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THE INTERSECTION OF DEMOGRAPHICS AND IMMUNIZATION BELIEFS AMONG NURSING MOTHERS

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ABSTRACT: ***Background:*** *This research aims to elucidate the influence of demographic factors on nursing mothers' beliefs regarding childhood immunization in Ondo State, Nigeria. By identifying key variables, the study seeks to inform public health strategies that could enhance vaccination rates and improve child health outcomes.* ***Methodology:*** *A cross-sectional survey design was employed, utilizing a structured questionnaire to collect data from 400 mothers attending postnatal clinics in selected health facilities across Ondo East and West Local Government Areas (LGAs). The sample size was determined using Cochran's formula, ensuring a representative sample. Multistage sampling techniques were applied, with health facilities grouped into clusters for systematic random sampling. The questionnaire, validated for face and content, consisted of four sections addressing study variables. Pre-testing was conducted with a Cronbach alpha reliability score of 0.69 for beliefs respectively. Data were analyzed using SPSS version 22.0, employing descriptive and inferential statistics.* ***Results:*** *Among respondents aged 21-30 years, 36.3% exhibited positive beliefs about immunization, though no significant correlation with age was found ($r=0.103$; $p>0.05$). Conversely, education significantly influenced beliefs; 23.9% of those with tertiary education demonstrated higher positive beliefs ($r=0.163$; $p<0.05$). Religious affiliation did not significantly correlate with immunization beliefs (Chi-square=0.104; $p>0.05$). A significant portion of nursing mothers expressed skepticism regarding vaccination safety, with 41.7% strongly disagreeing that vaccines cause more harm than diseases they prevent.* ***Conclusion:*** *The findings underscore the urgent need to address nursing mothers' beliefs about childhood immunization in Ondo State. Education emerged as a critical factor influencing acceptance, while age and religion were less significant. Targeted educational interventions are essential to combat misconceptions about vaccine safety and efficacy, leveraging insights from the Health Belief Model and the Theory of Reasoned Action to enhance health literacy and vaccination coverage in the region.*

KEYWORDS: Behavioral communication, Herd-immunity, Immunologic, Immunization, Vaccine.

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INTRODUCTION

Childhood immunization is one of the most effective public health strategies for preventing infectious diseases and reducing child mortality (WHO, 2022). Vaccines can avert an estimated 2 to 3 million deaths each year from diseases such as diphtheria, tetanus, pertussis, and measles (GAVI, 2021). Despite its proven efficacy, vaccination coverage remains a pressing challenge in many regions, particularly in Nigeria. According to the Nigeria Demographic and Health Survey (NDHS), only 57% of Nigerian children are fully vaccinated by their first birthday (National Population Commission [NPC], 2022). In Ondo State, the situation is even more concerning, with recent statistics indicating that only about 50% of children received all recommended vaccinations (Ogunbode et al., 2023). This low coverage highlights the urgent need for a critical examination of the factors influencing nursing mothers' beliefs about childhood immunization. Research indicates that maternal beliefs play a significant role in vaccination decisions, and understanding these beliefs is essential for improving vaccination rates and ensuring better health outcomes for infants (Musa et al., 2023).

Demographic factors such as age, religion, and education significantly impact health beliefs and behaviors regarding vaccination (Chukwuma et al., 2021; Adetokunbo & Eze, 2022). For example, younger mothers may exhibit different perceptions of immunization compared to older mothers, affecting their willingness to vaccinate their children (Musa et al., 2023). Additionally, religious beliefs can shape attitudes toward vaccines, with some communities expressing skepticism based on cultural or faith-based concerns (Zubair & Oduwole, 2024). Education level also plays a crucial role in shaping health beliefs. Studies indicate that mothers with higher educational attainment are more likely to understand the importance of immunization and engage in preventive health behaviors (Musa et al., 2023). This suggests that educational interventions could be key in improving immunization beliefs among less educated mothers.

