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The Interplay of Ethnicity, Education, and Employment on Maternal Attitudes Toward Childhood Vaccination in Nigeria

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ABSTRACT: Vaccination is a highly effective public health strategy for reducing child mortality from vaccine-preventable diseases (VPDs) such as measles, polio, tuberculosis, and Haemophilus influenzae.

Despite the provision of free routine immunizations for children up to two years old in Nigeria, challenges in vaccine uptake persist, especially for vaccines needed beyond early childhood. These challenges are not merely due to vaccine access but are significantly influenced by maternal attitudes towards immunization. Socio-demographic factors such as ethnicity, education, and employment status are crucial in shaping these attitudes, yet their specific impacts are not well understood. This study aims to explore how these socio-demographic variables affect maternal attitudes towards childhood immunization, with a focus on immunization beyond the age of two in Ughelli North Local Government Area (LGA) of Delta State, Nigeria.

A cross-sectional study was conducted with 321 mothers in Ughelli North LGA, utilizing a modified, pre-tested questionnaire to evaluate maternal attitudes towards childhood immunization. Data were collected through an online survey and analysed using descriptive and inferential statistics, with Chi-square tests used to assess the relationships between socio-demographic factors and attitudes. The majority of participants were Urhobo (60.7%), semi-employed (53.6%), and had tertiary education (92.1%). The findings showed that 79.4% of mothers had positive attitudes towards childhood immunization. Significant associations were found between maternal attitudes and ethnicity ($p = 0.026$), employment status ($p = 0.016$), and educational level ($p < 0.001$), indicating that these factors are pivotal in shaping maternal views on the importance and necessity of immunization.

Unexpectedly, even mothers with high educational levels showed variability in their attitudes based on ethnic background and employment status, suggesting that public health interventions must consider the complex interplay of these factors. The study's results provide valuable insights into the socio-cultural and economic determinants of maternal attitudes towards immunization in Ughelli, underscoring the need for targeted health promotion strategies that address specific demographic groups. Efforts should focus on community-based interventions and media campaigns that highlight the importance of continuing vaccination beyond infancy. Additionally, enhancing access to immunization services and addressing barriers related to employment and ethnicity will be crucial for improving vaccine uptake in the region.

Keywords: Maternal attitudes, child immunization, ethnicity, cultural background, educational attainment, employment status, socio-demographic influences, vaccine acceptance, Nigeria, Ughelli North LGA.

INTRODUCTION: Childhood immunization is one of the most cost-effective public health interventions for reducing childhood morbidity and mortality. It provides protection against serious diseases such as measles, polio, tetanus, diphtheria, pertussis, and Mpox, which has seen a growing prevalence in recent years (World Health Organization [WHO], 2021; Abejegah, Obohwemu & Mdegela, 2024; Jesse & Obohwemu, 2024). While global initiatives like the Expanded Program on Immunization (EPI) have significantly improved vaccination rates, low- and middle-income countries (LMICs), including Nigeria, continue to face barriers to achieving optimal coverage. Maternal attitudes significantly influence vaccination uptake, shaped by demographic factors like ethnicity, education, and employment. These factors contribute to maternal decision-making regarding childhood immunization, with significant implications for vaccine acceptance or hesitancy (Dubé et al., 2013; Bangura et al., 2020; Obohwemu, 2024a).

Nigeria is among the countries with the highest number of under-vaccinated children. According to WHO and UNICEF, over three million Nigerian children were either under-vaccinated or entirely unvaccinated in 2018 (WHO/UNICEF, 2020). While barriers such as limited healthcare access, logistical challenges, and cultural resistance persist, maternal attitudes play a pivotal role (Obohwemu, 2024b). These attitudes are shaped not only by knowledge but also by broader psychosocial, cultural, and economic factors influencing beliefs and perceptions about vaccination, especially as diseases like MPox become more prevalent.

Nigeria's ethnic diversity—home to over 250 ethnic groups—profoundly shapes maternal attitudes toward immunization. Ethnic identity is closely tied to cultural practices, which may conflict with biomedical perspectives on health. In certain ethnic communities, beliefs favouring natural immunity or divine intervention over medical interventions, including vaccines, contribute to vaccine hesitancy (Jegede, 2007). Mothers influenced by such beliefs may prioritize traditional remedies, especially when distrust of Western medicine is prevalent.

