



KNOWLEDGE AND ATTITUDES OF NURSING MOTHERS TOWARDS CHILDHOOD IMMUNIZATION IN ONDO STATE

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ABSTRACT: Background: This research aimed to assess the level of knowledge and attitudinal disposition regarding childhood immunization among nursing mothers attending postnatal clinics in selected health facilities in Ondo town, Nigeria. **Methodology:** A cross-sectional survey design was employed in this study; a total number of three hundred and eighty-six (386) respondents participated in this study. A multi-stage sampling technique was used to select eleven (11) groups from Ondo West and Ondo East LGA. Systematic random sampling was then employed to select three (3) groups from Ondo West and Ondo East LGA, in which all the health centers in the three groups were used for this study. A structured and validated instrument was used for data collection and was administered to the participants at the health facilities using direct contact approach. Analysis of the data was done using descriptive statistics and correlation which was fixed at 0.05 significance level. **Results:** The study found that nursing mothers aged 31-40 years represented the highest proportion (35.5%) of attendees at postnatal clinics, while 16.8% were adolescents. The majority were married (71.5%) and had attained tertiary education (41.7%). Knowledge about immunization was generally high, with 90.7% having heard of immunization, though only 64.2% acknowledged potential side effects like convulsions. The mean knowledge score was 12.63 ± 4.23 , indicating moderate knowledge. Regarding attitudes, 72% had positive attitudes toward immunization. Age and education were significantly correlated with both knowledge ($p = 0.002$) and attitudes ($p = 0.000$). **Conclusion:** The study concluded that strategic behavioral communication needs to be developed to dispel fears of side reactions and provide targeted information that will boost and maintain immunization coverage in the study area.

KEYWORDS: Attitudinal disposition, Nursing mothers, post-natal, Immunization, Vaccine.



INTRODUCTION

Immunization is one of the most successful and cost-effective preventive measures against childhood diseases. It is the process of inducing immunologic defense against infectious organisms without posing any risk to the recipient (Edna, 2007). Immunization not only protects individuals from infectious diseases but also limits the spread of these diseases within communities through herd immunity, and can ultimately lead to the eradication of diseases (Edna, 2007). Over the years, immunization has prevented more deaths globally than most other health interventions (Awosika, 2012). Mojinyinola and Olaleye (2012) emphasized that childhood immunization provides primary prevention against life-threatening diseases in children, especially in low- and middle-income countries, where these diseases claim numerous lives.

Globally, approximately 27 million children do not receive routine immunization, contributing to the deaths of 2 million children annually (Abdulkarim, 2011). In low- and middle-income countries, more than 10 million children die each year before reaching the age of five, largely due to the lack of access to interventions that could prevent these childhood illnesses (Lee, 2003). Vaccine-preventable diseases (VPDs) are among the leading causes of childhood mortality, accounting for about 3 million deaths annually (Odusanya et al., 2008). Although vaccines are available to approximately three-quarters of the world's child population, only half of the children in sub-Saharan Africa receive basic immunization, with some disadvantaged areas seeing only one in twenty children vaccinated (UNICEF, 2009).

Immunization is a life-saving intervention designed to protect individuals from specific infections (Andre et al., 2008). Vaccination has been instrumental in controlling, and in some cases, eradicating diseases, and has significantly reduced the morbidity and mortality associated with diseases such as diphtheria, tetanus, and pertussis (World Health Organization [WHO], 2006). Infectious disease control is achieved when herd immunity, the proportion of immune individuals in a community, exceeds a specific threshold. This threshold varies by disease, ranging from 75% for mumps to 94% for measles (WHO, 2010). The WHO launched the Expanded Program on Immunization (EPI) in 1980, targeting children under 2 years old to increase herd immunity against six childhood killer diseases. The goal was to achieve 80% coverage in this age group by 1990 (National Population Commission, 2004). However, three decades after the program's inception, this target has still not been met in Nigeria. In 1999, the government replaced the EPI with the National Program on Immunization (NPI) to reinvigorate the country's immunization efforts (Oche & Shittu, 2014).

In Nigeria, childhood immunization coverage remains low. This limited coverage may be attributed to factors such as inefficient planning, lack of motivation among health workers, poor quality of immunization services, and low community demand for immunization (Rasheed, 2012). Despite the identification of major childhood diseases by modern technology, many children in African countries continue to die from vaccine-preventable diseases.