Demographic characteristics significantly influence health beliefs and behaviors, as outlined in the Health Belief Model (HBM) and the Theory of Reasoned Action (TRA). The HBM posits that individuals are more likely to engage in health-promoting behaviors, such as vaccination, when they perceive themselves at risk for disease and believe in the efficacy of the health intervention (Becker, 2018). The TRA emphasizes the role of personal attitudes and subjective norms in shaping intentions toward health behaviors (Ajzen & Fishbein, 2020). Understanding how these models apply to nursing mothers in Ondo State can inform targeted interventions to enhance vaccination uptake.

Given the influence of demographic factors on immunization beliefs, targeted public health strategies are essential. Health education programs that address specific concerns related to age, religion, and education can enhance understanding and acceptance of childhood immunization. Community engagement initiatives that involve local leaders and influencers may also help to dispel myths and encourage vaccination among hesitant mothers. Globally, the COVID-19 pandemic has disrupted routine immunization services, with UNICEF reporting that 25 million children missed vaccinations in 2021, a significant increase from previous years (UNICEF, 2022). In Nigeria, the ongoing effects of this disruption have been felt acutely, underscoring the urgent need for effective public health strategies to address vaccine hesitancy and improve coverage (GAVI, 2023). This gap highlights the need for a deeper understanding of the beliefs of nursing mothers towards immunization, which are shaped by various demographic factors including age, religion, and education. To effectively address these

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challenges and improve vaccination coverage in Ondo State, targeted public health strategies must be developed. Engaging nursing mothers through tailored health education programs that address specific demographic influences can significantly enhance vaccination uptake (GAVI, 2021; UNICEF, 2022). The main objective of this research is to contribute to the understanding of how demographic factors influence nursing mothers' beliefs about childhood immunization in Ondo State. By identifying the key variables at play, this study aims to inform public health strategies that can effectively enhance vaccination rates and ultimately improve health outcomes for children.

THEORETICAL UNDERPINNING

The intersection of demographics and immunization beliefs among nursing mothers can be effectively examined through the lens of two prominent theories: the Health Belief Model (HBM) and the Theory of Reasoned Action (TRA). The HBM posits that health behaviors are influenced by personal beliefs about health risks and benefits. Key constructs of the HBM include perceived susceptibility, perceived severity, perceived benefits, and perceived barriers (Becker, 2018). For nursing mothers, beliefs about the risks associated with childhood diseases and the effectiveness of vaccines can significantly shape their beliefs towards immunization. For example, mothers who perceive a high risk of infectious diseases may be more inclined to vaccinate their children (Musa et al., 2023). Conversely, perceived barriers, such as misinformation or logistical challenges, can deter vaccination (Ogunbode et al., 2023).

The TRA complements the HBM by emphasizing the role of intention in behavior formation. According to the TRA, individual attitudes toward a behavior and perceived social norms influence intentions, which in turn drive actions (Ajzen & Fishbein, 2020). For nursing mothers, positive beliefs towards immunization, influenced by demographic factors such as age, education, and religion, can lead to a stronger intention to vaccinate their children. For instance, younger mothers may be more receptive to public health messages than older mothers, impacting their vaccination decisions (Chukwuma et al., 2021).

These theoretical frameworks guide the research objectives by providing a structured approach to understand how demographic factors influence immunization beliefs. By identifying the specific variables of age, religion, and education, this study aims to illuminate the underlying beliefs that inform vaccination behaviors among nursing mothers. Ultimately, integrating HBM and TRA into public health strategies can enhance the effectiveness of interventions designed to improve childhood immunization rates (GAVI, 2021; UNICEF, 2022).

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METHODOLOGY

A cross-sectional survey design was adopted in this study. It involved the use of structured questionnaires, designed to obtain data from respondents on the variables of study. This provided a way for achieving the study objectives. Ondo town is made up of two Local Government Areas, namely: Ondo East and Ondo West. The study was conducted in Ondo, Ondo State, Nigeria using selected registered health facilities offering post-natal services in Ondo East and Ondo West Local Government Areas (LGA). Ondo has a population of over two hundred and eighty-three thousand, six hundred and seventy-two people.

