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Nursing Mothers' Adherence to Vaccination Protocols in Ibadan North East Local Government, Oyo State, Nigeria

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Abstract:

This study explores routine immunization compliance among nursing mothers in Ibadan North East Local Government, Oyo State, Nigeria, with 275 respondents. Demographics and attitudes' interplay on adherence are examined. Young, educated mothers are involved, highlighting tailored educational needs. Husbands' roles in decision-making are pivotal. Positive attitudes towards vaccinations are prevalent, with 63.9% strongly agreeing and 32.1% agreeing on benefits. Barriers include religious constraints (25.2%), distance (52.3%), staff interactions (52.0%), time (42.4%), cost (33.8%), vaccine availability (45.4%), and partner support (28.1%). Age, marital status, education influence compliance. Willingness to pay (8.2%), child well-being priority (30.6%), uptake assurance (17.7%), and designated days' acceptance (28.0%) link to better compliance. This study culminates in a set of recommendations that encompass meticulously tailored educational campaigns, active collaboration with religious leaders, the seamless integration of the work schedules of trading mothers, equitable provision of affordable services, and an adept mitigation of cultural barriers. The study underscores that the fortification of immunization compliance necessitates a holistic approach that amalgamates education, partner involvement, and the dismantling of financial and cultural impediments.

Key words: routine immunization, nursing mothers, compliance, attitudes, demographics, immunization adherence,

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Introduction

In contemporary public health practice, the process of conferring immunity or resistance to infectious diseases is achieved through immunization. By reinforcing the body's innate defense mechanisms (WHO, 2017), vaccines play a vital role in empowering the immune system to effectively counter infections caused by foreign agents. The value of immunization is underscored by its consistent recognition as a cost-effective health intervention, delivering extensive benefits to individuals and society at large. Notably, vaccinations annually save an estimated 2-3 million lives and have even led to the eradication of diseases such as polio, diphtheria, and pertussis in several high-income countries. Through the prevention of vaccine-preventable diseases (VPDs) including measles, tetanus, tuberculosis, poliomyelitis, pertussis, diphtheria, yellow fever, and hepatitis B, immunization significantly curtails mortality rates among children under the age of five. This significance is particularly evident in Nigeria, where VPDs contribute to 22% and 17% of under-five mortality and morbidity, respectively (Abdulraheem & Onajole, 2011). Globally, the toll of approximately 2 million lives lost annually due to infectious diseases includes 1.5 million children under five. Thus, the imperative of vaccinating children against preventable diseases remains a pivotal strategy, especially within resource-constrained settings (Abdulraheem & Onajole,2011). In 2019, Nigeria stood among a group of ten countries, including Angola, Brazil, the Democratic Republic of the Congo, Ethiopia, India, Indonesia, Mexico, Pakistan, and the Philippines, where more than 60% of children did not receive the DPT3 vaccine (WHO, 2019). The coverage of DTP3 vaccination serves as an indicator of the effectiveness of a country's routine immunization (RI) program. As of 2017, Nigeria accounted for 20% of infants globally who were without the DPT vaccine (WHO, 2017). Notably, out of the 8.9 million infants in the WHO African Region who were not immunized against measles in 2015, a substantial three million were born in Nigeria, signifying more than 40% of the 28,279 confirmed measles cases reported in the WHO African Region for 2016. The World Health Organization (WHO) initiated the Expanded Programme on Immunization (EPI) in 1974, urging all nations to adopt and comprehensively implement it, thereby ensuring comprehensive child protection. In Nigeria, the EPI was introduced in 1979 and subsequently re-launched in 1984 (NPCN & ICF MACRO, 2014).

The primary service delivery strategies under the EPI encompass routine immunization services at health facilities (both public and private), community outreach services, mass campaigns in highrisk populations, the "reaching every district" approach targeting remote areas, periodic national immunization days (NIDs), supplemented immunization activities (SIAs) to address missed opportunities and drop-outs, as well as home visits. In accordance with the current immunization schedule, a child is considered fully vaccinated if they have received a BCG vaccine, three doses of pentavalent vaccines (covering diphtheria, tetanus, pertussis, hepatitis B, and Haemophilus influenza type b), a minimum of three doses of oral polio vaccine, one dose of Inactivated Polio vaccine (IPV), one dose of measles vaccine, and one dose of yellow fever vaccine. Since the inception of the EPI, developing nations like Nigeria have encountered challenges in meeting the diverse immunization coverage benchmarks and timelines outlined by the WHO. Initial coverage rates, which held promise, gradually became unsustainable, particularly in rural areas (Ayinde et al.,2014).