Low socioeconomic status often creates practical barriers, such as lack of transportation, which may prevent the completion of the full set of immunizations (Bedford, 2008). Nigeria, like many other African countries, is striving to reduce the burden of vaccine-preventable diseases by improving immunization coverage and strengthening health systems and routine immunization services. Strategies to enhance immunization coverage include providing immunization education at antenatal and postnatal clinics, as well as through media platforms



such as television and radio (WHO, 2008). Good parental knowledge, perception, and practices regarding immunization are essential to reducing the incidence of vaccine-preventable diseases (Aetekah et al., 2011). Among the most important strategies for controlling infectious diseases, immunization is considered second only to access to clean water (Oyo-Ita et al., 2012). The knowledge that parents have regarding vaccination is influenced by the sources of information available to them, the number of these sources, and their acceptance of vaccine information. Key sources of information include maternity clinics, media outlets, literature, and the internet (Qutaiba et al., 2014).

LITERATURE AND THEORETICAL UNDERPINNING

Childhood immunization is influenced by various factors, including the attitudes, beliefs, and behaviors of caregivers. The Theory of Reasoned Action (TRA), developed by Ajzen (1991), offers a useful framework for understanding how these factors impact the likelihood of mothers ensuring complete immunization for their children. According to the TRA, behavior is primarily determined by two key factors: attitude and subjective norms, which in turn influence behavioral intentions. These intentions are then translated into actual behavior, making the theory a valuable tool for understanding the dynamics of childhood immunization.

Attitude, the first construct of the TRA, refers to an individual's evaluation of the behavior in question (Ajzen, 1991). In the context of immunization, this relates to how mothers perceive the outcomes of vaccinating their children. If the outcome is seen as positive and beneficial, mothers are more likely to hold favorable attitudes toward vaccination. Positive attitudes towards childhood immunization increase the likelihood that mothers will ensure their children receive all necessary vaccines. Studies have shown that when mothers believe in the importance of immunization and its role in preventing life-threatening diseases, they are more motivated to adhere to vaccination schedules (Brenner et al., 2011). For example, mothers with positive attitudes are more likely to prioritize their child's immunization, viewing it as an essential step in safeguarding their child's health (Yousif et al., 2013).

Subjective norms, the second construct of the TRA, refer to the perceived social pressure to engage in a particular behavior. In the case of immunization, these norms arise from the opinions and expectations of key individuals in a mother's social circle, such as family, friends, and healthcare providers (Ajzen, 1991). If significant others believe that immunization is important, a mother is more likely to view vaccination as a social expectation and comply with the immunization schedule. Research has shown that maternal behavior toward childhood immunization is often shaped by the social support they receive, and healthcare workers can play a crucial role in influencing mothers' attitudes (Mahy, 2003). In some cases, misconceptions about vaccines within the community can also lead to negative attitudes, making it harder for mothers to engage in vaccination behaviors (Babalola, 2009).

Perceived behavioral control, the third construct of the TRA, pertains to an individual's belief in their ability to perform a behavior, taking into account external factors that may facilitate or hinder the behavior (Ajzen, 1991). In the context of childhood immunization, this refers to the mother's confidence in her ability to comply with vaccination schedules, influenced by factors such as availability of healthcare services, financial constraints, and accessibility to vaccines. A higher level of education has been shown to improve health-seeking behaviors and increase a mother's perceived control over her ability to immunize her child (Tadesse et al., 2009;



Breiman et al., 2004). Educated mothers are more likely to understand the importance of vaccination and are better able to navigate healthcare systems to ensure that their children receive timely immunizations.

A significant factor influencing immunization rates is maternal education. Studies have shown that educated mothers are more likely to ensure their children receive full immunization (Agboola et al., 2015). Education improves mothers' knowledge about vaccine-preventable diseases and their belief in the efficacy of vaccines. In contrast, lower education levels can hinder a mother's understanding of the importance of immunization (Mabrouka & Bofarraj, 2011). In Nigeria, for instance, higher maternal education is correlated with increased immunization coverage, as educated mothers tend to seek reliable information about vaccines and make informed decisions (Sadoh et al., 2009; Odusanya et al., 2005).