The population of the study included four hundred (400) mothers attending postnatal clinics in selected registered health facilities offering post-natal services in Ondo East and Ondo West Local Government Areas of Ondo town. Ondo West LGA has thirty-two (32) registered government health facilities offering post-natal care while Ondo East LGA has fourteen (14) registered government health facilities offering post-natal care.

Sample size was determined using Cochran's formula (1977) as it is a standard method of randomization and identifies the limits of errors considered as the most essential items in the survey.

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

Where N is the desired sample size,

Z= the standard normal deviation at 95% confidence level (1.96)

P=the estimated prevalence

d^2= margin of error (d=0.05)

S^2= PQ, Z^2=1.96^2, d^2= 0.052^2,

P= 44.8% = 0.448

Q= 1-P = 0.528

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

Minimum sample will be approximately 364

10% of it will be added to the minimum sample size to take care of attrition.

10% of 364 = 36 + 364 = 400

Approximately 400 participants were selected for this study

In terms of sampling technique, Ondo town has two (2) Local Government areas, namely: Ondo East and Ondo West Local Government Areas. Ondo East Local Government Area has fourteen (14) government health facilities offering post-natal services while Ondo West Local Government Area has thirty-two (32) government health facilities offering post-natal services. Multistage sampling technique would be used for this study.

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Stage 1: The health centers in each LGA were grouped into clusters of 4 health centers in each group. This resulted in 8 groups in Ondo West LGA and 3 groups in Ondo East LGA.

Stage 2: Systematic random sampling was applied by selecting the 3rd element from the groups in each LGA. This resulted in 2 groups and 1 group from Ondo West and East LGA respectively.

Therefore, all the health facilities in the four groups from Ondo West LGA were used for this study, and all health facilities in the group from Ondo East LGA were used for this study. A total of eight (8) health facilities were therefore selected from Ondo West LGA and four (4) health facilities from Ondo East LGA, making twelve (12) health facilities in total for this study. In terms of inclusion criteria, women must be attending postnatal clinics, and participants must be willing to participate while in terms of exclusion criteria, women who are not attending postnatal clinics were not included in this study.

The instrument for data collection was a well-structured self-designed questionnaire as the main instrument for data collection. It took into consideration the objectives and hypothesis of study. One research assistant was employed and trained on how to administer instruments in approachable and pleasant manners. The questionnaire consists of four sections. Each section of the instrument will evaluate the stated variables. The structured questionnaire was submitted to supervisors for face and content validity and all adjustments and corrections were made. It was modified according to the recommendation of the supervisor.

The health facilities were visited beforehand in order to discuss with the management and request for permission to carry out the study. The prepared instruments were distributed to each of the participants by the researcher and the research assistants and retrieved after the data had been entered.

The reliability of the instrument was determined by pre-testing the instrument among a population of people with similar characteristics using the test-retest method where the same instrument was administered to the same set of people two times within a given time interval. Pilot test was carried out using 10% of the estimated sample size (40). The population used in pilot testing was primary health centers offering post-natal services in Ife, Osun State. 20 participants from two health care centers were used to test the instrument. The data obtained was statistically analyzed using the Cronbach alpha standard test score for reliability of the data. The result produced a Cronbach alpha of 0.69 for beliefs.

Data obtained from the completed questionnaire were computed and analyzed using Statistical Package for Social Science (SPSS) version 22.0. The variables were computed and responses were scored according to the rating scale for the variables to derive summaries of descriptive statistics such as means, standard error of means and standard deviation. Socio-demographic characteristics were analyzed using descriptive and inferential analysis such as frequency distribution, percentages, standard deviation and mean score in form of table. Pearson Correlation and Chi-square were carried out to give statistical responses to the research questions.