The Millennium Development Goal (MDG) 4 aimed to decrease the under-five mortality rate (U5MR) by two-thirds between 1990 and 2015, starting from 191 deaths per 1000 live births in 1990 and achieving a reduction to 89 deaths per 1000 live births in 2014. However, this progress fell short of the 2015 target of 64 deaths per 1000 live births by 28% (MDG12). Similarly, the infant mortality rate, which was 91 deaths per 1000 live births in 1990, improved to 58 deaths per 1000 live births in 2014. Nonetheless, this advancement still fell below the 2015 target of 30 deaths per 1000 live births (Ayinde, 2016). As of 2023, the infant mortality rate in Nigeria stands at 54.740 deaths per 1000 live births, reflecting a 2.63% decrease from the figures reported in 2022 (Ayinde et al., 2014). Similarly, the infant mortality rate for 2021 was 57.701 deaths per 1000 live births, showing a 2.5% decline from the previous year. This downward trend persisted in 2020, where the infant mortality rate was recorded at 59.181 deaths per 1000 live births, marking a 2.44% reduction from 2019. In 2019, Nigeria reported an infant mortality rate of 60.662 deaths per 1000 live births, depicting a 2.38% decrease from the rates in 2018 (Ayinde et al., 2014).

The global underfive mortality rate could witness a significant drop with a reduction in under-5 and infant deaths attributable to vaccine-preventable diseases across all WHO regions. Such a decline would contribute to the attainment of Sustainable Development Goal (SDG) 3, specifically target 3.2, which aims to eliminate preventable deaths among newborns and children under the age of 5. As part of this target, countries are collectively striving to minimize neonatal mortality to no more than 12 deaths per 1,000 live births and under-5 mortality to no more minimize neonatal mortality to no more than 12 deaths per 1,000 live births and under-5 mortality to no more than 25 deaths per 1,000 live births by the year 2030. This underscores the vital importance of addressing vaccine-preventable diseases to achieve these goals (Ayinde et al., 2014). Numerous research endeavors have highlighted diverse obstacles that contribute to challenges in achieving comprehensive immunization coverage within Nigeria.

In a study focusing on incomplete childhood immunization in Nigeria, Adedokun et al. (2015) and Ayinde 2016 pinpointed health system factors and maternal knowledge as key reasons for insufficient coverage. Within resource-constrained regions of Nigeria, achieving adequate levels of immunization against childhood diseases continues to pose a significant public health concern. Consequently, it becomes imperative to comprehend the underlying causes leading to the incomplete adherence to routine immunization schedules for children by women in developing nations like Nigeria.

Despite vaccines being the safest primary preventive measure against life-threatening childhood illnesses, a gap persists in understanding why many mothers do not complete the recommended routine immunization regimen for their children. Hence, this study embarks on an exploration of the factors influencing routine immunization Conpliance among parents in the Ibadan North East Local Government area, aiming to contribute insights into this critical issue Findings from this study can aid federal health policymakers by guiding efficient resource allocation for improved immunization programs. This includes enhancing staff training, electricity supply, cold chain equipment, and outreach vehicles. Such insights would also support the development of effective initiatives to boost immunization rates among caregivers.

The most concerned individuals in many nations, including Nigeria, are health care workers (HCWs). Nigeria is one of the countries most affected by the HIV/AIDS pandemic. According to the "Announcement" from 2016, 1.4% of people are HIV positive. Every day, tens of thousands of healthcare workers (HCWs) throughout the world unintentionally come into contact with blood-borne infections (WHO, 2017). According to Thomas et al. (2015), following these types of workplace incidents, the WHO and ILO recommend HIV Post-Exposure Prophylaxis (PEP) to prevent the spread of HIV. When administered shortly after exposure, PEP medications have been demonstrated to reduce HIV risk by 81%. According to Iloanusi et al. (2019), Nigeria has the highest number of HIV/AIDS cases worldwide.