The role of immunization knowledge is crucial. Studies have found that increased knowledge about vaccine-preventable diseases leads to higher immunization uptake (Bakhache et al., 2013). In Ondo, Nigeria, for instance, despite the availability of vaccines, immunization coverage remains low, with only 44.8% of children aged 12-23 months receiving full immunization (Multiple Indicator Cluster Survey, 2016-2017). Knowledge gaps, such as misconceptions about vaccine safety, contribute to poor immunization rates. In this context, the TRA suggests that improving mothers' knowledge and addressing their perceptions about vaccines could lead to greater vaccination compliance (Brenner et al., 2011).

Overall, the Theory of Reasoned Action provides a comprehensive framework for understanding the factors influencing mothers' decision-making regarding childhood immunization. By targeting improvements in mothers' attitudes, enhancing subjective norms through community engagement, and increasing perceived behavioral control through education and access to healthcare services, it is possible to improve immunization rates and reduce preventable childhood diseases. Therefore, health interventions aimed at improving vaccination coverage should focus on these key elements to promote behavior change effectively.

METHODOLOGY

This study adopted a cross-sectional survey design, utilizing a structured questionnaire to collect data on the variables of interest. The aim of this approach was to meet the objectives of the study. The research was conducted in Ondo town, located in Ondo State, Nigeria, which is divided into two Local Government Areas (LGAs): Ondo East and Ondo West. Ondo has a population of approximately 283,672 people. The study focused on mothers attending postnatal clinics in selected health facilities in both Ondo East and Ondo West LGAs.

The study sample comprised 400 mothers attending postnatal clinics in government-registered health facilities across the two LGAs. Ondo West LGA has 32 registered government health facilities offering postnatal care, while Ondo East LGA has 14 such facilities. The sample size was determined using Cochran's (1977) formula, a standard method for calculating sample sizes in survey research. The formula is expressed as:

$$Z\alpha (N) = \frac{Z^2 S^2}{d}$$



Where **N** represents the sample size, **Z** is the standard normal deviation at a 95% confidence level (1.96), **P** is the estimated prevalence, and **d** is the margin of error (set at 0.05). Substituting the values:

$$P=44.8\% = 0.448, \quad Q = 1-P = 0.528$$

$$N = \frac{1.96^2 \times 0.448 \times 0.528}{0.05^2}$$

$$N = 364$$

To account for potential attrition, a 10% increase was added, bringing the final sample size to 400 participants.

The study employed a multistage sampling technique. In Stage 1, health facilities in both LGAs were grouped into clusters, with four health centers per group. This resulted in 8 groups for Ondo West and 3 groups for Ondo East. In Stage 2, systematic random sampling was used to select every third group, resulting in 2 groups from Ondo West and 1 from Ondo East. All health facilities in the selected groups were included in the study, resulting in 8 health facilities from Ondo West and 4 from Ondo East. The inclusion criteria for participants were that they must be attending postnatal clinics and willing to participate in the study. Women not attending postnatal clinics were excluded from the study.

Data collection was facilitated using a self-designed structured questionnaire, which was developed based on the study's objectives and hypotheses. A research assistant was employed and trained to administer the questionnaires in a friendly and approachable manner. The questionnaire was divided into four sections, each corresponding to a variable of interest. Prior to data collection, the instrument was submitted to supervisors for face and content validity, and adjustments were made based on their feedback.

Permission to conduct the study was obtained from the management of the selected health facilities. The questionnaires were distributed by the researcher and research assistants and collected after completion. To ensure the reliability of the instrument, a pre-test was conducted in Ife, Osun State, where 40 participants from two primary health centers were used for pilot testing. The test-retest method was employed, where the same questionnaire was administered to the same participants twice within a specified time frame. Reliability was measured using Cronbach's alpha, yielding values of 0.73 for knowledge and 0.77 for attitudes, indicating satisfactory reliability.

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) version 22.0. Descriptive statistics, including means, standard deviations, and standard errors, were computed for the survey variables. Socio-demographic characteristics were analyzed using frequency distributions, percentages, and mean scores. Inferential statistics, including Pearson's correlation and chi-square tests, were used to address the research questions and examine relationships between variables.