Ethical Consideration

Ethical approval has been obtained from Babcock University Health Research and Ethics Committee (BUHREC). An informed consent form was filled for those who willingly agree to

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be part of the study before they fill in required data into the administered instrument. It was mentioned that there would be no risks involved in the study as there are no compensations for taking part in the study. The purpose of the study was explained including the criteria for participating.

RESULTS

Table 2: Test on the Association between Beliefs and Demographic Factors

Variable	**Category**	**Belief of Nursing Mothers Towards Childhood Immunization**		**Total N (%)**		
		Positive responses	**Negative responses**			**P-value**
Age	15 -20 years	55	42	97 (25%)	r=0.103	0.903
	21-30 years	140	60	200 (52%)		
	31-40 years	48	19	67 (17%)		
	41-50 years	15	7	22 (6%)		
	Total	**258 (67%)**	**128 (33%)**	**386 (100%)**		
Level of education	Non formal	37	10	47 (12%)	r=0.163	0.002
	Primary	48	30	78 (20%)		
	Secondary	79	23	102 (27%)		
	Tertiary	92	17	109 (28%)		
	Vocational edu.	40	10	40 (10%)		
	Other	7	3	10 (3%)		
	Total	**293 (76%)**	**93 (24%)**	**386 (100%)**		
Religion	Christian	157	61	218 (57%)	χ^2= 0.104	0.428
	Moslem	110	25	133 (34%)		
	Traditional belief	17	18	35 (9%)		
	Total	**284 (74%)**	**102 (26%)**	**386 (100%)**		

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In a study examining the beliefs of nursing mothers towards childhood immunization, demographic factors such as age, education, and religion were assessed. Among respondents aged 21-30 years, 140 out of 386, or approximately 36.3%, reported more positive beliefs regarding immunization. However, statistical analysis revealed no significant association between age and beliefs about immunization ($r=0.103$; $p>0.05$), suggesting that age does not significantly influence nursing mothers' belief towards childhood immunization.

In contrast, the level of education showed a notable relationship with beliefs about immunization. Specifically, 92 respondents with tertiary education, constituting about 23.9%, exhibited a higher level of positive beliefs regarding immunization. A significant association was identified, with an r-value of 0.163 and $p<0.05$, indicating that increased educational attainment correlates with stronger positive beliefs about childhood immunization. Furthermore, while 157 respondents, or approximately 40.7%, identified as Christian and demonstrated a higher level of positive beliefs, the analysis indicated no significant association between religion and beliefs regarding immunization (Chi square=0.104; $p>0.05$). This underscores the importance of educational factors in shaping beliefs about childhood immunization, while age and religion appear to have less influence.