Religious beliefs, often overlapping with ethnicity, also impact maternal attitudes. For example, northern Nigeria, predominantly Muslim, has a history of vaccine resistance, fuelled by misinformation. During the polio eradication campaigns of the early 2000s, rumours that vaccines were tools for sterilization or population control spread distrust in vaccination programs (Obanewa & Newell, 2020). Although such views are less

common in urban areas like Ughelli, they persist among migrant communities, where cultural and religious norms continue to shape attitudes toward immunization.

Education is a critical factor influencing maternal attitudes toward childhood immunization. Research consistently links higher maternal education levels to positive vaccination attitudes and adherence to immunization schedules (Adedokun et al., 2017; Obohwemu, 2024a). Educated mothers are typically more aware of the benefits of vaccination and less likely to be influenced by misinformation or cultural beliefs opposing immunization (Ndukwe et al., 2022). Furthermore, education fosters trust in healthcare providers and confidence in vaccine safety and efficacy (Bangura et al., 2020).

However, the relationship between education and maternal attitudes is not always linear. While education enhances access to accurate information, it can also expose mothers to misinformation, particularly through social media. Platforms like Facebook and WhatsApp facilitate the spread of both credible and false vaccine information, influencing maternal decision-making (Salmon et al., 2015). This paradox highlights the need for targeted health education that equips mothers to critically evaluate vaccine-related information.

Maternal employment status also shapes attitudes toward childhood immunization. Employed mothers, especially those in formal sectors, often face time constraints, which can hinder their ability to adhere to vaccination schedules (Afolabi et al., 2021). Conversely, employment can enhance maternal attitudes by increasing exposure to health information and resources through workplace programs or interactions with colleagues. Employment correlates with higher socioeconomic status, which generally promotes trust in healthcare systems and access to immunization services (Oladokun et al., 2016).

Delta State, particularly Ughelli, represents a microcosm of Nigeria's ethnic, cultural, and socioeconomic diversity. This urban centre hosts populations from various ethnic and religious backgrounds, including migrants who bring traditional beliefs that may conflict with biomedical health practices. Among certain groups, particularly those with ties to northern Nigeria, vaccine hesitancy remains a barrier to achieving optimal coverage (Jegede, 2007). Such beliefs are often reinforced by social networks, where misinformation about vaccines spreads rapidly through community leaders or social media platforms (Smith et al., 2017; Obohwemu, Idomeh & Chauhan, 2025).

Vaccine safety concerns are another significant challenge in Ughelli. Mothers frequently cite fears of side effects like fever, swelling, or allergic reactions (Isikwenu, 2021). These fears are amplified by widespread misinformation, including unfounded claims that vaccines cause infertility or contain harmful substances (Edje et al., 2020). Such concerns, even when accompanied by recognition of immunization benefits against diseases like MPox, can lead to delays or refusals in vaccination (Kingsley & Chukwuemeke, 2022).

Trust in healthcare providers is pivotal in shaping maternal attitudes. Negative experiences with the healthcare system, such as long wait times or poor communication, can erode trust and discourage vaccination (Asiwe et al., 2022). Conversely, positive patient-provider interactions can build trust and encourage adherence to immunization schedules (Ezeh et al., 2024). Improving healthcare quality and fostering better provider communication in overburdened systems like those in Ughelli is crucial for addressing vaccine hesitancy.

In Ughelli, social networks and community dynamics heavily influence maternal attitudes. Mothers often look to family members, friends, and community leaders for guidance. In communities where vaccine hesitancy prevails, mothers may follow prevailing norms even if they recognize the benefits of immunization (Smith et al., 2017). Conversely, observing positive vaccination behaviours among peers can encourage vaccine acceptance (Salmon et al., 2015). Community-based interventions leveraging these social dynamics are essential for shifting attitudes and promoting immunization.

This study contributes to understanding the interplay of ethnicity, education, and employment in shaping maternal attitudes toward childhood immunization in urban Nigeria. Unlike previous research focused on knowledge gaps or logistical barriers, this study emphasizes the psychosocial and cultural factors influencing maternal decision-making. The research highlights how Delta State's cultural and religious diversity affects immunization attitudes. It explores how beliefs in natural immunity or divine intervention intersect with concerns about vaccine safety. Such findings emphasize the need for culturally sensitive public health interventions. The study offers insights into how employment influences maternal attitudes. While employment can present logistical challenges, it also facilitates exposure to health information, which can improve vaccine acceptance. Highlighting the critical role of trust in healthcare providers, the research underscores the need to improve healthcare communication and reduce barriers like long wait times.

