Original Research

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IJNHS

Mothers' Perception about Immunization of Children in Bangladesh

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Article info

Article history:
Received: Decemberl, 28th, 2024
Revised: January 30th, 2025
Accepted: February 15th, 2025

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International Journal of Nursing and Health Services (IJNHS)
Volume 8, Issue 1, February 20th, 2025
DOI: 10.35654/ijnhs.v8i1.852
E-ISSN: 2654-6310

Abstract

Background: Immunization is an essential public health strategy to prevent childhood diseases and enhance community health. The effectiveness of immunization programs, however, relies heavily on the acceptance and compliance of parents, particularly mothers. This study aimed to evaluate mothers' perceptions of child immunization in rural areas of Bangladesh. **Methods:** A cross-sectional study was conducted at the EPI center of Sher-e-Bangla Medical College Hospital in Barishal, involving 112 participants selected through convenience sampling. Data were collected via structured face-to-face interviews, utilizing a questionnaire with two sections: one on socio-demographic details and the other on mothers' perceptions of immunization. The data were analyzed using SPSS version 26, employing descriptive statistics to summarize participant characteristics and perceptions, and inferential statistics to assess relationships among variables. **Results:** The average age of participants was 29.29 years (SD = 6.92). A significant positive association was observed between participants' age and their perception of immunization ($r = -0.190$, $p = 0.045$). Additionally, residential area was significantly related to immunization perception ($t = -2.115$, $p = 0.037$), and the information source also had a significant effect on perception ($F = -2.115$, $p = 0.021$). **Conclusion:** The study findings indicate that perceptions of immunization are significantly associated with certain demographic factors. These results highlight the need for targeted educational efforts and community-based initiatives to counter misinformation and increase awareness. The insights gained can aid policymakers, healthcare providers, and public health professionals in improving immunization rates and safeguarding the health of future generations in Bangladesh.

Keywords: mothers, perception, immunization, children, Bangladesh

Introduction:

Immunization, the process by which individuals are rendered immune or resistant to infectious diseases through vaccination, is a cornerstone of public health interventions aimed at significantly reducing child mortality and morbidity (1). Vaccines stimulate the immune system to protect against future infections, playing an irreplaceable role in the prevention of major illnesses in children worldwide (2). As a highly cost-effective intervention, immunization utilizes established approaches to ensure accessibility, particularly for marginalized and remote populations, and serves as a pivotal component of child survival strategies (3). Administered through outreach programs, vaccination requires minimal lifestyle changes, which enhances its appeal as a public health success, recognized globally as one of the 20th century's greatest accomplishments (4).

In 1974, the WHO launched the Expanded Program on Immunization (EPI) to safeguard children globally from six preventable diseases—tuberculosis, polio, diphtheria, pertussis, tetanus, and measles—by the year 2000 (5). Today, immunizations prevent approximately 2 to 3 million deaths annually, although preventable diseases continue to claim over 1.5 million lives each year (6). In 2022, 84% of infants worldwide received the diphtheria-tetanus-pertussis (DTP3) vaccine, while coverage for Haemophilus influenza type b (Hib) vaccine reached 76%. In contrast, the WHO Western Pacific Region reported significantly lower DTP3 coverage at just 32% (7). In Bangladesh, vaccination coverage differs slightly between urban (88.5%) and rural areas (85.1%), with the highest rates in Rangpur (91.5%) and the lowest in Sylhet (69.8%) (8).

Over the last two decades, new vaccines have become more accessible worldwide. The GAVI Alliance and other organizations have supported the distribution of vaccines for Hepatitis B, Haemophilus influenzae type b (Hib), pneumococcal, and rotavirus, crucially protecting against child mortality causes like pneumonia and diarrhea (9). Despite these achievements, challenges persist, particularly in the developing world, where improving immunization coverage could prevent an additional two million child deaths annually (10). The Ministry of Health in collaboration with UNICEF has identified several factors disrupting routine immunization, such as supply shortages, social distancing requirements, and vaccine hesitancy, which includes delays, doubts, or refusal stemming from mistrust, perceived risks, or limited access to services (11). Additionally, remote areas face hurdles like distance from healthcare facilities and socio-economic barriers, which exacerbate limited awareness about immunization benefits (12).