Nursing Mothers Beliefs based on Benefit of Childhood Immunization

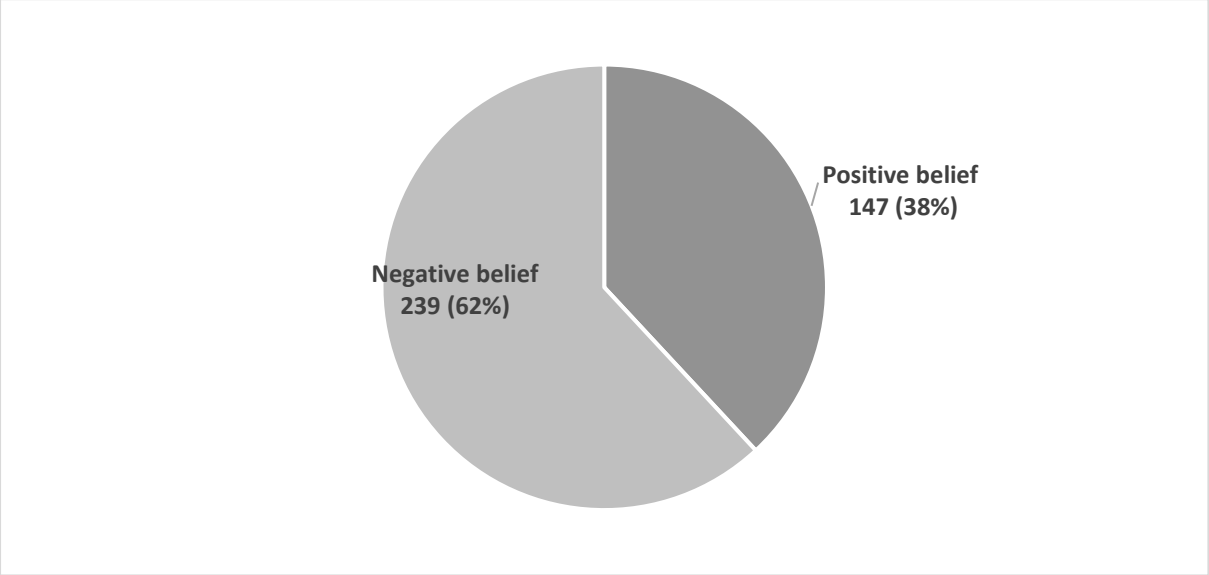

Figure 1: Vaccinations against dangerous disease have saved more lives than drugs, such as antibiotics

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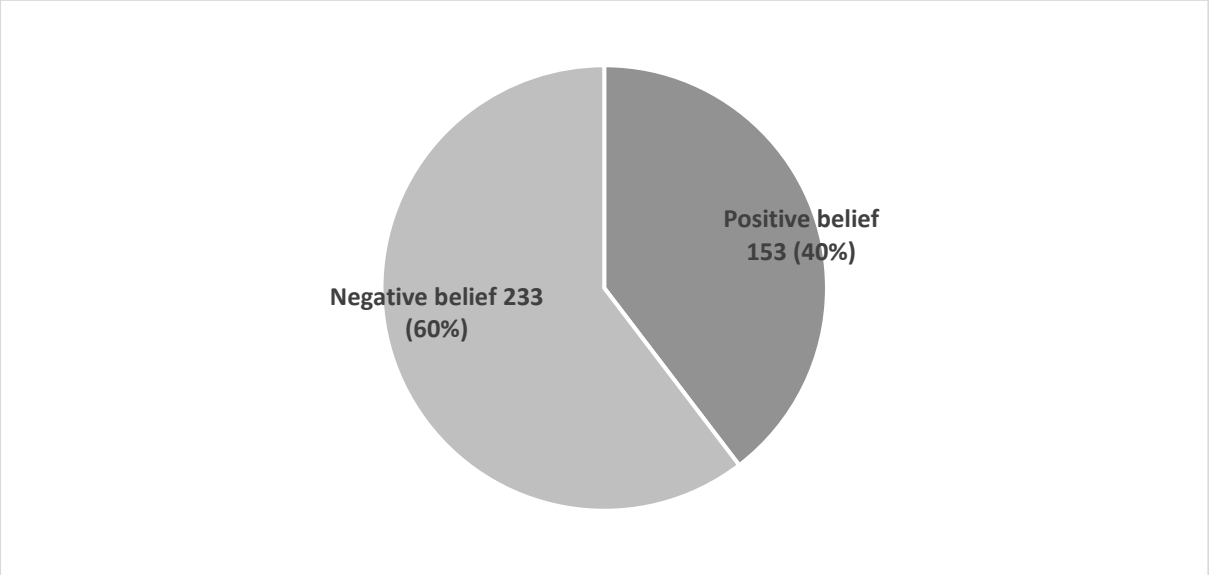

Figure 2: Respondents believe if my child is immunized, he gets lifetime protection against all vaccine preventable diseases

In a survey examining nursing mothers' beliefs regarding the benefits of childhood immunization, the results indicated a predominantly negative perception. Specifically, 147 respondents (38%) expressed positive beliefs, while 239 respondents (62%) held negative beliefs about the effectiveness of vaccinations in saving lives from dangerous diseases (see figure 1). Additionally, when asked about the belief that immunization provides lifetime protection against all vaccine-preventable diseases, 153 respondents (40%) agreed, whereas 233 respondents (60%) disagreed (see figure 2). These findings suggest that a significant majority of nursing mothers surveyed may harbor doubts about the benefits of childhood immunization, indicating a need for targeted education and outreach to address these concerns.

