisation programs against several childhood infectious diseases in numerous nations. According to Ophori et al. (2015), Nigeria has one of the lowest rates of routine vaccine coverage in the world, despite the objectives of the Expanded Programme on Immunisation (EPI). Vaccines that can prevent sickness are readily available, but

communicable diseases are still widely spread (World Health Organisation, 2024). However, despite the availability of vaccines and ongoing health campaigns, timely vaccination completion rates remain suboptimal, particularly in Nigeria. Nigeria was recently ranked 187th out of 190 countries in the World Health Organisation's (2017) ranking, requiring urgent public health actions. This gap in immunisation coverage poses a significant threat to child health and development, as unvaccinated children are at a higher risk of contracting vaccine-preventable diseases, which can lead to severe health complications and even death.

In 2018, the Nigeria Demographic Health Survey (NDHS) reported a mortality rate of 132 per 1,000 live births for children under the age of five (NPC and ICF, 2019). Additionally, it was noted that only 31 per cent of children had received all recommended immunisations, a glaring deviation from Sustainable Development Goal 3's aim of 90% of children having received all recommended vaccinations (WHO, 2018). Immunisation of children from an early age is an essential public health measure that has been shown to lower child mortality and morbidity rates globally. In Nigeria, vaccination rates are still low, and many children lack protection against diseases that can be prevented by vaccination, even though immunisation services are readily available. All children should obtain a full course of vaccinations, according to the World Health Organisation (WHO), to guard against diseases like polio, measles, diphtheria, tetanus, pertussis, and others that can be prevented.

Most disease control and prevention initiatives in Nigeria are vertically administered, which has the unintended consequence of reducing efficiency, coverage, and synergy due to the limited availability of staff, materials, and funding (WHO, 2018). It is concerning and difficult to deal with the high rates of disability, illness, and mortality among children and nursing mothers because of low socioeconomic position and negative attitudes regarding vaccination services. Because selecting to get vaccinated is a complex and contextual decision, recent systematic reviews carried out globally have not been able to identify common factors associated with inadequate immunisation (Mde, Sato & Waldman, 2016).

Understanding the barriers and motivating factors that affect vaccination completion is crucial for creating effective strategies to improve immunisation rates. Research has highlighted several challenges that caregivers encounter, such as logistical issues, distance to health facilities, financial limitations, and time constraints due to demanding work schedules (Mohammed et al. 2004; Sato, 2020). Furthermore, misconceptions about vaccine safety, past negative experiences, and a lack of awareness about the importance of timely vaccinations also play a significant role in vaccine hesitancy and incomplete immunisation (Mohammed et al., 2004; Balgovind & Mohammadnezhad, 2022). On the other hand, there are several motivating factors that can inspire caregivers to ensure their children receive vaccinations on schedule. These factors include easy access to immunisation services, educational outreach through mass media, support from healthcare providers, and encouragement from family and friends (Anderson 2014; Balgovind & Mohammadnezhad, 2022; Mba & Aniwada, 2023). Identifying these motivating factors is essential for developing targeted interventions that can effectively tackle the barriers to vaccination.

This study explored the barriers and motivating factors that influence timely immunisation completion rates among children under five in Southwest Nigeria.

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## **METHOD**

The study employed a community-based cross-sectional design in two randomly selected Southwestern States in Nigeria, namely, Ogun and Oyo States. The 2006 Census conducted by the National Population Commission estimated the population of Ogun State to be 4.6 million. The State is home to a varied population from a range of socioeconomic and cultural origins, and it is organised into 20 Local Government Areas (LGAs). The National Population Commission's 2006 Census indicates that Oyo State has a population of roughly 5.5 million. The population of the 33 LGAs that make up the State is diverse, coming from a range of socioeconomic and cultural backgrounds.

Participants were selected using a multi-stage sampling technique. Initially, five local government areas (LGAs) were randomly selected from each state. Within each LGA, communities were randomly chosen, and caregivers were purposively selected and approached for participation based on their availability and willingness to participate in the study. Study participants comprised caregivers, parents and guardians responsible for the health and vaccination decisions of the children. A total of 786 caregivers of children aged 0-5 years residing in Ogun and Oyo States, Nigeria, constituted the study population.

Data were collected within three months, from April 2023 to June 2023. A validated structured questionnaire was used to collect data on caregivers' demographics, children's demographics, perceived barriers, and motivating factors for vaccination. The immunisation cards of children were used as a means of determining the timely completeness of each child's immunisation status based on their age frame (in weeks), using the standard immunisation schedule as a guide (UNICEF, 2024). Trained research assistants administered the copies of the questionnaire and face-to-face interviews. The data were cleaned and entered into an Excel spreadsheet and then exported to SPSS Version 27 for data management and analysis.

