

Multivariate Analysis of Determinants of Mothers' Willingness to Provide BCG Immunization to Children as an Effort to Prevent Tuberculosis in the Working Area of Paya Bakong Health Center

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ABSTRACT

BCG immunization is one of the essential basic immunizations that provides protection against severe forms of tuberculosis in children. Mothers' willingness to provide BCG immunization is an important aspect in achieving optimal immunization coverage. This study aimed to analyze the determinants associated with mothers' willingness to provide BCG immunization in the working area of Paya Bakong Public Health Center. This study employed a quantitative analytical design with a cross-sectional approach. The study was conducted in December 2025 and involved 195 mothers with infants aged 0–11 months. Participants were selected using an accidental sampling technique. Data were analyzed using univariate analysis, bivariate analysis with the Chi-Square test, and multivariate analysis using binary logistic regression. The results showed that

150 respondents (76.9%) were willing to provide BCG immunization, while 45 respondents (23.1%) were unwilling. Bivariate analysis showed that knowledge ($p=0.000$) and attitude ($p=0.000$) were significantly associated with willingness to provide BCG immunization, whereas barriers were not significantly associated ($p=0.171$). In the multivariate analysis, knowledge ($p=0.001$) and attitude ($p=0.002$) remained significantly associated with willingness to provide BCG immunization, while barriers were not significant ($p=0.718$). The regression model explained 29.2% of the variation in willingness to provide BCG immunization. In conclusion, knowledge and attitudes were significantly associated with mothers' willingness to provide BCG immunization. Therefore, strengthening health education and communication regarding the benefits and importance of BCG immunization is necessary to increase mothers' willingness to immunize their children.

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INTRODUCTION

Immunization is one of the most effective public health interventions for preventing vaccine-preventable diseases and protecting children from serious infections. Achieving high and equitable immunization coverage is therefore essential to ensure optimal protection among children (Nurina et al., 2026). Maintaining broad immunization coverage is essential for protecting communities from vaccine-preventable diseases and reducing the

likelihood of outbreaks (Kemenkes, 2021). Each year, vaccination is estimated to avert around 3.5–5 million deaths worldwide, demonstrating its substantial contribution to global disease prevention (WHO, 2023). Vaccination is also considered one of the most cost-effective health interventions in primary health care services (UNICEF, 2023). In Indonesia, complete basic immunization is essential for protecting children from various vaccine-preventable diseases (VPDs), including tuberculosis (TB), diphtheria, pertussis, tetanus, hepatitis B, measles, polio, rubella, meningitis, and pneumonia. Immunization programs in Indonesia are implemented under mandatory and optional categories in accordance with Minister of Health Regulation No. 12 of 2017 (Kemenkes, 2017).

One of the essential basic immunizations for preventing tuberculosis is the BCG (*Bacillus Calmette–Guérin*) vaccine. This vaccine is administered to infants to provide protection against tuberculosis, particularly severe forms such as TB meningitis and miliary TB. Recent evidence suggests that BCG vaccination at birth is effective in preventing tuberculosis in young children, especially those under five years of age (Martinez et al., 2022). In addition, BCG vaccination is particularly beneficial in preventing severe childhood TB, including TB meningitis and miliary TB (Kemenkes, 2023a). Given that Indonesia is among the countries with a high tuberculosis (TB) burden, achieving high BCG immunization coverage is important to provide early protection for children. A study in Indonesia involving 16,236 children also found that several socioeconomic and demographic factors were associated with childhood immunization coverage and completeness (Sinuraya et al., 2024).

Global immunization coverage declined during the COVID-19 pandemic, with routine childhood vaccination coverage falling from 86% in 2019 to 83% in 2020 (WHO; UNICEF, 2021). This decline in immunization coverage resulted in a substantial number of children remaining unvaccinated or incompletely vaccinated. A recent study across 43 low- and middle-income countries reported that 9.0% of children had received no vaccines, highlighting persistent gaps in childhood immunization coverage (Cata-Preta et al., 2024). In Indonesia, the COVID-19 pandemic also disrupted routine childhood immunization programs, with a notable reduction in immunization coverage, particularly in rural areas (Rahayuningsih et al., 2024). WHO also reported that during the 2020–2022 period, routine immunization coverage experienced its most significant decline in three decades, resulting in millions of children not receiving basic immunization doses (*zero-dose children*) (WHO, 2023). This condition is consistent with a UNICEF report (2023), which showed that DTP vaccine coverage remained at 84%, while measles immunization coverage declined to 83%

(UNICEF, 2023). The *State of the World's Children* report also indicated that inequalities in access to immunization services have continued to increase (UNICEF, 2023).