A mother's perception of immunization can greatly influence vaccination uptake among children, as her understanding and trust in the process often guide her decisions (13, 14, 15). Fears of side effects, hesitancy due to minor illnesses, and misinformation can hinder vaccination rates (16). Mothers with negative views or limited knowledge about immunization may choose not to vaccinate their children or avoid seeking further information (17). Given their central role in child health, mothers' knowledge and attitudes toward vaccination are crucial, as parental knowledge is a primary factor in immunization decisions (18). Thus, empowering mothers with information is key to enhancing immunization rates and compliance (19).

In Bangladesh, research on mothers' perspectives on child immunization remains limited (5,8,20). While Bangladesh's Expanded Program on Immunization (EPI) has significantly reduced childhood morbidity and mortality, achieving remarkable coverage levels compared to global standards (5), disparities persist across socioeconomic and geographic lines. Despite an 86% national immunization coverage rate, urban areas outperform rural regions, and children from wealthier families and educated parents are more likely to be fully immunized (8). These inequalities highlight a gap in access to immunization services for socioeconomically disadvantaged groups, as predisposing factors like maternal education, enabling factors such as proximity to healthcare facilities, and household wealth strongly influence vaccination outcomes (20). However, maternal perceptions and barriers to accessing immunization services, particularly in rural and underserved communities, remain underexplored, presenting a critical gap that this study sought to explore.

Therefore, this study addressed this gap by examining the perceptions of rural Bangladeshi mothers regarding immunization. Understanding their viewpoints is essential to identifying factors associated with incomplete immunization, low vaccine coverage, and mothers' specific concerns. Insights from this research assumed to help guiding interventions to boost child immunization rates in Bangladesh, emphasizing the importance of addressing maternal concerns and strengthening vaccination programs tailored to community needs. By focusing on maternal perceptions, policymakers can better structure vaccination initiatives to achieve greater impact and coverage among vulnerable populations.

Methodology:

Design

A cross-sectional study design was utilized to assess mothers' perceptions of child immunization in Bangladesh. This study was span from July 1, 2023, to June 30, 2024, to capture comprehensive data within the given period.

Sample, sample size, & sampling technique

The study participants were consisting of mothers attending the Expanded Program on Immunization (EPI) center at Sher-e-Bangla Medical College Hospital (SBMCH) in Barishal. Eligible participants were mothers with at least one child under the age of five and who consent to participate. Mothers without children or those whose children were older than five years were excluded from the study. The sample size was calculated using G*Power (version 3.1.9.4) software, targeting a significance level of α = 0.05, power of 0.80 (1-β), and an effect size of 0.30, as common in nursing research. This resulted in a sample size of 84 participants. To account for a 20% attrition rate, an additional 28 participants were included, finalizing the sample at 112. Convenience sampling was employed to select participants who met the inclusion criteria.

Data collection process

Data were collected through a newly developed structured questionnaire. The validity of the questionnaire was supported by multiple factors. Content validity was ensured as the questionnaire was developed based on a comprehensive literature review, referencing credible sources such as Thirunavukkarasu et al. (2023), Almutairi et al. (2021), and Mphaka et al. (2018) (11,18,19). This approach guarantees that the questionnaire adequately addresses critical dimensions, including mothers' knowledge, attitudes, beliefs, and barriers related to immunization.

Instrument for data collection

The questionnaire comprised of two sections, first one to assess the socio-demographic characteristics (11 items), such as age, education level, occupation, family size, and residence type and the second one to evaluate mothers' perceptions on immunization, with 20 items rated on a five-point Likert scale from "strongly agree" to "strongly disagree." Higher scores reflect more positive perceptions. The questionnaire, originally in English, was translated into Bangla and validated by two experts to ensure content accuracy.

Data were gathered at the SBMCH EPI center using structured, face-to-face interviews with participants. This approach aims to facilitate accurate and consistent responses. Face validity is likely achieved through expert review and pilot testing, ensuring that the questions were relevant, clear, and comprehensible to the target population. In addition, Cronbach's Alpha score was found to be .89 indicating a good internal consistency of this questionnaire

Statistical analysis

The collected data were processed and analyzed using SPSS (version 25). Descriptive statistics (frequency, percentage, range, mean, and standard deviation) had summarized the socio-demographic characteristics, while inferential statistics (t-test, ANOVA, and correlation) explored the relationships between socio-demographic variables and perceptions of immunization. Statistical significance was set at $p < 0.05$.