Descriptive statistics were used to summarise demographic characteristics and vaccination status. Chi-square tests were employed to assess the association between barriers/motivating factors and vaccination completion rates, with a significance level set at  $p < 0.05$ . Ethical approvals for this study was obtained from the Oyo State Ministry of Health, Department of Planning Research & Statistics Division (AD 13/479/ 318A), Ogun State Health Research Ethics Committee (OGHREC/467/05), Ogun State Primary Health Care Development Board Ethics Committee (PHCB/01/05/015) and Lead City University Research Ethics Committee, Ibadan, Oyo State (LUC-REC/23/288). Informed consent was obtained from all participants prior to data collection, ensuring they understood the purpose of the study and their right to withdraw at any time without consequence. Confidentiality was maintained throughout the research process, with all data securely stored and anonymised.

## RESULTS AND DISCUSSION

**Table 1:** Child's Socio-demographic Characteristics

Variables	Frequency	Percent (%)
<b>Age of Child</b>		
Mean $\pm$ S.D (weeks)	37.94 $\pm$ 5.98	
0-5 weeks	197	25.1
6-9 weeks	84	10.7
10-13 weeks	74	9.4
14-23 weeks	71	9
24-35 weeks	89	11.3
36-47 weeks	65	8.3
48-59 weeks	57	7.3
60- 59 months	149	19
<b>Sex of Child</b>		
Male	355	45.2
Female	431	54.8
<b>Receive Ante-Natal Care When Pregnant for the Child</b>		
No	73	9.3
Yes	713	90.7
<b>Place of ANC (n=713)</b>		
Health centre	459	64.4
General hospital	200	28.1
Chemist/pharmacy	8	1.1
Home	32	4.5
Others	14	2.0
<b>Doses of tetanus toxoid (TT) received during the pregnancy</b>		
None	47	6.6
1	125	17.5
2	310	43.5
3	231	32.4
<b>Where index child was delivered</b>		
House	73	9.3
Health centre	402	51.1
General hospital	203	25.8
TBA	64	8.1
Others	44	5.6

The mean age of the children was 37.94 weeks ( $\pm 5.98$ ), with most (25.1%) aged 0-5 weeks. Slightly more were female (54.8%) than male (45.2%). The majority of caregivers (90.7%) received antenatal care during pregnancy, primarily at health centres (64.4%). Most received two (43.5%) or three (32.4%) doses of tetanus toxoid injections. Over half of the



children (51.1%) were delivered at health centres, followed by general hospitals (25.8%) and home deliveries (9.3%) (Table 1).

**Table 2a:** The Immunisation Status of Children

Age of child	Vaccines expected to have collected (W.H.O Standard)	Completed	Incompleted
0 – 5 weeks	BCG, OPV0, HeP B0	97(49.2)	100(50.8)
6-9 weeks	Penta 1, PCV 1, OPV 1, IPV 1 and Rota 1	55(65.5)	29(34.5)
10- 13 weeks	Penta 2, PCV 2, OPV2, Rota 2	46(62.2)	28(37.8)
14- 23 weeks	Penta 3, PCV 3, OPV 3, Rota 3 and IPV 2	52(73.2)	19(26.8)
24 – 35 weeks	Vit. A 1st dose	60(67.4)	29(32.6)
36-47 weeks	Measles 1st dose, Yellow fever, Meningitis	48(73.8)	17(26.2)
48-59 weeks	Vit. A 2nd dose	43(75.4)	28(37.8)
60 weeks – 59 months	Measles 2nd dose	82(55)	67(45)

**Table 2b:** Overall Immunisation Status of Children

Immunisation Status	Frequency	Percent
Complete	483	61.5
Incomplete	303	38.5

Table 2 shows the immunisation status of children in Nigeria across various age groups. It details the expected vaccines, the percentage of children who completed their vaccinations, and those who did not. Notably, the highest completion rate (75.4%) was observed for the second dose of Vitamin A in the 48-59 weeks age group, while the lowest (49.2%) was for the 0-5 weeks' group. The overall immunisation status indicates that 61.5% of children had complete immunisation, while 38.5% were incomplete as at the time of visit.