In Indonesia, immunization is an important effort to protect children from various health problems, although its implementation still faces several challenges (Sulkani, 2024). The immunization program stipulates that infants aged 0–11 months should receive complete basic immunization, consisting of 1 dose of hepatitis B, 1 dose of BCG, 3 doses of DPT-HB-Hib, 4 doses of polio, and 1 dose of measles vaccine (Kemenkes, 2023b). Nevertheless, national coverage of complete basic immunization (CBI) continues to show disparities and has not fully achieved the established targets (Kemenkes, 2022).

Based on the results of the 2024 Indonesian Nutritional Status Survey (SSGI), complete basic immunization coverage among children aged 12–23 months continues to show disparities across provinces, with Aceh Province recording the lowest coverage at 30.0% (Kemenkes, 2025). These disparities indicate that gaps remain in achieving immunization coverage and are associated with the level of community knowledge (Ernisa et al., 2025). In this context, mothers play an important role in making decisions regarding immunization for their children, including BCG immunization. However, some mothers still do not take their children to receive immunization due to various influencing factors (Muslim et al., 2024).

Low immunization coverage in North Aceh remains a public health concern that requires further attention (Safitri et al., 2024). In 2023, only 26.2% of villages in North Aceh achieved Universal Child Immunization (UCI) status (BAPPEDA, 2024). Previous research also reported that complete basic immunization coverage was below 20%, with maternal knowledge and family support identified as important factors related to immunization uptake (Irmawati et al., 2025). A preliminary survey in the working area of Paya Bakong Public Health Center further indicated that BCG immunization coverage had not yet reached the expected level. These findings highlight the importance of examining the determinants of mothers' willingness to provide BCG immunization through a multivariate approach as part of efforts to prevent childhood tuberculosis (TB).

RESEARCH METHOD

This study employed a quantitative analytical design with a *cross-sectional* approach to analyze the determinants of mothers' willingness to provide BCG immunization to children. The study was conducted in the working area of Paya Bakong Public Health Center in December 2025. The study population consisted of all mothers with infants aged

0–11 months. A total of 195 respondents were selected using the Lemeshow formula with a 95% confidence level and a 5% margin of error, and participants were recruited using an *accidental sampling* technique. The inclusion criteria were mothers who possessed a Maternal and Child Health (KIA) book or Child Health Card (KMS) and were willing to participate as respondents, while mothers who could not complete the interview were excluded from the study.

RESULTS AND DISCUSSIONS

The study results are presented based on univariate, bivariate, and multivariate analyses. Univariate analysis was used to present the frequency distribution and percentages of each study variable. Bivariate analysis was used to present the results of the analysis between the independent and dependent variables, while multivariate analysis was used to examine several independent variables simultaneously in relation to the dependent variable. The results of the three analyses are presented in tables and described systematically according to the objectives of the study.

Univariate Analysis

Univariate analysis was conducted to determine the frequency distribution and percentages of each variable studied. The results of the univariate analysis are presented in tables, including the characteristics of the respondents and the distribution of each study variable. The results of the univariate analysis are presented in the following tables.

Table 1. Distribution of Respondents' Characteristics in the Working Area of Paya Bakong Health Center

Variable	f	%
Age		
Early Adulthood	1	0.5
Late Adulthood	90	46.2
Early Elderly	104	53.3
Total	195	100
Education		
Junior High School	4	2.1
Senior High School	191	97.9
Total	195	100
Occupation		
Housewife	177	90.8
Farmer	14	7.2
Entrepreneur	4	2.1
Total	195	100

Based on Table 1, among the 195 respondents, the majority were in the early elderly age group, comprising 104 respondents (53.3%), followed by the late adulthood group with 90 respondents (46.2%) and the early adulthood group with 1 respondent (0.5%). This indicates that the respondents in this study were predominantly in the early elderly age group. This condition may be associated with the respondents' experience and role in meeting family health needs, including decision-making regarding health services.