Ethical Consideration

Ethical clearance was obtained from the Institutional Review Board (IRB) of Sher-e-Bangla Medical College, Barishal (SBMC/IRB/2024/1372). Approval from the hospital director was also be secured. Informed consent was obtained from each participant, who was assured of confidentiality and

anonymity. Identifiable information was excluded, and participants were allowed to withdraw at any time without justification. Data was stored securely and destroyed upon study completion.

Results:

In the Table 1, the socio-demographic profile of the study participants (N=112) shows a mean age of 29.29 years (SD ±6.92), with a range between 18 and 55 years. The majority of participants identified as Muslim (87.5%), with smaller proportions identifying as Hindu (9.8%) and Christian (2.7%). Regarding education, 42.9% of mothers had schooling, 27.7% attended college, and 29.5% had a university education. Most mothers were housewives (71.4%), while 26.8% were service holders and 1.8% engaged in business. For fathers, educational levels varied, with 42% having completed school, 20% college, and 37.5% university. Occupation-wise, 45.5% of fathers were service holders, 43.8% were businessmen, and 10.7% were workers. Monthly family income ranged from 6000 to 90000 Bangladeshi Taka, with a mean income of 35116 (SD ±25265.7). A higher proportion of participants resided in urban areas (62.5%) than rural (37.5%). The family structure was nearly evenly split between nuclear (49.1%) and joint families (50.9%). On average, participants had 1.86 children (SD ±1.05) and 4.98 family members (SD ±1.62). Most participants relied on family or friends for information (58.9%), followed by healthcare providers (34.4%), television (9.8%), and social media (0.9%).

Table 1: Distribution of socio-demographic characteristics of the participants (**N=112**).

Variables	Categories	n	%	Mean±SD
Age (years)	Range (18-55) years			29.29±6.917
Religion	Muslim	98	87.5%	
	Hindu	11	9.8%	
	Christian	3	2.7%	
Mothers' Educational Level	School	48	42.9%	
	College	31	27.7%	
	University	33	29.5%	
Mothers' Occupation	Service holder	30	26.8%	
	Housewife	80	71.4%	
	Business	2	1.8%	
Fathers' Educational Level	School	47	42%	
	College	23	20%	
	University	42	37.5%	
Fathers' Occupation	Service Holder	51	45.5%	
	Worker	12	10.7%	
	Businessman	49	43.8%	
Monthly family income rage (6000-90000) Bangladeshi Taka				35116±25265.704
Residential Area	Rural	42	37.5%	
	Urban	70	62.5%	
Types of family	Nuclear	55	49.1%	
	Joint family	57	50.9%	
Number of children (1-6) person				1.86±1.047
Number of family members (3-12) person				4.98±1.622
Source of information	Family/friends	66	58.9%	
	Health care provider	34	34.4%	
	Television	11	9.8%	
	Social media	1	.9%	

The findings in Table 2 provide insight into mothers' perceptions of immunization for children, reflecting generally positive attitudes toward vaccinations. A high percentage of mothers agreed with statements supporting immunization's benefits, with over 90% acknowledging the importance of the first dose immediately after birth (Mean = 3.44, SD = 0.72) and the belief that vaccines help keep children healthy (Mean = 3.73, SD = 0.63). Additionally, 72.3% strongly agreed that receiving all recommended vaccines is crucial for their children (Mean = 3.71, SD = 0.50), and 59.8% recognized the benefits of government-provided vaccines (Mean = 3.48, SD = 0.82).

However, there were also misconceptions and concerns regarding vaccination, particularly regarding its necessity and potential side effects. For instance, nearly half of the mothers (50.9%) disagreed with the statement that healthy children do not need vaccines (Mean = 1.01, SD = 1.30). In contrast, beliefs about a single vaccine being sufficient for all diseases (Mean = 1.57, SD = 1.40) and concerns that vaccinations could cause adverse effects, like fever or cramps, post-vaccination (Mean = 2.83, SD = 0.97). Furthermore, a considerable proportion of mothers still held misconceptions, such as the belief that immunity gained through natural infection is superior to vaccination (Mean = 1.25, SD = 1.33) and the assumption that newer vaccines may carry more risks than older ones (Mean = 1.13, SD = 1.09). Overall, the mothers' mean perception score of 49.10 (SD = 6.12) was found in this study.