Ethical Consideration

The Babcock University Health Research and Ethics Committee (BUHREC) gave its ethical approval for this project. Every person who willingly consented to participate in the study gave their informed consent. Participants were made aware that there would be no financial remuneration and that there were no hazards involved in the study. Before completing the questionnaire, all participants received a thorough explanation of the study's objectives and the requirements for participation.

RESULTS

Table 1: Distribution of Socio-demographic Characteristics of the Respondents

Variable	Category	Frequency (N=386)	Percentage (%)
Age	15 -20 years	65	16.8%
	21-30 years	130	33.7%
	31-40 years	137	35.5%
	41-50 years	54	14.0%
Marital status	Single	64	16.6%
	Married	276	71.5%
	Widowed	18	4.7%
	Separated	20	5.2%
	Divorced	5	1.3%
	Cohabiting	3	0.8%
Education	Non formal	45	11.7%
	Primary	57	14.8%
	Secondary	71	18.4%
	Tertiary	161	41.7%
	Vocational education	52	13.5%
	Other	0	0%
Religion	Christian	233	60.4%
	Moslem	150	38.9%
	Traditional belief	3	0.8%

The findings from the study reveal that the age group 31–40 years had the highest proportion of nursing mothers attending postnatal clinics for childhood immunization (137, 35.5%), while 65 (16.8%) nursing mothers were still adolescents (Table 4.1). Sixty-four (16.6%) nursing mothers reported being single, 276 (71.5%) were married, 18 (4.7%) were separated, and 20 (5.2%) indicated that they were divorced, while 0.8% were cohabiting.

Regarding educational attainment, 45 (21.0%) nursing mothers reported having no formal education, 57 (14.8%) had a primary school education, 71 (18.4%) had completed secondary school, 161 (41.7%) had attained tertiary education, and 52 (13.5%) had other educational qualifications. Additionally, 233 (60.4%) nursing mothers reported being affiliated with



Christianity, 150 (38.9%) were Muslims, and 3 (0.8%) identified as traditional believers (Table 1).

Knowledge of Nursing Mothers Towards Immunization

Table 2: Knowledge of Nursing Mothers Towards Immunization Based on Specific Responses

	Knowledge sub-variables	YES Frequency (%)	NO Frequency (%)
1	Have you ever heard about immunization?	350 (90.7%)	36 (9.3%)
2	Part of the benefits of immunization includes preventing your child from vaccine preventable diseases and keeping them healthy	359 (93.0%)	27 (7.0%)
3	Malnutrition, low fever and diarrhoea are contraindications for vaccination	272 (70.5%)	114 (29.5%)
4	Vaccines actually cause more disease than they prevent	79 (20.5%)	307 (79.5%)
5	From my knowledge about immunization, too many vaccines can harm my child	219 (56.7%)	167 (43.3%)
6	Vaccination could result in convulsions and skin rash	248 (64.2%)	138 (35.8%)
7	Compliance to immunization schedule is very important	267 (69.2%)	119 (30.8%)
8	Do you feel you get enough information about vaccines and their safety?	180 (46.6%)	206 (53.4%)
9	Fever and pain are side effects of immunization	262 (67.9%)	124 (32.1%)
10	I know all the necessary vaccines to get for my child	86 (22.3%)	300 (77.7%)

Mean score is 12.63±4.23 on a maximum scale of 20

The nursing mothers' knowledge regarding immunization was assessed, and the responses are presented in Table 2. The majority of the women (350, 90.7%) reported having heard of immunization, and 359 (93%) identified the benefits of immunization, such as preventing children from vaccine-preventable diseases and keeping them healthy. However, when asked whether vaccines could result in convulsions and skin rashes, only 64.2% of the nursing mothers agreed.

Approximately 272 mothers (70.5%) reported that malnutrition, low fever, and diarrhea are not contraindications for vaccination, while 79 mothers indicated that vaccines actually cause more diseases than they prevent (Table 2). About a third of the nursing mothers (69.2%) reported that adhering to the immunization schedule is very important. However, only 46.6% (180 mothers) felt they received enough information about vaccines and their safety. Additionally,



67.9% of the nursing mothers indicated that fever and pain are common side effects of immunization.

The knowledge items were computed on a 20-point rating scale (with "Yes" = 2 and "No" = 1). Based on the mean score of 12.63 ± 4.23 , nursing mothers in this study had a moderate level of knowledge (Table 2).