These changes are essential for fostering positive maternal attitudes toward immunization. The paper identifies social networks as key drivers of maternal attitudes. By targeting influential community members and leveraging positive peer influences, public health initiatives can address vaccine hesitancy more effectively.

METHODOLOGY

This study investigated factors influencing maternal knowledge of childhood vaccination in Ughelli North Local Government Area, Delta State, Nigeria. A semi-structured questionnaire, adapted from an earlier study by Idowu, Obohwemu & Iyevhobu (2024), was administered to a purposively selected sample of mothers in the area. The questionnaire focused on evaluating the mothers' knowledge of vaccination schedules, the benefits of vaccines, and potential side effects. Additionally, demographic data such as ethnicity, education level, and employment status were collected to assess the relationship between these factors and maternal vaccination knowledge.

Research Design

A cross-sectional study design was utilized to collect primary data from mothers with children within the recommended vaccination schedule. The survey gathered demographic information and variables related to vaccination attitudes and perceptions. Descriptive statistics were used to present the characteristics and experiences of the respondents, while bivariate analysis was conducted to identify associations between socio-demographic factors and vaccination knowledge.

Study setting

This study was conducted in Ughelli North Local Government Area (LGA) of Delta State, Nigeria. Ughelli North LGA, the headquarters of Ughelli, is a prominent region in Delta State. The LGA covers approximately 818 square kilometers and has an estimated population of 388,191 according to recent statistics (National Bureau of Statistics, 2023). A semi-urban environment, Ughelli North is one of the 25 LGAs in Delta State (Agaja & Unueroh, 2012).

Ughelli North LGA comprises several towns and villages, including Afiesere, Ododegho, Ofuoma, Agbarha, Owheru, Evwreni, Ogor, Agbarho, and Orogun (Ekeh, 2007). The area is predominantly inhabited by the Urhobo ethnic group, though it also hosts a mixture of other tribes such as the Isokos and Edos (Ogbeide, 2016), contributing to its rich cultural tapestry.

The residents of Ughelli North benefit from a range of healthcare services provided by both government and private entities. The LGA is home to several primary healthcare centers distributed across its towns and villages, providing essential health services, including vaccination programs (Agaja & Unueroh, 2012; Delta State Ministry of Health, 2023).

Ughelli North's proximity to Warri, a major commercial hub in Delta State, enhances its accessibility and connectivity (Warri Chamber of Commerce and Industry, 2023). The region's infrastructure includes schools, a general hospital, and a local government secretariat, making it a suitable setting for various research studies (Ekeh, 2007). However, like many other LGAs, Ughelli North lacks comprehensive data on the knowledge, attitude, and practice of mothers regarding childhood vaccination, highlighting the need for further research in this area (NITAG, 2023).

Study Population

The study targeted mothers with children aged 2 years and above, residing in Ughelli North LGA, Delta State. Participants were recruited via online platforms, such as Facebook, Instagram, and YouTube. Inclusion criteria required digital literacy and residency in Ughelli North LGA. Consent was obtained through the data collection tool, which also gathered demographic data and information on vaccination knowledge, including awareness of vaccines sourced "out-of-pocket." These data were then subjected to statistical analysis.

Sampling Approach

The study evaluated the knowledge, attitudes, and practices of mothers in Ughelli North LGA regarding the vaccination of their children aged 2 to 10 years. A purposive non-probability sampling method was employed due to the unique nature of the target population (Ames et al., 2019). Eligible mothers were identified, consented, and administered semi-structured questionnaires. The sample size was calculated beforehand using appropriate statistical methods.

Eligibility Criteria

Inclusion criteria for the study were: mothers whose children met the age range of 2–10 years, who resided in Ughelli North LGA, were digitally literate, and who provided consent. Mothers who did not meet these criteria, such as those outside the study area, with children not within the age range, or lacking digital literacy, were excluded.

Sample Size

A sample size of 420 was calculated using Cochrane's (1977) formula for studying a single proportion. A prevalence rate of 51.0% from a 2019 study on maternal vaccination knowledge in Lagos (Adefolalu et al., 2019) was used, allowing for a 10% non-response rate to

account for attrition.