Based on the level of education, the majority of respondents had completed senior high school, totaling 191 respondents (97.9%), while 4 respondents (2.1%) had completed junior high school. The predominance of respondents with a senior high school education indicates that most respondents had received formal education up to the secondary level. Educational attainment may be one of the aspects that supports an individual's ability to receive and understand health information.

Based on occupation, the majority of respondents were housewives, totaling 177 respondents (90.8%), followed by farmers with 14 respondents (7.2%) and entrepreneurs with 4 respondents (2.1%). The high proportion of housewives indicates that most respondents' primary activity involved managing the household. This condition may allow respondents to have substantial involvement in childcare and meeting their children's health needs, including providing immunization.

Table 2. Distribution of Factors Associated with Mothers' Willingness to Provide BCG Immunization in the Working Area of Paya Bakong Community Health Center

Variable	f	%
Willingness to Provide BCG Immunization		
Unwilling	45	23.1
Willing	150	76.9
Total	195	100
Knowledge		
Poor	61	31.3
Good	134	68.7
Total	195	100
Attitude		
Unfavorable	64	32.8
Favorable	131	67.2
Total	195	100
Barriers		
Experienced barriers	117	60.0
No barriers	78	40.0
Total	195	100

Based on Table 2, among the 195 respondents, the majority of mothers stated that they were willing to provide BCG immunization to their children, totaling 150 respondents

(76.9%), while 45 respondents (23.1%) stated that they were unwilling. These results indicate that most mothers had a good level of willingness to provide BCG immunization to their children. Mothers' willingness to provide immunization is important because it can support the completion of basic immunization among children.

For the knowledge variable, 134 respondents (68.7%) had good knowledge, while 61 respondents (31.3%) had poor knowledge. Based on this distribution, the majority of respondents had a good level of knowledge regarding immunization. Good knowledge can support mothers' ability to understand information about immunization, including the benefits, purpose, and importance of BCG immunization for children's health.

For the attitude variable, the majority of respondents had a positive attitude, totaling 131 respondents (67.2%), while 64 respondents (32.8%) had a less positive attitude. The predominance of respondents with a positive attitude indicates that most mothers had a favorable acceptance of BCG immunization. A positive attitude may be one of the aspects that supports mothers' willingness to provide immunization to their children.

Meanwhile, for the barriers variable, 117 respondents (60.0%) experienced barriers to providing BCG immunization, while 78 respondents (40.0%) did not experience any barriers. This indicates that although most mothers were willing to provide BCG immunization, a considerable proportion of respondents still experienced barriers. These barriers need to be addressed because they may affect the implementation of immunization. Therefore, support from families and health workers is needed to help mothers overcome the barriers they encounter.

Bivariate Analysis

This analysis was conducted by comparing the distribution of willingness to provide BCG immunization across each category of the variables studied. The results of the bivariate analysis are presented in tables along with the *p*-values to determine whether an association exists between the variables. The results of the bivariate analysis are presented in the following tables.

Table 3. Association Between Knowledge and Mothers' Willingness to Provide BCG Immunization

Knowledge	Willingness to Provide BCG Immunization				OR	CI 95%	P-Value	
	Unwilling		Willing					Total (%)
	f	%	f	%				
Poor	30	49.2	31	50.8	61 (100)	7.677	3.681-16.012	0.000
Good	15	11.2	119	88.8	134 (100)			

Total	45	23.1	150	76.9	195 (100)
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Based on Table 3, among the 61 mothers with poor knowledge, 30 respondents (49.2%) were unwilling to provide BCG immunization, while 31 respondents (50.8%) were willing. Meanwhile, among the 134 mothers with good knowledge, 15 respondents (11.2%) were unwilling to provide BCG immunization, whereas 119 respondents (88.8%) were willing. These findings indicate that willingness to provide BCG immunization was higher among mothers with good knowledge than among those with poor knowledge.