Attitudinal Disposition Towards Childhood Immunization

Table 3: Distribution of Nursing Mothers Attitudes Towards Childhood Immunization

Attitude sub-variables	Strongly agreed	Agreed	Disagreed	Strongly Disagreed
1 There should be obligatory vaccination programs designed by the health authorities for immunization of infants	37(9.6%)	71(18.4%)	198(51.3%)	80(20.7%)
2 I am fearful about immunizing my child.	98(25.4%)	99 (25.6%)	115(29.8%)	74(19.2%)
3 I won't allow my child receive all vaccines because it can weaken his/her immune system	115(29.8%)	90(23.3%)	141(36.5%)	40(10.4%)
4 Going to my farm/work/trade is more important to me than taking my child to health facility for immunization	108(28.0%)	192(49.7%)	75(19.4%)	11(2.8%)
5 I can always give my child locally prepared herbal brews for preventing childhood illness	45(11.7%)	72(18.7%)	125(32.4%)	144(37.3%)
6 Vaccine preventable diseases are just part of childhood. It is better to have the disease than become immune through vaccines	140(36.3%)	172(44.6%)	53(13.7%)	21(5.4%)
7 To me going for immunization is a waste of time	169(43.8%)	185(47.9%)	23(6.0%)	9(2.3%)
8 I wouldn't mind taking time off from work to make sure my child gets vaccinated	0	55(14.2%)	218(56.5%)	113(29.3%)
9 If I have to spend more than one hour in travel time to get a vaccine, I consider it important enough to travel for it	42(10.9%)	106(27.5%)	159(41.2%)	79(20.5%)
10 I do not like to go to health facility for immunization because the health workers are not friendly	82(21.2%)	112(29.0%)	146(37.8%)	46(11.9%)

Mean score is 25.72 ± 8.758 on a maximum scale of 40



The attitudes of nursing mothers regarding childhood immunization were assessed using 10 items, each rated on a 4-point Likert scale. Seventy-one mothers (18.4%) agreed that obligatory vaccination programs should be designed by health authorities for the immunization of infants, while 9.6% strongly agreed. Approximately 25.4% of nursing mothers reported that they would not allow their child to receive all vaccines because they believe it could weaken the child's immune system, while 10.4% strongly disagreed. Only 28% of nursing mothers reported that going to their farm/work/trade was more important than taking their child to a health facility for immunization, while 19.4% disagreed. Also, 11.7% of nursing mothers strongly agreed that they always give their child locally prepared herbal brews to prevent childhood illness, while 37.3% (144 mothers) strongly disagreed. Additionally, 43.8% (169 mothers) reported that they consider immunization to be a waste of time, while 2.3% (9 mothers) strongly disagreed. Regarding travel time, 10.9% (42 mothers) strongly agreed that they would consider it important enough to travel more than one hour to get a vaccine, while 41.2% (159 mothers) disagreed (Table 3).

Most of the nursing mothers (72%, 278 mothers) reported having positive attitudes toward childhood immunization, while 27.9% (108 mothers) had negative attitudes (Table 3). The items assessing the attitudes of nursing mothers regarding childhood immunization were computed on a 40-point maximum scale. The mean score for nursing mothers' attitudes was 25.72 ± 8.758 .

Relationship between Knowledge, and Demographic Factors

Table 4: Relationship between Knowledge, and Demographic Factors - Age, Level of Education and Religion

Variable	Category	Knowledge		Total	R	P-value
		Yes	No			
Age	15 -20 years	60	5	65	0.106	0.123
	21-30 years	93	37	130		
	31-40 years	98	39	137		
	41-50 years	44	10	54		
	Total	295	91	386		
Education	Non formal	24	23	47	0.153	0.002*
	Primary	39	19	58		
	Secondary	71	31	102		
	Tertiary	61	48	109		
	Vocational education	36	14	50		
	Other	18	2	20		
Total	249	137	386			
Religion	Christian	88	40	128	0.104	0.526
	Moslem	103	66	169		
	Traditional belief	45	44	89		
	Total			386		

The selected demographic characteristics—age, religion, and education—were tested to determine their association with the knowledge of nursing mothers regarding childhood immunization. The results showed that age had a positive relationship ($r = 0.106$) with the



knowledge of nursing mothers about childhood immunization; however, this correlation was not statistically significant ($p = 0.123$). The level of education was found to be correlated with the knowledge of nursing mothers regarding childhood immunization ($r = 0.153$), and the relationship was statistically significant ($p = 0.002$) (Table 4). Additionally, the religion of the nursing mothers was correlated ($r = 0.104$) with their knowledge about childhood immunization, but this relationship was not statistically significant ($p = 0.526$) (Table 4).