Sample Recruitment

Participants were recruited between April and June 2024, with the survey link, participant information, consent form, and questionnaire distributed through social media platforms and groups. A Google advertisement campaign was launched to further promote the study, and eligible participants were able to access the survey link. Participants had to agree to participate by clicking "yes" on the consent form before proceeding to the questionnaire.

Data Analysis

Data analysis was performed using IBM SPSS version 28.0 (IBM Inc., Chicago, USA). Descriptive statistics were used to describe demographic variables and vaccination awareness levels. Inferential statistics, specifically Chi-square tests, were used to examine the relationship between maternal knowledge and demographic variables. The data, categorized into nominal and ordinal responses, were coded numerically and analyzed using Pearson's Chi-square test, with a significance level set at $p < 0.05$.

Data Management

Data collected through Survey Monkey was filtered to remove responses that did not meet the inclusion criteria, coded, and analyzed using SPSS version 28.0. Responses to "Yes" or "No" questions were scored as "1" or "0," respectively, while multiple-choice and open-ended questions were scored accordingly. Knowledge scores were calculated, and knowledge levels were categorized as "poor" (<50%), "fair" (50-69%), or "good" (≥70%). Descriptive statistics, including frequency distributions for categorical variables and means with standard deviations for continuous variables, were computed. Bivariate analyses were conducted using Chi-square or Fisher's Exact Test where appropriate, with a two-tailed p-value < 0.05 considered statistically significant.

RESULTS

Sociodemographic Characteristics of Respondents

A total of 321 respondents (mothers) were included in the analysis, giving a response rate of 76%. The mean age of the respondents was 33.5 ± 5.8 years, with the youngest being 21 years old and the oldest 51 years. The mean age of their children was updated to 5.2 ± 2.1 years. In terms of the age distribution, 64.2% (n = 206) of the respondents were aged 31–40 years, 25.9% (n = 83) were aged 21–30 years, and 9.9% (n = 32) were aged above 40 years. For the children, 57.3% (n = 184) were 5 years old or younger, while 42.7% (n = 137) were over 5 years old (see Table 1). Regarding ethnicity, the majority were of Urhobo descent (60.7%, n = 195), Isoko (21.5%, n = 69), Itsekiri (9.6%, n = 31) and Others (8.2%, n = 26). Employment status showed that 50.2% (n = 161) were semi-employed, 43.0% (n = 138) were employed, and 6.8% (n = 22) were unemployed. For education level, 88.8% (n = 285) of the respondents had attained tertiary education, 8.1% (n = 26) had secondary education, and 3.1% (n = 10) had primary education.

Table 1: Summary Statistics of Respondents' Sociodemographic Characteristics

Characteristic	Mean (SD)	Range	Frequency (%)
Respondent Age (years)	33.5 (5.8)	21-51	-
Child Age (years)	5.2 (2.1)	-	-
Ethnicity	-	-	Urhobo (60.7%), Isoko (21.5%), Itsekiri (9.6%), Others (8.2%)
Employment Status	-	-	Semi-employed (50.2%), Employed (43%), Unemployed (6.8%)
Education Level	-	-	Tertiary (88.8%), Secondary (8.1%), Primary (3.1%)

A more comprehensive data is presented in Table 2, including detailed demographic information about the study participants, such as age, ethnicity, employment status, education level, and the age of respondents' children. This information is essential for understanding the characteristics of the study population and interpreting the findings.

Table 2: Sociodemographic Characteristics of Respondents

Characteristic	Frequency (n)	Percentage (%)	Mean ± SD	Range

Age (years)			33.5 ± 5.8	21-51
21-30	83	25.9		
31-40	206	64.2		
>40	32	9.9		
Child's Age (years)			5.2 ± 2.1	
≤5	184	57.3		
>5	137	42.7		
Ethnicity				
Urhobo	195	60.7		
Isoko	69	21.5		
Itsekiri	31	9.6		
Others	26	8.2		
Employment Status				
Semi-employed	161	50.2		
Employed	138	43		
Unemployed	22	6.8		
Education Level				
Tertiary	285	88.8		
Secondary	26	8.1		
Primary	10	3.1		

Respondents' Attitudes towards Childhood Vaccination

Mothers' attitudes towards childhood vaccination were measured using a 5-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). To simplify the analysis, responses were grouped into three categories: agree (score of 3 or above), neutral (score of 2), and disagree (score of 1). As shown in Table 3, the majority of respondents (79.1%, n = 254) agreed that childhood vaccination is necessary, while 12.1% (n = 39) were neutral and 8.7% (n = 28) disagreed.