**Table 3:** Timeliness and Coverage of Childhood Immunisation Uptake

Antigen	None	Scheduled Date	Other Date
BCG	26(3.3)	688(87.5)	72(9.2)
OPV0	26(3.3)	688(87.5)	72(9.2)
OPV1	8(1.4)	524(88.9)	57(9.6)
OPV2	6(1.2)	436(86.3)	63(12.4)
OPV3	17(3.9)	375(87)	39(9)
IPV1	50(8.5)	492(83.5)	47(7.9)
IPV2	28(6.6)	361(84.7)	37(8.6)
PENTA 1	8(1.4)	524(88.9)	57(9.6)
PENTA 2	6(1.2)	436(86.3)	63(12.4)
PENTA 3	17(3.9)	375(87)	39(9)
Pneumococcal 1	53(9)	460(78.1)	76(12.9)
Pneumococcal 2	44(8.7)	399(79)	62(12.28)
Pneumococcal 3	38(8.8)	323(74.9)	70(16.2)
Measles 1	4(1.4)	227(83.7)	40(14.7)
Measles 2	6(4)	129(86.5)	14(9.4)
Yellow fever	4(1.4)	227(83.7)	40(14.7)
Men A	4(1.4)	227(83.7)	40(14.7)
Rotavirus 1	83(14)	436(74)	70(11.8)



Rotavirus 2	57(11.2)	386(76.4)	62(12.3)
Vitamin A	8(2.2)	303(84.1)	49(13.6)
Vitamin A 2	6(2.9)	172(	28(13.6)

Table 3 shows that most children received their vaccines on schedule for most antigens, with adherence rates ranging from 74.9% to 89.7%. However, notable delays were observed, especially for Pneumococcal 3 (16.2%), Rotavirus 1 (11.8%), and Vitamin A doses (13.6%). Non-vaccination rates were relatively low, generally below 9%, except for Rotavirus 1 (14%) and IPV1 (8.5%).

**Table 4a: Motivating Factors for Completing Child's Immunisation**

Motivating Factors for Completing Child's Immunisation	Yes	No	P value
Easy Access to Immunisation Centre	457(94.6)	26(5.4)	0.001
Education from the Mass Media	387(80.1)	96(19.9)	0.096
Advice from Family, Partner or Friends	382(79.1)	101(20.9)	0.075
Well-Co-Ordinated Immunisation Services	432(89.4)	51(10.6)	0.035
Fear of My Child Contracting Infectious Diseases and Death	338(69.5)	145(30)	0.003
Free Immunisation Services	431(89.2)	52(10.8)	0.037
Every Parent is Immunizing the Child	320(66.3)	163(33.7)	0.004
Encouragements from Health Care Providers	454(94)	29(6)	0.001

Table 4a shows that the majority of caregivers who have completed their child's immunisation identified easy access to immunisation centres (94.6%) and encouragement from healthcare providers (94%) as significant motivators, both with a p-value of 0.001, indicating strong statistical significance. Other notable factors include well-coordinated immunisation services (89.4%) and free immunisation services (89.2%), both with p-values below 0.05, suggesting they also play a crucial role. Conversely, education from mass media and advice from family or friends showed less statistical significance, with p-values of 0.096 and 0.075, respectively.

**Table 4b: Barriers for Not Completing Child's Immunisation**

Barriers For Not Completing Child's Immunisation	Yes	No	P value
Busy Work Schedule	180(59.4)	123(40.6)	0.415
Long Waiting in Queue at the Immunisation Centre	214(70.6)	89(29.4)	0.071
Child was Sick or on Admission	132(43.6)	171(56.4)	0.001
Child Developed Side Effect After the Last Visit	124(40.9)	179(59.1)	0.001
Child Was too Small to be Taken Out	126(41.6)	177(58.4)	0.001
Had No Money to Transport Myself to Centre	138(45.5)	165(54.5)	0.001
Did Not Know the Next Schedule Date or Forgot the Date	167(55.1)	136(44.9)	0.039
Travelled Out of Town	109(36)	194(64)	0.001
Older Child Had Side Effect for a Particular Vaccine So Have Decided Not to Immunize any of My Children Against That Vaccine	98(32.3)	205(67.7)	0.001

Table 4b identifies the primary obstacles faced by caregivers in ensuring their children's vaccinations are completed. The most significant barriers include long waiting times at immunisation centres (70.6%) and various health-related issues, such as the child being sick or admitted (43.6%) and experiencing side effects after previous vaccinations (40.9%). Notably, all health-related barriers, including financial constraints for transportation (45.5%) and



concerns about the child's size (41.6%), have p-values of 0.001, indicating strong statistical significance. Additionally, forgetting the vaccination schedule (55.1%) also shows significance with a p-value of 0.039. In contrast, a busy work schedule (59.4%) had a non-significant p-value of 0.415, suggesting it may be a less critical factor. The high percentage of caregivers receiving antenatal care during pregnancy aligns with the World Health Organisation's recommendation for early and regular antenatal visits. Antenatal visits present opportunities for reaching pregnant women with interventions that may be vital to their health and well-being and that of their infants. WHO (2024) recommends a minimum of four antenatal visits based on a review of the effectiveness of different models of antenatal care. This finding is consistent with previous studies emphasising the importance of antenatal care in promoting maternal and child health outcomes. However, the 9.3% who did not receive antenatal care highlight a potential gap in access or awareness, warranting further investigation and targeted interventions and also the primary locations for antenatal care being health centers and general hospitals reflect the common settings for maternal healthcare services in low- and middle-income countries and a proportion which was similar to 74.3% recorded in a study in North-West Ethiopia but lower than a similar study conducted in Nigeria which recorded 34.9% (Bayu, et al. 2015; Etokidem et al. 2022).