Relationship between Attitudes and Demographic Factors

Table 5: Relationship between Attitudes and Demographic Factors - Age, Level of Education and Religion

Variable	Category	Attitude				Total	R	P-value
		SA	A	D	SD			
Age	15 -20 years	23	19	19	14	75	0.010	0.004
	21-30 years	49	47	56	30	182		
	31-40 years	15	20	22	33	90		
	41-50 years	14	10	3	12	39		
	Total	101	96	100	89	386		
Education	Non formal	9	16	10	13	48	0.150	0.000
	Primary	18	23	11	14	66		
	Secondary	28	28	20	25	101		
	Tertiary	41	19	40	9	109		
	Vocational education	15	14	10	6	45		
	Other	4	8	2	3	17		
Total	115	108	93	70	386			
Religion	Christian	70	57	49	41	217	0.107	0.000
	Moslem	41	36	25	20	122		
	Traditional belief	10	10	12	15	47		
	Total	121	103	86	76	386		

The selected demographic characteristics—age, religion, and education—were tested to determine their association with the attitudes of nursing mothers toward childhood immunization. The results indicated that age had a positive relationship ($r = 0.010$) with the attitude of nursing mothers toward childhood immunization. This relationship was statistically significant ($p = 0.004$). The level of education was also found to have a correlation with the attitudes of nursing mothers toward childhood immunization ($r = 0.150$), with the relationship being significant at $p = 0.000$. Additionally, the religion of nursing mothers was found to be correlated ($r = 0.107$) with their attitude toward childhood immunization, and this relationship was significant at $p = 0.000$ (Table 5).



DISCUSSION

The study aimed to assess the levels of knowledge and attitudes beliefs of nursing mothers toward childhood immunization. Among the 386 nursing mothers in this study, the majority (35.5%) were within the age range of 31–40 years, followed by the 21–30 years age group, which comprised 33.7% of the participants. Two hundred and thirty-three women (60.4%) reported being affiliated with Christianity, 38.9% were Muslims, and 0.8% were traditional believers. Regarding educational levels, the majority of the respondents (41.7%) had attained tertiary education, while 11.7% had no formal education.

The level of knowledge of nursing mothers regarding childhood immunization was generally good, with 89.6% of women reporting having good information about immunization. However, the assessment of parents' knowledge showed variation in responses to questions designed to evaluate their understanding of childhood immunization. For instance, 70.5% of the women believed that malnutrition, low fever, and diarrhea are contraindications for vaccination. Additionally, 53.4% felt they did not receive enough information about vaccines and their safety, and a large percentage (77.7%) did not know all the necessary vaccines for their children. This indicates a significant knowledge gap among the women regarding immunization. A significantly higher percentage of compliant parents believed that the benefits of vaccination outweigh its harms, a finding also reported by Alyami, Alhashan, Nasser, Alyami, et al. (2018).

Overall, in this study, 346 (89.6%) mothers had good knowledge, a finding similar to a study conducted at Nnamdi Azikiwe University Hospital, Nigeria, by Ubajaka et al. (2012), which found that 215 (70.0%) of mothers had good knowledge. The discrepancy between these results may be due to differences in sample size. As presented in Table 4.6, 72.0% of the nursing mothers in this study had a positive and favorable attitude toward childhood immunization. This is similar to the study conducted in Kinshasa, Congo, by Mapatano (2008), which showed that 93.8% of respondents had a positive attitude toward immunization. Despite the generally positive attitudes, 51% of the women in this study were still fearful of immunizing their children.

In this study, a high percentage of mothers believed that immunization is crucial for preventing deadly, preventable diseases. The results revealed a significant association between parents' educational level and their knowledge of childhood immunization. Higher educational levels clearly help parents understand educational messages better, and such parents are also more likely to encounter substantial information about immunization in the media. This finding aligns with the results of a study by Yousif, Albarraq, Abdallah, and Elbur (2013). Socio-demographic factors, such as older age and higher education, were found to significantly affect parents' knowledge of childhood immunization. Older parents, who tend to have more life experience and higher levels of education, were more likely to have better knowledge. In this study, a positive and significant relationship was found between age and education. The association between older age and a higher level of knowledge has been reported in previous studies by Alfahl and Alharbi (2017). Well-educated parents are naturally better able to understand the value of immunization for their children and the potential consequences of not adhering to vaccination schedules.