Nursing Mothers Beliefs Based on Severity of Lack of Childhood Immunization

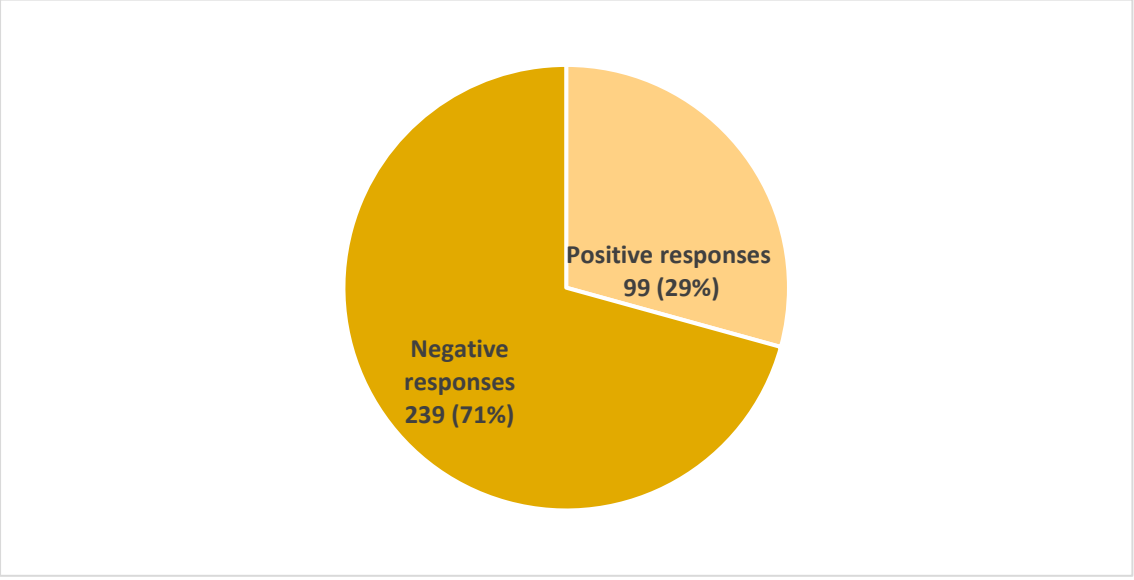

Figure 3: Respondents believed that many of the disease's vaccine prevents are severe

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In the assessment of nursing mothers' beliefs regarding the severity of the consequences associated with a lack of childhood immunization, the data revealed a concerning trend. Out of the respondents, only 99 (29%) expressed positive beliefs about the severity of diseases prevented by vaccines, while a significant majority, 239 (71%), held negative beliefs. This indicates that many nursing mothers may underestimate the seriousness of vaccine-preventable diseases, suggesting an urgent need for educational initiatives to enhance awareness about the potential severity of these illnesses and the critical role of immunization in protecting children's health.