The analysis in Table 3 indicates a statistically significant relationship between certain socio-demographic factors and mothers' perceptions of child immunization. Notably, age shows a slight but significant negative correlation with perception scores (r = -.190, p = .045). Residence also has a significant impact on perception, with urban mothers displaying a higher perception score (Mean = 49.96, SD = 6.719) compared to rural mothers (Mean = 47.67, SD = 4.709, p = .037). Additionally, the source of information significantly influences perception (p = .021), with mothers who rely on family and friends for information scoring highest (Mean = 49.85, SD = 5.879), while those who receive information from healthcare providers or television report slightly lower perception scores. Social media users, though a small subgroup, show a notably high perception score (Mean = 64).

Discussion

This study explored the mothers' perception of children's immunization and its association with their socio-demographic factors thoroughly. The study's findings underscore a largely positive perception of child immunization among Bangladeshi mothers, though they also reveal significant areas of misconception and concern that could impact vaccine compliance. The high level of agreement with statements on the importance and health benefits of vaccines aligns with previous research, suggesting that mothers were generally aware of the protective value of vaccines for preventing infectious diseases in children (21, 22). Specifically, the majority of mothers strongly agreed with the need for the first dose of vaccination at birth and the importance of completing the entire vaccine schedule, consistent with similar findings from studies in South Asia where vaccination awareness campaigns are prevalent (23).

Despite the overall positive perceptions, a significant portion of mothers harbored doubts or misinformation about vaccination necessity and safety, echoing concerns found in other developing contexts. For instance, a substantial number of mothers believed that natural immunity is preferable, a misconception that has also been documented in studies from both rural and urban areas globally, where traditional health beliefs sometimes discourage vaccination (24). Similarly, concerns about vaccine side effects, particularly fever or cramps, were prevalent, which may contribute to vaccine hesitancy, as seen in comparable studies (25). Addressing these concerns through targeted health education could mitigate fears and correct misunderstandings, as supported by research indicating that enhanced communication from healthcare providers significantly improves vaccine uptake (26).

Table 2: Distribution of Mothers' Perception about immunization

S/L no	Item	Strongly disagree (0)	Disagree (1)	Neither agree/ disagree (2)	Agree (3)	Strongly agree (4)	Mean SD ±
		n(%)	n(%)	n(%)	n(%)	n(%)	
1.	The first dose of vaccination is given to children just after birth	0(0%)	4(3.6%)	3(2.7%)	45(40.2%)	60(53.6%)	3.44±.720
2.	Vaccine are keeping your baby healthy	1(.9%)	1(.9%)	2(1.8%)	19(17%)	89 (79.5%)	3.73±.629
3.	It is important to receive all vaccine recommended for your baby	0(0%)	0(0%)	2(1.8%)	29(25.9%)	81(72.3%)	3.71±.496
4.	All childhood vaccines offered by the government program in my community are beneficial.	3(2.7%)	1(.9%)	2(1.8%)	39(34.8%)	67(59.8%)	3.48±.816
5.	Children who are healthy do not need vaccine	57(50.9%)	24(21.4%)	13(11.6%)	9(8%)	9(8%)	1.01±1.298
6.	Vaccination of children should be necessary before seasonal diseases	16(14.3%)	18(16.1%)	23(20.5%)	35(31.3%)	20(17.9%)	2.22±1.313
7.	A particular vaccine can be immunize all the disease	37(33%)	20(17.9%)	21(18.8%)	22(19.6%)	12(10.7%)	1.57±1.400
8.	Vaccination can be harmful for children	78)69.6%)	10(8.9%)	11(9.8%)	2(1.8%)	11(9.8%)	.73±1.301
9.	Want to give immunize your baby's full dose	10(8.9%)	4(3.6%)	5(4.5%)	11(9.8%)	82(73.2%)	3.35±1.271
10.	Vaccination only can prevent infectious disease	13(11.6%)	12(10.7%)	5(4.5%)	54(48.2%)	28(25%)	2.64±1.287
11.	Vaccination can reduce death and disability	7(6.3%)	7(6.3%)	13(11.6%)	53(47.3%)	32(28.6%)	2.86±1.098