The majority of respondents reported complete immunisation for their children; the presence of incomplete immunisation rates among a substantial proportion underscores the need to address barriers and challenges to improve overall immunisation coverage. The findings of this study are in contrast to the study conducted in southwestern Ethiopia, where a total of 322 mothers/caretakers were interviewed. Based on vaccination card and mothers/caretakers' recall, 295 (91.6%) of the children took at least a single dose of vaccine. Of the total children, 27 (8.4%) were not immunised at all, 159 (49.4%) were partially immunised, and 136 (42.2%) were fully immunised (Meleko, Geremew & Birhanu, 2017).

The study highlighted several key challenges that caregivers encounter in ensuring their children receive vaccinations on schedule. Logistical issues, such as the distance to health facilities and lack of reliable transportation, were major hurdles. These results are consistent with earlier research showing that geographic accessibility is a vital factor in healthcare utilisation, especially in rural areas where health services may be limited (Tanou, Kishida & Kamiya, 2021). Financial difficulties also surfaced as a significant barrier, with many caregivers mentioning the costs related to transportation and potential loss of income as reasons for not seeking vaccinations. This shows the necessity for policies that tackle economic obstacles to healthcare access, like subsidising transportation or offering free vaccination services.

Health-related worries, including fears of vaccine side effects and the belief that children should not be vaccinated when they are sick, were also common among caregivers. These misconceptions can contribute to vaccine hesitancy, which various studies have identified as a major reason for low immunisation rates (Favin et al. 2012; Pugliese-Garcia et al. 2018). It is essential to address these concerns through focused health education campaigns that deliver accurate information about vaccine safety and the importance of timely immunisation.

The study identified several key factors that motivate caregivers to ensure their children receive vaccinations. One significant factor is the easy access to immunisation services, which include well-organised vaccination campaigns and community outreach initiatives that greatly impact caregivers' choices. This highlights the need to strengthen health systems to make immunisation services available and accessible to all families. Support from healthcare providers was also found to be a crucial motivator, as caregivers preferred to receive information and encouragement from trusted health professionals. This aligns with the health belief model, which suggests that perceived benefits and cues to action play a significant role in influencing health behaviours (Favin et al., 2012). Training healthcare workers to effectively communicate the importance of vaccinations and address caregivers' concerns can improve vaccination rates.

Additionally, community support and social networks were essential in motivating caregivers. The encouragement from family and friends regarding vaccination emphasises the importance of community involvement in health promotion efforts. Utilising social networks to spread information about the benefits of vaccination can help create a supportive environment that encourages positive health behaviours.

### **Implications for Public Health Practice**

To boost vaccination completion rates, it's crucial to adopt a variety of strategies that tackle both obstacles and incentives. This could involve making immunisation services more accessible and running community health education campaigns to clear up myths and misunderstandings about vaccines. Additionally, involving community leaders and local influencers can strengthen health promotion initiatives and motivate collective efforts to enhance vaccination rates. By cultivating a community atmosphere that prioritises immunisation, we can create a supportive setting that encourages caregivers to focus on their children's health.

### **CONCLUSION**

This study has pinpointed important barriers and motivating factors that affect the timely completion of vaccinations for children under five in Southwest Nigeria. Key obstacles include logistical issues, financial limitations, and health-related worries, which prevent caregivers from ensuring vaccinations are administered on schedule. On the other hand, motivating elements such as convenient access to immunisation services, support from healthcare professionals, and encouragement from the community significantly contribute to improving vaccination rates. The findings emphasise the need for targeted strategies that leverage these motivators while tackling the identified challenges. By increasing community awareness and improving access to immunisation services, stakeholders can foster an environment that promotes timely vaccinations. Ultimately, addressing these challenges is essential for boosting immunisation rates in the region and improving child health outcomes.

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### What is already known on this topic?

Nigeria has one of the lowest rates of routine vaccine coverage globally, with only 31% of children having received all recommended immunisations as reported in the 2018 Nigeria Demographic Health Survey (NDHS). Various barriers affecting vaccination completion were documented.

### What this study adds

The study **identified specific barriers and motivating factors**. The study findings emphasise the importance of community involvement and the need for tailored health education campaigns to address misconceptions about vaccines and improve access to immunisation services.

**Competing Interest:** “The authors declare no competing interest.” All the authors have read and agreed to the final manuscript.

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