The statistical test results showed a statistically significant association between maternal knowledge and willingness to provide BCG immunization, with a Chi-Square value of 36.268 and a *p-value* of 0.000 (<0.05). The Odds Ratio (OR) was 7.677, with a 95% CI of 3.681–16.012, indicating that mothers with poor knowledge were 7.677 times more likely to be unwilling to provide BCG immunization compared with mothers who had good knowledge. This finding suggests that mothers with better knowledge about BCG immunization tend to be more willing to immunize their children. Adequate knowledge can help mothers understand the benefits and purpose of immunization, as well as the importance of BCG immunization in protecting children against tuberculosis.

The findings of this study are consistent with the *Knowledge-Attitude-Practice* (KAP) theory, which explains that knowledge is one of the fundamental factors in the formation of health-related attitudes and behaviors. Adequate knowledge about immunization can help mothers understand the purpose, benefits, schedule, and importance of BCG immunization in protecting children against tuberculosis (WHO, 2022). This is also consistent with the WHO (2022) *Behavioral and Social Drivers of Vaccination* (BeSD) approach, which explains that individuals' thoughts and feelings about vaccines, including their understanding of vaccine benefits and safety, are associated with vaccine acceptance (WHO, 2022). With adequate knowledge, mothers may have a stronger basis for making informed decisions about providing immunization to their children.

The results of this study are consistent with the findings of Hidayattullah et al. (2026), who found a significant association between maternal knowledge and willingness to provide BCG immunization among mothers in the working area of Matang Kuli Public Health Center. The study showed that mothers with good knowledge were more likely to be willing to provide BCG immunization to their children, with a statistically significant result ($p=0.003$). In addition, maternal attitude and perceived barriers were also significantly associated with willingness to provide BCG immunization, with *p-values* of

0.002 and 0.003, respectively. These findings further support the results of the present study, indicating that maternal knowledge is an important factor associated with willingness to provide BCG immunization. Adequate knowledge can help mothers understand the benefits and importance of BCG immunization in protecting children against tuberculosis, thereby encouraging greater willingness to immunize their children (Hidayattullah et al., 2026).

Based on these findings, the researchers assumed that the association between knowledge and willingness to provide BCG immunization in this study occurred because mothers with good knowledge tended to have a better understanding of the benefits, purpose, schedule, and importance of BCG immunization in preventing tuberculosis in children. This understanding may increase mothers' confidence and encourage them to provide immunization to their children. Conversely, inadequate knowledge may lead to a limited understanding of the benefits of immunization or misconceptions about immunization, thereby reducing mothers' willingness to provide BCG immunization.

Table 4. Association Between Attitude and Mothers' Willingness to Provide BCG Immunization

Attitude	Willingness to Provide BCG Immunization					OR	CI 95%	P-Value
	Unwilling		Willing		Total			
	f	%	f	%				
Unfavorable	30	46.9	34	53.1	64 (100)	6.824	3.294-14.134	0.000
Favorable	15	11.5	116	88.5	131 (100)			
Total	45	23.1	150	76.9	195 (100)			

Based on Table 4, among the 64 mothers with an unfavorable attitude, 30 respondents (46.9%) were unwilling to provide BCG immunization, while 34 respondents (53.1%) were willing. Meanwhile, among the 131 mothers with a favorable attitude, 15 respondents (11.5%) were unwilling to provide BCG immunization, whereas 116 respondents (88.5%) were willing. These findings indicate that the proportion of mothers who were willing to provide BCG immunization was higher among those with a favorable attitude than among those with an unfavorable attitude.

The statistical test results showed a statistically significant association between maternal attitude and willingness to provide BCG immunization, with a Chi-Square value of 30.394 and a *p-value* of 0.000 (<0.05). The Odds Ratio (OR) was 6.824, with a 95% CI of

3.294–14.134, indicating that mothers with an unfavorable attitude were 6.824 times more likely to be unwilling to provide BCG immunization compared with mothers who had a favorable attitude. This finding indicates that maternal attitudes toward immunization are significantly associated with their willingness to provide BCG immunization. A favorable attitude may encourage mothers to accept and support immunization because of their positive perception of its benefits for their children's health. Conversely, an unfavorable attitude may be one of the factors contributing to mothers' unwillingness to provide BCG immunization to their children.