12.	Diphtheria, tetanus, and pertussis can be controlled through vaccinations	5(4.5%)	10(8.9%)	5(4.5%)	25(22.3%)	67(59.8%)	3.24±1.164
13.	Hepatitis B virus can be prevented by vaccination	5(4.5%)	5(4.5%)	7(6.3%)	40(35.7%)	55(49.1%)	3.21±1.050
14.	Childhood vaccinations can control measles	8(7.1%)	7(6.3%)	6(5.4%)	34(30.4%)	57(50.9%)	3.12±1.206
15.	It is better for a child to develop immunity by getting sick than to get a vaccine	47(42%)	23(20.5%)	17(15.2%)	17(15.2%)	8(7.1%)	1.25±1.332
16.	Newly approved vaccines carry more risks than older vaccines	39(34.8%)	37(33%)	20(17.9%)	14(12.5)	2(1.8%)	1.13±1.086
17.	The information I receive about vaccines from the vaccine program is reliable and trustworthy	8(7.1%)	6(5.4%)	6(5.4%)	27(24.1%)	65(58%)	3.21±1.209
18.	One dose of vaccine is enough, multiple dose not needed	48(42.9%)	35(31.3%)	9(8%)	9(8%)	11(9.8%)	1.11±1.311
19.	My child does not need vaccines for diseases that are not common anymore	45(40.2%)	24(21.4%)	14(12.5%)	26(23.2%)	3(2.7%)	1.27±1.280
20.	Vaccination can cause fever, cramps, rashes after vaccination	4(3.6%)	8(7.1%)	15(13.4%)	61(54.5%)	24(21.4%)	2.83±.967
	Total mean of perception about immunization						**49.10±6.123**
	Mean of Total mean of perception about immunization						**2.455±.306**

Table 3: Relationship between mothers' socio-demographic characteristics and perception regarding children immunization.

Variables	Categories	Perception		
		Mean±SD	t/F/r	Sig (P)
Age (years)	Range (18-53) years		-.190*	**.045**
Religion	Muslim	49.4±6.318	.944	.392
	Hindu	47.09±3.673		
	Christian	46.67±6.506		
Mothers' Education Level	School	49.02±5.730	.049	.953
	College	49.39±6.037		
	University	48.94±6.896		
Mothers' Occupation	Service holder	48.67±5.762	.304	.739
	Housewife	49.19±6.309		
	Business	52±5.657		
Fathers' Education Level	School	48.34±6.012	.797	.453
	College	50.26±5.730		
	University	49.31±6.471		
Fathers' Occupation	Service Holder	49.33± 6.781	.088	.916
	Worker	48.58±4.641		
	Businessman	48.98±5.808		
Monthly family income			-.078	.415
Residential Area	Rural	47.67±4.709	-2.115	**.037**
	Urban	49.96±6.719		
Types of family	Nuclear	49.4±6.288	.511	.611
	Joint family	48±6.001		
Number of children (1-5) person			.116	.223
Number of family members (3-17) person			.123	.198
Source of information	Family/friends	49.85±5.879	3.360	**.021**
	Health care provider	47.5±6.689		
	Television	48.18±2.892		
	Social media	64		

Urban mothers exhibited higher perception scores than their rural counterparts, likely due to greater exposure to healthcare services and information sources (27). This disparity indicates a need for strengthened immunization awareness efforts in rural areas to ensure equal access to accurate information. Relying on family or friends as primary information sources was also associated with higher perception scores; however, healthcare providers are recognized as critical in addressing specific misconceptions and providing trustworthy information (28). Therefore, reinforcing healthcare professionals' role in rural immunization education could be instrumental in improving perceptions and reducing vaccine hesitancy.

This study highlights a significant influence of various socio-demographic factors on study participants' attitudes and beliefs. This analysis provides insights that can inform targeted public health interventions aimed at improving vaccine uptake in specific populations.

One of the notable findings was the inverse relationship between maternal age and perception of immunization, indicating that older mothers were slightly more hesitant or hold less favorable views regarding vaccines than younger mothers ($r = -0.190$, $p = 0.045$). While this correlation is weak, it suggests that age may impact perceptions, contradicting findings from a prior author (29), which showed older parents in Saudi Arabia held more positive views on vaccination. This difference could be attributed to cultural, educational, and healthcare access disparities between Bangladesh and Saudi Arabia. Such findings reinforce the importance of context when examining health beliefs (29).