According to Domkam et al. (2018), healthcare workers are responsible for around 2.5% of all HIV infections worldwide. Healthcare workers who handle blood or bodily fluids on the job have a slight but significant risk of contracting HIV and other blood-borne infections. PEP is frequently not administered to those who seek medical attention more than 72 hours after being exposed to HIV or to people who are not at high risk of HIV transmission. PEP cannot be used in place of appropriate safety precautions while handling potentially contaminated materials or fluids. Giving PEP to healthcare professionals who had been exposed to HIV through needle stick incidents reduced their risk of contracting the virus by around 81% in previous case-controlled trials.

The effectiveness of PEP after sexual activity and other non-work-related occurrences is uncertain, although this supports its usage after exposure. The study assessed the link between parental knowledge and children's immunization, reinforcing the value of education for higher rates and consistent measurement. Healthcare providers in Ibadan North East LGA could use these findings to encourage regular awareness campaigns, enriching caregiver understanding. Moreover, these results can serve as a valuable reference for future research, enriching knowledge on immunization coverage among caregivers. The specific objectives of the study were:

1. To assess the attitude of parents towards routine immunization in Ibadan North East Local Government Area, Oyo state
2. To Identify the key factors influencing parental compliance with routine immunization in Ibadan North East Local Government, Oyo state.
3. To examine the correlation between Parents attitude towards routine immunization and their level of compliance in Ibadan North East Local Government

Methods

This study was conducted in Ibadan North-East LGA. The Ibadan North-East LGA has a land area of about 15.5 square kilometres (km2). It is situated between longitude 3°45’ and 4°00’ East and Latitude 7°15’ and 7°30’ North, with an altitude ranging from 150 to 210 above mean sea level (MSL) (Figure 1). The study area is one of the most populated LGAs of Oyo State with a land area of 16 679 km2. The study area is mainly a residential area and the commercial hub of Ibadan. Dwellings are compact and are mainly characterized by commercial and economic activities, both within the formal and informal sector, mainly along the road sides (street hawking). Commercial markets located within the study area included the Oje, Orita-Aperin, Agodi and Oranmiyan markets. Ibadan North-East is connected through an interstate highway system that traverses the administrative boundary (the Lagos-Ibadan Expressway) and provides the only major access for interstate traffic

along numerous hierarchies of roads. Ibadan North-East is one of the core LGAs in Oyo State and is believed to be the origin of the city of Ibadan. (Wikipedia,2021)

This is a descriptive cross-sectional study, this was preferred because it provides further insights into the research problem by unfolding the variables of interest, estimating, predicting, and examining associative relationships. The population of this study will comprise all parents having children aged 3 – 24 months within Ibadan North East Local Government in Ibadan. A two-stage sampling procedure was used in this study: At stage one simple random sampling technique was used to select five (5) health centres out of the health centers in and around Ibadan North East LGA. Health Centers selected are Oranyan PHC, Felele PHC, St Mary Ayekale PHC, Iwo road PHC, OjePHC. At stage two purposive sampling technique was used to select 55 mothers of children 3 - 24 months from the health centers to make a total of 275 mothers

On the days selected for data collection, the researcher administered the questionnaires to the parents at the primary health Centre. Participants were informed about the study's purpose and provided with a brief explanation of the questionnaire. They were assured that their participation was voluntary, and their responses would remain anonymous. Mothers were given the questionnaires to complete themindependently. The data collected was coded and entered into SPSS (Statistical Package for Social Sciences) software package version 26. Descriptive statistics were used and data were presented in tables, frequencies and percentages, also an inferential statistic such as chi-square was used to determine the level of association between selected independent and dependent variables with p- less than 0.05. Agreement of the Health Centers earmarked for this study was obtained before starting the study

RESULTS

Table 1 Attitude of nursing mothers toward the uptake of routine immunization

Attitude items	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 take immunization for my child even if it requires payment	204 (67.5)	66 (21.9)	9 (3.0)	23 (7.6)
I ensure I take all immunization availablein the	180 (59.6)	101 (33.4)	9 (3.0)	12 (4.0)
health center for my child				
Even when my husband says I should not go I still take my child for immunization for his/her wellbeing	213 (70.5)	42 (13.9)	23 (7.6)	24 (7.9)
I am ready to accept immunization that are given on immunization plus days	229 (75.8)	61 (20.2)	0 (0.0)	12 (4.0)