Level of Poor Perception about Childhood Immunization

Table 1: The Level of Poor Perception of Childhood Immunization

S/N	Items: Belief that:	Strongly Agree	Agree	Disagree	Strongly Disagree
1	Vaccinations can have serious side effects that cause more harm than some of the diseases that they are supposed to prevent	48(12.4%)	85(22.0%)	92(23.8%)	161(41.7%)
2	Not fully convinced that childhood immunization is the safest protection for my child against diseases	72(18.7%)	76(19.7%)	117(30.3%)	121(31.3%)
3	Children should only be immunized against serious disease	20(5.2%)	82(21.2%)	138(35.8%)	146(37.8%)
4	It is better for my child to start receiving vaccines only when they are over one year of age.	38(9.8%)	118(30.6%)	92(23.8%)	138(35.8%)
5	There are better ways to prevent vaccine preventable diseases than vaccination	39(10.1%)	84(21.8%)	102(26.4%)	161(41.7%)
6	It is not important for my child to receive all the necessary vaccinations	132(34.2%)	140(36.3%)	64(16.6%)	50(13.0%)
	Average Percentage	15.0667%	25.2667%		
		=40.33%			

The level of poor perception regarding childhood immunization was assessed using a four-point Likert scale: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). Emphasis was placed on the notable frequencies and percentages of responses. For instance, a significant proportion of nursing mothers, 161 (41.7%), strongly disagreed with the statement that vaccinations can have serious side effects that cause more harm than the diseases they are intended to prevent. Additionally, 18.7% of nursing mothers reported that they were not fully convinced that childhood immunization is the safest protection for their child against diseases, while 31.3% strongly disagreed with this notion.

When asked whether there are better methods to prevent vaccine-preventable diseases than vaccination, 10.1% (39 respondents) strongly agreed, while a notable 41.7% (161 respondents)

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disagreed. Furthermore, the belief that it is not important for their child to receive all necessary vaccinations garnered a significant response, with 272 out of 386 respondents (70.5%) agreeing with this statement. Also, these findings highlight the critical need for enhanced education and outreach to address misconceptions about the importance and safety of childhood immunization among nursing mothers.

DISCUSSION

The beliefs of nursing mothers regarding childhood immunization in Ondo town present a complex interplay of demographic factors, notably age, education, and religion. The study indicates that while a segment of respondents aged 21-30 years exhibited more positive beliefs (36.3%), statistical analysis did not find a significant association between age and immunization beliefs ($r=0.103$; $p>0.05$). This finding suggests that age alone may not be a substantial determinant of belief toward childhood immunization, which aligns with previous research indicating that demographic characteristics do not always predict health-related beliefs (Davis et al., 2020; Becker et al., 2019). The lack of significance implies that other factors, such as social influences or misinformation, may play more critical roles in shaping these beliefs (Thompson et al., 2021).

Conversely, educational attainment emerged as a significant factor influencing beliefs about immunization. Among those with tertiary education, 23.9% reported higher levels of positive beliefs, with a statistically significant correlation ($r=0.163$; $p<0.05$). This finding is consistent with the Health Belief Model (HBM), which posits that higher knowledge and education levels enhance the perceived benefits of health interventions, such as immunization (Champion & Skinner, 2008). Studies have shown that educated individuals are more likely to engage in health-promoting behaviors and have a better understanding of the risks associated with vaccine-preventable diseases (Sankaranarayanan et al., 2017; MacDonald et al., 2016). Thus, the positive association between education and immunization beliefs underscores the need for educational initiatives aimed at improving health literacy among nursing mothers.

While the religious affiliation of respondents did not show a significant association with immunization beliefs (Chi square=0.104; $p>0.05$), it is worth noting that a higher percentage of Christians (40.7%) expressed positive beliefs. This finding could suggest that religious beliefs influence health perceptions, although the statistical analysis did not confirm this link. The Theory of Reasoned Action (TRA) posits that subjective norms influence behavioral intentions (Ajzen & Fishbein, 1980). Therefore, while the data did not reveal a direct connection, the interplay between religious beliefs and health perceptions warrants further investigation to understand how religious frameworks may shape beliefs toward childhood immunization.