Regarding the completion of the vaccination schedule, 79.8% believed that healthy children should be vaccinated to prevent diseases, 12.2% were neutral, and 8.1% saw no need to complete the vaccination schedule. A significant majority (85.7%) supported the idea that all vaccination services should be free, with only 4.4% expecting out-of-pocket payments. Furthermore, 53.3% of respondents disagreed with the statement that 'vaccinations are not 100% effective,' while 26.8% were undecided, and 19.9% agreed.

These findings underscore the generally positive attitude of mothers towards childhood vaccination, although concerns about vaccine effectiveness and affordability remain.

Table 3: Mothers' Attitudes towards Childhood Vaccination (N = 321)

Variable	Agree (%)	Neutral (%)	Disagree (%)
Vaccination for children is very necessary	254 (79.1)	39 (12.1)	28 (8.7)
It is compulsory to complete vaccination for children	256 (79.8)	39 (12.2)	26 (8.1)
Vaccination should be discontinued if the child is healthy	24 (7.5)	36 (11.2)	261 (81.3)
All vaccinations should be free	275 (85.7)	32 (10.0)	14 (4.4)
Vaccinations are not 100% effective	64 (19.9)	86 (26.8)	171 (53.3)

The clinic staff was helpful during vaccination	225 (70.1)	70 (21.8)	26 (8.1)
Waiting time discouraged you from completing vaccination	110 (34.3)	90 (28.0)	121 (37.7)
Finding information about vaccination was difficult	80 (24.9)	76 (23.7)	165 (51.4)
Availability of vaccines was a problem	69 (21.5)	61 (19.0)	191 (59.5)

A notable 70.1% of mothers indicated that healthcare staff positively influenced their attitude towards vaccination, while only 8.1% disagreed and 21.8% were indifferent. Moreover, 34.3% felt that long waiting times affected their willingness to vaccinate their children, while 37.7% did not consider waiting times a significant deterrent.

Furthermore, 59.5% of mothers disagreed with the statement that availability of vaccines was a problem, suggesting that most mothers in the study had access to vaccines. However, 21.5% believed that availability was indeed an issue, and 19.0% were neutral on the matter. Access to information about vaccination was another concern, with 24.9% reporting difficulty in obtaining relevant information.

Overall, 20.9% of respondents exhibited a poor attitude towards childhood vaccination, while 79.1% had a good attitude, as illustrated in Figure 1.