Religion was also found to be significant in this study. A significant positive relationship was observed between religion and mothers' attitudes toward childhood immunization. This finding



is consistent with the research conducted by Babalola (2009), which highlighted those misconceptions held by Muslims in Northern Nigeria negatively affect immunization uptake. The level of education of mothers was found to be highly significant ($p = 0.001$) in relation to their knowledge of immunization. The higher the level of education, the greater the mother's knowledge about immunization. This finding aligns with those of Angellillo et al. (1999) and Odusanya et al. (2008), who reported that the level of knowledge about mandatory vaccinations for infants was significantly correlated with the mother's level of education. This is expected, as individuals with higher education generally have a greater ability to process information. A higher level of education is also associated with improved health-seeking behavior.

This study's findings are consistent with other research, including Tadesse et al. (2009) and Breiman et al. (2004), which found that maternal education is a significant predictor of immunization completion. Highly educated mothers are more likely to be aware of the importance of immunization. The role of maternal education in influencing immunization uptake has also been emphasized by Mahy (2003) and Onyiriuka (2005). In contrast, a study conducted in Libya by Mabrouka and Bofarraj (2011) found no significant relationship between mothers' educational level and immunization status. However, a study by Agboola et al. (2015) revealed an association between higher education levels and better knowledge and attitudes toward child immunization. Our findings are consistent with those of Agboola et al. (2015). This study showed that the higher the mother's level of education, the greater her knowledge of immunization. Similar findings have been reported in Nigeria by Sadoh et al. (2009) and Odusanya et al. (2005).

IMPLICATION TO RESEARCH AND PRACTICE

This study highlights the critical role of maternal education and socio-demographic factors in shaping attitudes and knowledge towards childhood immunization. Findings suggest that while nursing mothers generally have good knowledge and positive attitudes, there are significant gaps, particularly regarding the understanding of all required vaccines. Future research should focus on addressing these knowledge gaps, with a particular emphasis on low-education groups and rural populations. Interventions should target enhancing maternal education, as higher educational levels correlate with better understanding and adherence to immunization schedules. Health programs must tailor their educational campaigns to ensure that parents, especially those with limited formal education, receive accurate information about the importance and safety of vaccines. Moreover, research should explore how cultural and religious beliefs influence immunization uptake, particularly in regions with varying religious affiliations. Practically, healthcare providers should prioritize clear communication and ongoing education about vaccination, starting early in pregnancy, to encourage informed decision-making. Extending immunization sessions to more accessible times could also enhance coverage and improve immunization rates across diverse socio-economic groups.



CONCLUSION

Childhood immunization is critical to reducing vaccine-preventable diseases, and while many parents show good knowledge and positive attitudes towards vaccinations, gaps remain in both areas. The study revealed that education significantly influences mothers' knowledge and attitudes, highlighting the need for targeted educational interventions. Special attention should be given to less educated populations and those in rural areas who may have lower immunization awareness. To address these gaps, the Nigerian government should strengthen existing immunization programs such as National Immunization Days (NIDs) and Catch-up campaigns. These efforts should include focused communication on the importance of vaccines, their benefits, and addressing misconceptions about side effects. Health campaigns should specifically target undereducated and low-income groups to help them make informed decisions about immunization. Additionally, health facilities should actively promote the completion of immunization schedules and engage in strategic behavioral communication to alleviate vaccine-related fears. Extending immunization sessions to evening hours could also improve coverage. Finally, healthcare professionals should engage with parents from pregnancy onward, particularly those with low educational backgrounds, to foster positive attitudes and ensure better immunization uptake.

FUTURE RESEARCH

Future research should explore the effectiveness of targeted educational interventions for low-income and rural populations to enhance immunization knowledge and attitudes. Studies could also evaluate the impact of evening immunization sessions on coverage, assess strategies to address vaccine-related fears, and examine the role of healthcare workers in improving parental communication and decision-making.

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