In evaluating the overall perception of childhood immunization, the survey results reveal a troubling trend of skepticism among nursing mothers. A substantial majority (62%) held negative beliefs about the effectiveness of vaccinations in preventing dangerous diseases, with 60% doubting that immunization provides lifetime protection. These findings resonate with concerns raised in the literature regarding vaccine hesitancy, which is often fueled by misinformation and fear of adverse effects (Larson et al., 2014; Opel et al., 2016). The high percentage of respondents (41.7%) who strongly disagreed with the notion that vaccines can cause more harm than the diseases they prevent highlights a critical gap in understanding the

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risk-benefit ratio of vaccinations (Kata, 2010). This underscores the urgent need for targeted educational programs to clarify misconceptions about vaccine safety and efficacy.

Additionally, the assessment of nursing mothers' beliefs regarding the severity of diseases prevented by vaccines revealed a disconcerting trend. Only 29% expressed positive beliefs about the seriousness of these diseases, with a significant majority underestimating their severity. This discrepancy reflects a broader issue within public health: the need for effective communication strategies that convey the potential consequences of vaccine-preventable diseases (Betsch et al., 2018). The HBM suggests that enhancing perceived severity may motivate individuals to adopt healthier behaviors, such as immunization (Champion & Skinner, 2008). Therefore, health campaigns should emphasize the risks associated with non-immunization to instill a sense of urgency and promote proactive health behaviors among nursing mothers.

The intersection of demographics and immunization beliefs among nursing mothers in Ondo town can be effectively understood through the lenses of the Health Belief Model and the Theory of Reasoned Action. While age appeared to have minimal influence, education emerged as a critical factor correlating with positive beliefs about childhood immunization. The skepticism prevalent among nursing mothers, particularly regarding the seriousness of vaccine-preventable diseases and the effectiveness of vaccinations, highlights the urgent need for comprehensive educational interventions. Addressing misconceptions, enhancing health literacy, and fostering a supportive environment for informed decision-making about immunization are essential steps in improving childhood immunization rates in this demographic.

IMPLICATION TO RESEARCH AND PRACTICE

The findings from the study on nursing mothers' beliefs about childhood immunization in Ondo town carry significant implications for both research and practice. First, the lack of strong associations between age and immunization beliefs suggests that future research should explore other influencing factors, such as social networks and cultural perceptions, to develop a more comprehensive understanding of vaccine hesitancy. Additionally, the significant correlation between education and positive beliefs highlights the need for targeted educational interventions that address misconceptions about vaccination, especially among less-educated demographics.

In practice, health professionals should prioritize creating accessible, clear communication strategies to effectively convey the importance of immunization and the seriousness of vaccine-preventable diseases. This could involve community outreach programs that engage nursing mothers directly, enhancing their health literacy and encouraging informed decision-making regarding childhood immunization. Overall, integrating these insights into public health initiatives will be crucial for improving vaccination rates and protecting child health.

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CONCLUSION

In conclusion, this study underscores the critical need to address the beliefs of nursing mothers regarding childhood immunization in Ondo State, Nigeria. Despite the recognized efficacy of vaccines in preventing infectious diseases, the findings reveal significant skepticism among mothers, particularly influenced by education and age. While younger mothers displayed slightly more positive beliefs, educational attainment emerged as a key determinant, with those possessing higher education levels showing greater acceptance of immunization's benefits. Additionally, the lack of significant association between religious beliefs and vaccination beliefs suggests the need for nuanced communication strategies. The alarming underestimation of the severity of vaccine-preventable diseases highlights an urgent requirement for targeted educational interventions. By leveraging the insights from the Health Belief Model and the Theory of Reasoned Action, public health initiatives can be tailored to enhance health literacy and foster informed decision-making, ultimately improving vaccination coverage and health outcomes for children in the region.

FUTURE RESEARCH

Future research should explore the impact of social influences, misinformation, and community dynamics on nursing mothers' beliefs about childhood immunization. Additionally, studies should evaluate the effectiveness of targeted educational interventions across different demographic groups, particularly focusing on enhancing health literacy to improve vaccination rates in Ondo State and similar regions.

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