I advise my friends and relative to take immunization for their children	139 (46.0)	128 (42.4)	23 (7.6)	12 (4.0)

In terms of attitudes towards vaccinations, a significant percentage (63.9%) strongly agree that vaccinations are beneficial, while 32.1% agree to some extent, and a negligible proportion disagree. Similarly, a substantial number (67.5%) are willing to pay for immunization, while a smaller portion (21.9%) also agree, and only a few (3.0%) disagree or strongly disagree. Regarding the uptake of available immunizations at health centers, 59.6% make sure to take all available immunizations for their child, and 33.4% agree to some extent, with a minimal number (3.0%) disagreeing. Even when facing resistance, 70.5% are committed to ensuring their child's immunization for their well-being, with 13.9% agreeing, 7.6% disagreeing, and 7.9% strongly disagreeing. A substantial majority (75.8%) express readiness to accept immunizations provided on designated days, while 20.2% agree, and a minor fraction (4.0%) strongly disagree. Moreover, almost half (46.0%) advise friends and relatives to have their children immunized, 42.4% agree to some extent, and 7.6% and 4.0% respectively disagree or strongly disagree.

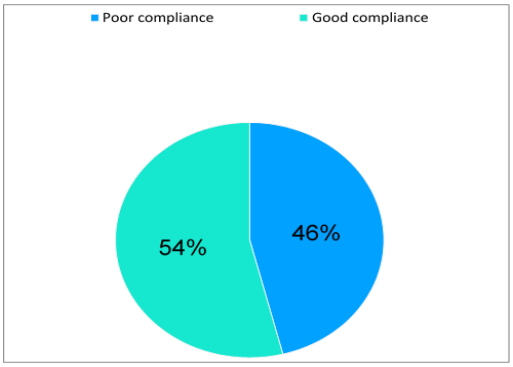
Table 2: Level of compliance with the infant immunization schedule

VARIABLE	Yes N (%)	No N (%)
Have you ever delayed your child's immunization for any other reason apart from illness or allergy?	124 (41.1)	178 (58.9)
Haveyoueverdecidednottohaveyourchildvaccinatedfor any other reason apart from 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 vaccination of your children	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)

A significant proportion (41.1%) of respondents admitted to having delayed their child's immunization for reasons other than illness or allergy, while 58.9% reported no such delays. Moreover, 52.0% acknowledged deciding not to vaccinate their child for reasons other than illness or allergy, compared to 48.0% who reported not having made such decisions. The recommended immunization schedule was deemed beneficial for children by a substantial majority (92.4%), while a small portion (7.6%) expressed reservations. In terms of trust, 92.1% indicated confidence in the information they receive about their children's vaccination, with 7.9% expressing doubt. Furthermore, a significant proportion (88.4%)

noted that only very serious circumstances would prevent them from bringing their child for immunization, while 11.6% acknowledged potential circumstances that could deter them.

Figure 1: Level of compliance with the infant immunization schedule



The mean aggregate score for the questions related to the level of compliance with the immunization schedule was 3.80±.993. Therefore, those respondents who scored below the mean were categorized to have poor compliance while those who scored above the mean were categorized to have good compliance. Figure 1 above reveals that 139 (46.0%) had poor compliance while 163 (54.0%) had good compliance.

Table 3: Factors influencing routine immunization compliance among nursing mothers in Ibadan North East Local Government

Factor that influences the compliance with infant immunization schedule in Ibadan North East LGA	Yes N (%)	No N (%)
My religion prohibits children 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 health care centre	128 (42.4)	174 (57.6)
Immunization charges are costly	102 (33.8)	200 (66.2)
Vaccines are not usually available in the health care centre	137 (45.4)	165 (54.6)
My husband prohibits children immunization	85 (28.1)	217 (71.9)

The compliance with the infant immunization schedule in Ibadan North East Local Government Area is influenced by various factors. A notable percentage (25.2%) indicated that their religion prohibits children's immunization, while 52.3% reported living far from the immunization center. Additionally, 52.0% expressed concerns about the demeanor of healthcare staff not being friendly and welcoming, and 42.4% mentioned that significant time is wasted at the healthcare center. Cost was a factor for 33.8% as immunization charges were considered costly, and 45.4% noted that vaccines are often unavailable at the

healthcare center. Furthermore, 28.1% reported their husbands prohibiting children's immunization, and 71.9% indicated no such prohibition (Table 3)