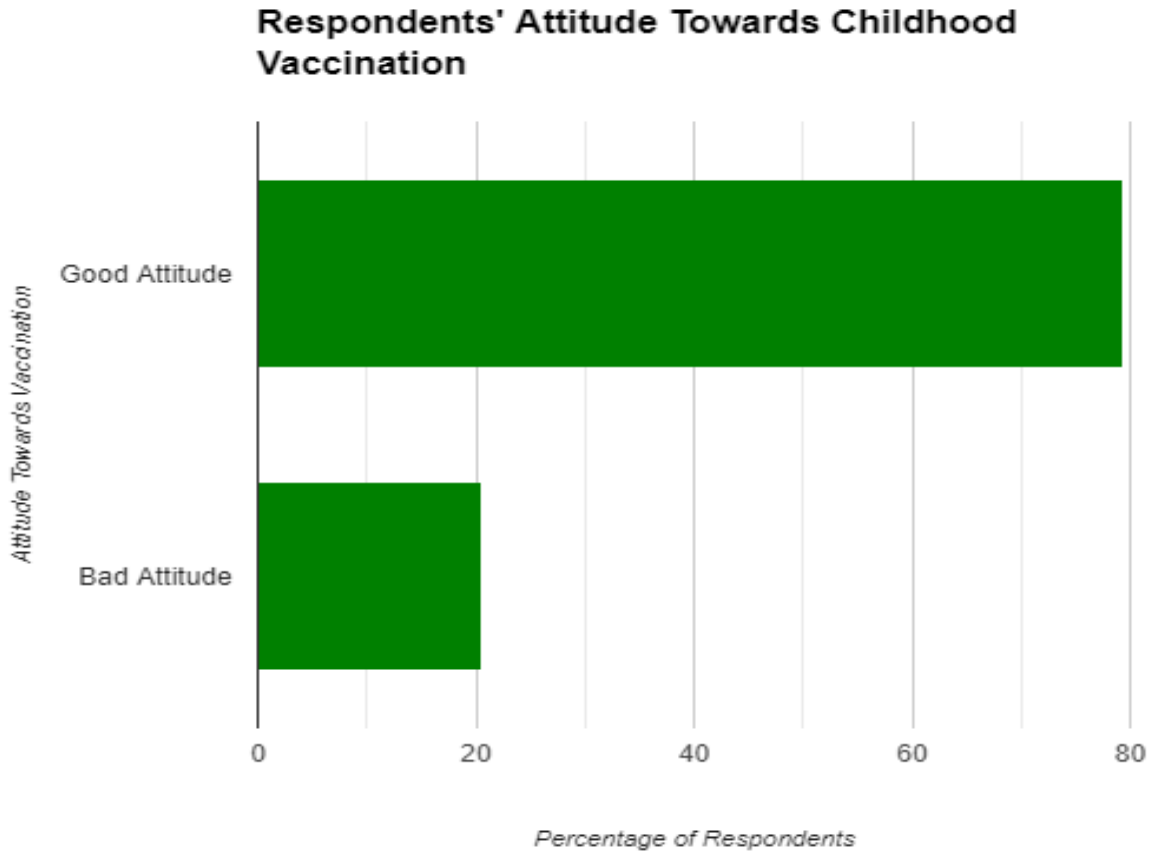

Figure 1: Mothers' Attitudes Towards Childhood Vaccination

Factors Associated with Respondents' Attitudes Towards Childhood Vaccination

Bivariate analysis was conducted to examine potential associations between attitudes towards childhood

vaccination and knowledge, as well as socio-demographic characteristics (Table 4). Among age groups, 75.1% of respondents aged 21-30 years, 81.3% aged 31-40 years, and 74.2% above 40 years exhibited positive attitudes towards childhood vaccination. However, no significant association was found between respondents' ages and their attitudes (p = 0.413).

Similarly, there was no significant association between the child's age and the mother's attitude towards vaccination (p = 0.116). Among respondents with children under five years of age, 76.4% had a positive attitude, while 83.8% of those with children above five years also exhibited positive attitudes.

Knowledge level was also not significantly associated with attitude (p = 0.086). Among mothers with good knowledge of vaccination, 86.9% displayed a positive attitude, while 77.3% of those with poor knowledge still demonstrated good attitudes towards vaccination.

Conversely, ethnicity (p = 0.026) and employment status (p = 0.016) showed significant associations with attitudes. For example, 82.9% of Urhobo, 71.0% of Isoko, and 61.4% of Itsekiri respondents exhibited positive attitudes towards vaccination. Unemployed mothers were more likely to have poor attitudes compared to employed mothers (75% vs 19.9%).

Educational status was also strongly associated with attitude (p < 0.001). Women with tertiary education were significantly more likely to have poor attitudes (82.5%) compared to those with secondary education or less (43.5%).

Table 4: Association between Socio-Demographic Characteristics and Attitude (N = 321)

Variable	Good Attitude (%)	Poor Attitude (%)	Chi-square	p-value
Age-group (years)				
21-30	55 (75.1)	18 (24.9)	1.766	0.413
31-40	178 (81.3)	41 (18.7)		
>40	19 (74.2)	7 (25.8)		
Child's age (years)				
≤5	133 (76.4)	41 (23.6)	2.477	0.116
>5	119 (83.8)	23 (16.2)		
Ethnicity				
Urhobo	201 (82.9)	41 (17.1)	7.298	0.026*
Isoko	37 (71.0)	15 (29.0)		
Itsekiri	11 (61.4)	7 (38.6)		
Employment status				
Unemployed	1 (25.0)	3 (75.0)	FET**	0.016*
Employed	247 (80.1)	61 (19.9)		
Education level				
Secondary & below	15 (56.5)	11 (43.5)	FET**	<0.001*
Post-Secondary	52 (17.5)	245 (82.5)		
Knowledge				
Good	10 (13.1)	66 (86.9)	2.955	0.086
Poor	56 (22.7)	191 (77.3)		

***Statistically significant at p <0.05, Good Knowledge (Good and Fair) **FET: Fisher's Exact**

Summary of Findings

Among the 321 women surveyed, the mean age was 34.5 ± 5.3 years, and their children had a mean age of 5.4 ± 2.3 years. A majority of respondents were of Urhobo ethnicity (77.3%) and had tertiary education

(92.1%). Despite low knowledge of vaccination (76.9% with poor knowledge), 79.1% exhibited a positive attitude towards childhood vaccination.