A significant correlation was found between residential area and mothers' perceptions ($t = -2.115$, $p = .037$), with urban mothers displaying more positive attitudes toward immunization than rural mothers. This finding likely reflects the greater access to healthcare facilities, information, and services in urban areas compared to rural ones (30). The result is consistent with other studies showing urban mothers tend to have higher vaccination-related knowledge scores (31). Addressing this rural-urban disparity in health perceptions requires the expansion of healthcare infrastructure and enhanced information dissemination in rural regions.

Furthermore, the study identified the source of information as a critical factor influencing mothers' perceptions of immunization ($F = -2.115$, $p = .021$). Mothers who accessed information from credible sources, such as healthcare providers and educational programs, exhibited more positive perceptions. This finding emphasizes the need for reliable health communication strategies that ensure mothers receive accurate and trustworthy information, reducing misconceptions and improving vaccine acceptance (32). Research shows that information from healthcare professionals is particularly effective in fostering vaccine confidence (28), highlighting the potential benefits of bolstering communication channels between healthcare providers and mothers.

Interestingly, the study found no significant relationship between religion and immunization perceptions. This finding is aligned with research by a previous author (33), which suggests that while religion can influence health behaviors, it does not uniformly impact immunization views. This implies that public health campaigns could use generalized messaging across religious groups in Bangladesh without needing religiously tailored content, potentially simplifying outreach efforts.

Education, traditionally viewed as a critical factor in health perceptions, did not significantly affect mothers' perceptions of

immunization in this study. This finding diverges from studies that emphasize education as a determinant of health attitudes (23), suggesting that informal community knowledge or peer influences may play a larger role in shaping mothers' attitudes toward immunization in Bangladesh. Nonetheless, other studies have reported conflicting results, showing a positive association between maternal education and immunization knowledge (29, 31). This discrepancy highlights the complex dynamics of health literacy and suggests the need for community-focused education initiatives that go beyond formal schooling.

The lack of a significant relationship between parental occupation and immunization perceptions aligns with findings from other low-resource settings where job type does not correlate strongly with health knowledge or attitudes (34). This suggests that immunization efforts in Bangladesh could focus on universal health education rather than tailoring messages based on parental occupation. Additionally, the study found no significant associations between family size or income level and mothers' perceptions of immunization, challenging assumptions that these factors affect health priorities. While income is often linked to healthcare access, the lack of correlation in this study may be due to the low-cost or free availability of immunization services in Bangladesh, making financial barriers less relevant (30).

In summary, the study provides valuable insights into the socio-demographic factors influencing immunization perceptions among Bangladeshi mothers, offering significant implications for both clinical practice and policymaking. By identifying key factors shaping mothers' views on immunization, healthcare providers can design targeted interventions to address misconceptions, enhance awareness, and foster trust. Clinically, this involves creating culturally sensitive education programs and equipping healthcare workers with the skills to effectively communicate immunization benefits and counter vaccine hesitancy. For policymakers, the findings support the development of evidence-based national immunization programs, guiding resource allocation to high-priority areas, implementing mother-centric awareness campaigns, and integrating immunization initiatives into existing maternal and child health programs. The study also highlights the importance of addressing age-related misconceptions, improving access to healthcare information in rural areas, and ensuring communication from trusted sources. While the lack of significant relationships between perceptions and factors such as religion, education, and income suggest that generalized public health strategies may be effective, community-centered education remains essential to promote accurate understanding and positive attitudes toward immunization. Ultimately, the study underscores the need for a collaborative approach between clinicians, community stakeholders, and policymakers to enhance immunization coverage and improve child health outcomes nationwide.

Conclusion:

The current study reveals several important associations between demographic factors and mothers' perceptions of immunization in Bangladesh. The results show a weak but notable positive link between age and immunization perception, indicating that older mothers may hold more favorable views toward immunization than younger ones. The study also highlights a significant effect of residential location, with urban mothers potentially having better access to healthcare information and services, which influences their perceptions differently compared to rural mothers. Additionally, the

study underscores the vital role of information sources, as mothers receiving immunization information from reliable and thorough sources tend to have more accurate and positive views. These findings point to the need for customized communication strategies and greater access to reliable healthcare information to improve mothers' perceptions of immunization in Bangladesh.

Acknowledgment:

The authors extend their heartfelt gratitude to the authorities of Sher-E-Bangla Medical College in Barishal, Rajdhani Nursing College in Barishal, and Universal Nursing College in Dhaka for their unwavering support, which was instrumental in the timely completion of this study.

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