Hypothesis Testing

Table 4: Association between respondent's demographics and level of compliance

Variables	Poor compliance	Good compliance	X^2value	p- value
Age				
20 years and below	2	8	9.588	0.048*
21 - 25 years	14	30		
26 - 30 years	60	58		
31 - 35 years	33	43		
36 - 40 years	30	24		
Marital Status				
Single	44	32	9.038	0.029*
Married	83	115		
Divorced	10	8		
Separated	2	8		
Level of Education				
No formal Education	25	16	10.417	0.015*
Primary	12	18		
Secondary	22	47		
Tertiary	80	82		
Family Type				
Monogamous	104	119	0.128	0.721
Polygamous	35	44		

Religion				
Christianity	73	100	19.258	<0.001*
Islam	46	61		
Traditional	20	2		
* significant at p-value ≤ 0.05				

The analysis of variables impacting compliance with the infant immunization schedule revealed significant connections in specific areas. Age exhibited a notable link, with individuals aged 20 and below showing poorer compliance. Similarly, marital status had an impact, with single individuals displaying lower adherence. Education levels also demonstrated significance; those with no formal education or primary education showed weaker compliance, while secondary and tertiary education displayed mixed patterns. However, family type and religion did not show significant correlations. Overall, age, marital status, and education were found to significantly influence compliance with the infant immunization schedule, as indicated by the established p-valuethreshold.

Table 5 Association between respondent's attitudes and level of compliance

Respondents attitudes	Poor compliance	Good compliance	X^2value	p-value
I am ready to take immunization for my child even if it requires payment	23(8.2%)	255(91.2%)	13.201	0.004*
Even when my husband says I should not go I still take my child for immunization forhis/her wellbeing	85(30.6%)	193(69.4%)	11.299	0.010*
I ensure I take all immunization available in the health center for my child	49(17.7%)	229(82.3%)	31.082	<0.001*
I am ready to accept immunization that are given on immunization plus days	78(28%)	200(72.0%)	11.791	0.001*
* significant at p-value ≤ 0.05				

The analysis of respondents' attitudes towards compliance with the infant immunization schedule revealed significant correlations. A willingness to pay for immunization (8.2%) and prioritizing a child's well-being despite opposition (30.6%) were linked to better

compliance, supported by respective p-values of 0.004 and 0.010. Ensuring uptake of all available immunizations at health centers (17.7%) and willingness to accept immunizations on specific days (28.0%) were both associated with improved compliance, as indicated by p-values of <0.001 and 0.001 respectively. These findings collectively emphasize the importance of positive attitudes in influencing adherence to the immunization schedule.

Discussion

The participants in this research mainly consist of young mothers, as indicated by the average age and standard deviation of respondents (30.1±5.28 years). This highlights the need for targeted educational initiatives aimed at this specific age group. Given that a significant portion of the respondents are married (65.6%), it's evident that both mothers and their partners play a role in immunization decisions. This emphasizes the necessity of involving husbands in educational efforts and campaigns to create a supportive environment for vaccination. Interestingly, more than half of the respondents (53.6%) have tertiary education, suggesting a relatively educated group. This educational background likely contributes positively to their understanding of immunization, potentially leading to better immunization rates. Consequently, there is a crucial need to disseminate accurate information and address any misconceptions through educational interventions. Cultural and religious factors hold substantial importance, with a majority of respondents belonging to monogamous families (73.8%) and identifying as Christians (57.3%). This underscores the significance of recognizing and addressing cultural and religious beliefs, and involving religious leaders in promoting immunization acceptance and uptake. Furthermore, a significant portion of respondents (57.0%) are traders, implying the need to design interventions that accommodate their unique circumstances, such as flexible immunization schedules or outreach programs considering their work responsibilities.