No significant association was found between socio-demographic characteristics like age and knowledge level and attitude ($p > 0.05$). However, attitude was significantly associated with ethnicity, employment status, and educational level ($p < 0.05$). Therefore, while knowledge may not directly influence attitudes, cultural and socio-economic factors do play a significant role in shaping maternal attitudes towards childhood vaccination.

DISCUSSION

Immunization is widely regarded as one of the most effective and economically efficient public health strategies, protecting children from numerous vaccine-preventable diseases (VPDs) that contribute significantly to child morbidity and mortality, particularly in low- and middle-income countries (LMICs). Despite substantial global and national initiatives, childhood immunization coverage in Nigeria continues to fall short of optimal levels, with considerable regional and socio-demographic disparities. Maternal attitudes toward immunization, shaped by various socio-demographic factors, are critical in determining vaccine uptake and adherence to immunization schedules. This discussion examines the influence of ethnicity, education, and employment on maternal attitudes toward childhood immunization in Nigeria.

Ethnicity and Maternal Attitudes Toward Immunization

As one of the world's most ethnically diverse nations, Nigeria's over 250 ethnic groups exhibit distinct cultural beliefs and practices that significantly influence health-seeking behaviours, including immunization. Ethnic norms and traditions often shape maternal perceptions of vaccine safety and efficacy, with some ethnic groups adhering to traditional remedies or expressing scepticism toward Western medicine. This can result in reduced immunization uptake (Edje et al., 2020; Obohwemu et al., 2022).

Research by Oladokun et al. (2016) highlighted the influence of cultural and religious beliefs on vaccine hesitancy in Northern Nigeria, predominantly inhabited by the Hausa-Fulani. In these communities, concerns about vaccines leading to infertility or not complying with Islamic dietary laws ("halal") have contributed to resistance. Similar resistance has been noted among some Christian communities in the southeastern region, where mistrust arises from rumours linking vaccines to political or anti-religious agendas (Bangura et al., 2020).

Conversely, the Urhobo-dominated south-south region, including urban centres like Ughelli, often reports more favourable attitudes toward immunization due to historical openness to Western education and medical systems. The Urhobo ethnic group generally exhibits greater acceptance of vaccines, as this study has shown. However, even within relatively homogeneous ethnic communities, subgroups such as migrants or internally displaced persons (IDPs) may face additional challenges, including limited access to healthcare services, which can hinder immunization uptake.

Culturally sensitive interventions are critical for addressing ethnic disparities in maternal attitudes. Tailored health education campaigns that respect local customs, religious beliefs, and linguistic diversity can foster more positive attitudes toward immunization (Ndukwe et al., 2022). Such initiatives should involve trusted community leaders to bridge cultural divides and dispel myths surrounding vaccines.

Education and Its Impact on Maternal Attitudes

Education is a key socio-demographic determinant of maternal attitudes toward childhood immunization. Numerous studies have demonstrated that higher educational attainment correlates with better health literacy, more positive vaccine attitudes, and higher immunization rates (Adedokun et al., 2017; Obohwemu et al., 2022). Educated mothers are more likely to understand the importance of vaccines, resist misinformation, and seek accurate healthcare information.

A study by Fatiregun et al. (2021) in Lagos revealed that mothers with secondary or tertiary education were more likely to view vaccines as essential and safe compared to mothers with only primary or no formal education, who expressed greater scepticism. Additionally, educated mothers are more likely to adhere to complete immunization schedules, including booster doses, rather than stopping after initial vaccinations.

However, education alone does not guarantee optimal attitudes toward vaccination. Sadoh et al. (2013) found that even educated mothers sometimes lacked full knowledge of immunization schedules, particularly regarding booster doses. This indicates the need for ongoing education and engagement with health services to address knowledge gaps and reinforce positive attitudes.

Conversely, mothers with limited or no formal education are more vulnerable to misinformation, often spread through informal communication channels such as word-of-mouth or social media. Eze et al. (2021) noted that misinformation about vaccine

safety proliferates in low-education communities, fuelling negative attitudes that undermine immunization efforts.