In terms of attitudes towards vaccinations, a significant portion (63.9%) of respondents strongly agree on the benefits of vaccinations, with an additional 32.1% expressing partial agreement. These findings mirror those discovered in Addis Ababa (Birhanu et al., 2015), where an overwhelming 96% of participants believed in the preventive benefits of immunization against diseases. Similarly, Adefolalu et al. (2020) reported that an impressive 98.8% of their respondents considered childhood immunization essential for disease prevention. Likewise, a substantial number of participants (67.5%) are willing to cover the costs of immunization, while a smaller group (21.9%) also agree, and only a minority (3.0%) disagree. This resonates with the study by Taiwo et al. (2015) in Kaduna, Nigeria, where 65% of respondents recognized the protective value of vaccinations and were open to receiving them on designated days. As for the uptake of available immunizations at healthcare centers, a considerable portion (59.6%) ensure their children receive all appropriate vaccinations, and 33.4% agree to some extent. This, however, diverges from the findings of Angadi et al. (2013), where only 29.98% believed in the importance of adhering to full immunization schedules. Despite encountering resistance, a significant majority (70.5%) of parents remain steadfast in ensuring their child's immunization for the sake of well-being, while 13.9% express agreement.

Similarly, a substantial percentage (75.8%) show readiness to accept immunizations on designated days, aligning well with Taiwoetal.'s (2015) findings. It's notable that nearly half of

the participants (46.0%) actively encourage friends and relatives to have their children immunized, with 42.4% expressing partial agreement. Additionally, a high degree of confidence (92.1%) is evident in the information received about their children's vaccinations. Furthermore, a significant portion (88.4%) indicated that only very serious circumstances would deter them from bringing their child for immunization, whereas 11.6% acknowledged potential obstacles.

The aggregate score of 3.80±.993 for questions related to compliance with the immunization schedule served as a benchmark. Respondents scoring above the mean were categorized as having good compliance, while those scoring below were deemed to have poor compliance. The analysis revealed that factors influencing compliance included religious prohibitions (25.2%), distance from the healthcare center (52.3%) this is inline with a study by Bangura, et al 2020, where it was reported that the long distances between health centres and the familes they serve are barriers to full immunization uptake compliance by parents., concerns about healthcare staff demeanor (52.0%), time wastage (42.4%), cost (33.8%), vaccine availability (45.4%), and lack of partner support (28.1%). Statistical analysis further highlighted the impact of age, marital status, and education on compliance. Individuals aged 20 and below, single individuals, and those with lower levels of education showed weaker adherence. These findings echo those of Konwea et al. (2015), reinforcing the association between educational status and compliance with routine immunization. Moreover, the correlation between attitudes and compliance was significant. A willingness to pay for immunization (8.2%), prioritizing a child's well-being despite opposition (30.6%), ensuring uptake of all available immunizations (17.7%), and willingness to accept immunizations on specific days (28.0%) were all connected to better compliance, reinforcing the influence of positive attitudes on adherence to immunizationschedules.

Conclusion And Recommendations

This study underscores the significance of addressing specific demographics and attitudes to enhance immunization compliance. The participants primarily consist of young, educated mothers, highlighting the need for tailored educational initiatives. The involvement of husbands in immunization decisions is crucial due to their influence, especially among married respondents. Furthermore, the positive attitudes towards vaccinations, willingness to cover costs, and confidence in information signal a favorable disposition towards immunization. Notably, compliance with the immunization schedule is impacted by various factors, including religious constraints, distance from healthcare centers, concerns about healthcare staff, time constraints, costs, vaccine availability, and partner support. Age, marital status, and education were shown to significantly influence compliance, aligning with previous studies. Attitudes such as willingness to pay, prioritizing child well-being, ensuring complete immunization uptake, and readiness to accept designated immunization days all correlated with better compliance.

Based on these findings, it is recommended that immunization interventions target young mothers and their partners through comprehensive educational campaigns. Considering the high level of education among respondents, these campaigns should focus on addressing misconceptions and disseminating accurate information. Engaging religious leaders and cultural influencers could foster greater acceptance among families adhering to specific

religious and cultural beliefs. Moreover, flexible immunization schedules and outreach programs accommodating the work responsibilities of traders could help improve immunization rates among this group. To ensure equitable access, efforts should be directed towards providing affordable or free immunization services for families with varying income levels. Overall, the study highlights the needfor a multifaceted approach to improve immunization compliance, including tailored education, involvement of partners, and addressing financial and cultural barriers.

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