To address these challenges, educational interventions should prioritize health literacy over simple awareness. Simplified, culturally relevant materials and programs targeting women with lower education levels can help bridge gaps in understanding. Integrating immunization education into adult literacy programs may further enhance maternal attitudes in underserved populations (Oyo-Ita et al., 2016).

Employment and Its Influence on Immunization Attitudes

Maternal employment status plays a significant role in shaping attitudes toward childhood immunization by affecting both access to healthcare resources and availability for immunization appointments. Studies suggest that mothers in formal employment generally exhibit more positive attitudes toward immunization than those who are unemployed or informally employed (Adedokun et al., 2017).

Formal employment provides financial stability and often includes access to health insurance and workplace health initiatives, exposing mothers to reliable information about vaccines. In contrast, mothers working in the informal economy face unique challenges, such as irregular working hours, lack of health insurance, and financial instability, all of which can hinder their ability to prioritize healthcare services, including immunization (Fatiregun et al., 2021).

Informally employed mothers, such as market vendors or domestic workers, often struggle with time constraints, limiting their ability to attend scheduled immunization appointments. Furthermore, the indirect costs associated with accessing healthcare, including transportation or time off work, can deter vaccine uptake, even when vaccinations are offered for free under Nigeria's national immunization program (Adefolalu & Bamgboye, 2020).

Unemployed or underemployed mothers also face economic barriers to healthcare access, fostering negative attitudes toward immunization as they perceive it to be an inaccessible or unaffordable service. These economic pressures can overshadow the perceived benefits of vaccines.

To address these barriers, targeted interventions must account for the specific needs of employed mothers, especially those in informal sectors. Mobile health (mHealth) strategies, such as SMS reminders and digital health campaigns, offer flexibility and real-time access to information, accommodating mothers with demanding schedules (Eze et al., 2021). Additionally, workplace immunization drives and extended clinic hours can help mitigate time-related barriers, promoting more positive attitudes toward vaccination.

Intersecting Influences of Ethnicity, Education, and Employment

The effects of ethnicity, education, and employment on maternal attitudes toward immunization often intersect, creating complex dynamics in vaccine acceptance or hesitancy. For instance, an educated mother from an ethnic minority with strong traditional beliefs may still harbour vaccine hesitancy due to cultural influences. Similarly, an unemployed mother from a pro-vaccine ethnic group may face financial and logistical barriers, despite having positive attitudes toward vaccination.

In urban centres like Ughelli, which is both ethnically diverse and highly urbanized, these intersecting variables contribute to variations in immunization coverage. Studies have shown that mothers in low-income, ethnically mixed neighbourhoods often face compounded challenges such as language barriers, limited access to health education, and unstable employment, all of which negatively impact their attitudes toward immunization (Edje et al., 2020; Idowu, Obohwemu & Iyevhobu, 2024).

Health promotion campaigns must adopt a multi-faceted approach to address these overlapping socio-demographic factors. Interventions should simultaneously tackle cultural, educational, and economic barriers. For example, community-based programs involving local leaders and healthcare workers from various ethnic backgrounds can help mitigate cultural resistance to immunization (Afolabi et al., 2012; Isikwenu, 2021; Obohwemu, 2023). Providing health education in diverse languages and formats can ensure accessibility for all groups, while integrating immunization services into maternal and child health programs can ease access for working mothers.

CONCLUSION

Ethnicity, education, and employment significantly influence maternal attitudes toward childhood immunization in Nigeria. Generally, higher education levels and formal employment correlate with more favourable attitudes, while ethnic and cultural beliefs, along with economic challenges, can hinder vaccine acceptance. Ethnic identity shapes health beliefs and access to healthcare information, while education enhances health literacy and the ability to evaluate vaccine safety. Employment status, especially in the informal sector, adds barriers to accessing immunization services and affects how mothers prioritize preventive healthcare. Overcoming these

challenges requires culturally sensitive and accessible health education programs that consider the diverse socio-demographic contexts of Nigerian mothers. To boost childhood immunization rates in Ughelli, public health initiatives must address these socio-demographic factors by promoting positive vaccine attitudes through culturally sensitive, accessible, and context-specific health education efforts. A comprehensive approach is needed, combining health education with improved healthcare access to ensure all children benefit from immunization, regardless of their mothers' backgrounds.

CONFLICTS OF INTEREST

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