The results of this study are consistent with the *Behavioral and Social Drivers of Vaccination* (BeSD) framework developed by WHO (2022), which explains that vaccine acceptance is associated with how individuals think and feel about vaccines, including their beliefs regarding vaccine benefits and safety, as well as their motivation and willingness to receive vaccination (WHO, 2022). Thus, a positive attitude toward immunization may support the development of mothers' motivation and willingness to have their children vaccinated.

The results of this study are consistent with the findings of Sakdah and Ilhami (2024), who found a significant association between maternal attitudes and measles immunization uptake among infants, with a p -value of 0.012 (Sakdah & Ilhami, 2024). These findings indicate that maternal attitudes are one of the factors associated with decisions regarding immunization uptake.

Based on these findings, the researchers assumed that the association between attitude and willingness to provide BCG immunization in this study was related to mothers' perceptions of the benefits and importance of immunization for their children's health. Mothers with favorable attitudes tended to have more positive acceptance of immunization and were therefore more willing to provide BCG immunization. Conversely, unfavorable attitudes may arise from concerns about side effects, doubts about the benefits of vaccines, or inaccurate information, which may reduce mothers' willingness to provide immunization. However, the finding that 15 mothers (11.5%) with favorable attitudes were unwilling to provide immunization indicates that attitude is not the only aspect associated with willingness to provide BCG immunization.

Table 5. Association Between Barriers and Mothers' Willingness to Provide BCG Immunization

Barriers	Willingness to Provide BCG Immunization					OR	CI 95%	P-Value
	Unwilling		Willing		Total			
	f	%	f	%				
Experienced barriers	23	19.7	94	80.3	117 (100)	0.623	0.318-1.219	0.171
No barriers	22	28.2	56	71.8	78 (100)			
Total	45	23.1	150	76.9	195 (100)			

Based on Table 5, among the 117 mothers who experienced barriers, 23 respondents (19.7%) were unwilling to provide BCG immunization, while 94 respondents (80.3%) were willing. Meanwhile, among the 78 mothers who did not experience barriers, 22 respondents (28.2%) were unwilling to provide BCG immunization, whereas 56 respondents (71.8%) were willing. These findings indicate that the proportion of mothers who were willing to provide BCG immunization was high in both groups, regardless of whether they experienced barriers or not.

The statistical test results showed that there was no statistically significant association between barriers and mothers' willingness to provide BCG immunization, with a Chi-Square value of 1.873 and a *p-value* of 0.171 (>0.05). The Odds Ratio (OR) was 0.623, with a 95% CI of 0.318–1.219, indicating that mothers who experienced barriers had 0.623 times the odds of being unwilling to provide BCG immunization compared with mothers who experienced no barriers. However, since the confidence interval includes 1 and the *p-value* is greater than 0.05, this association was not statistically significant. This finding suggests that the barriers experienced by mothers were not statistically associated with their willingness to provide BCG immunization. Although most mothers who experienced barriers were still willing to provide immunization, other factors may play a more important role in determining maternal willingness, such as knowledge, attitude, family support, and information received from healthcare workers.

According to WHO (2022), immunization uptake is the result of a complex decision-making process that can be influenced by various factors. Barriers to receiving vaccination are included in the aspect of *convenience*, such as access, time, cost, and the quality of health services (WHO, 2022). However, WHO also explains that the decision to receive vaccination is not determined solely by ease of access, but is also influenced by trust in vaccines and health services, as well as perceptions of the importance of immunization.

The findings of this study are consistent with those of Jusril *et al.* (2022), who found that 62 out of 395 districts/cities (16%) temporarily suspended immunization campaigns due to vaccine hesitancy. Areas that had never suspended immunization campaigns had higher immunization coverage than areas that had suspended campaigns, at 81% compared with 42% ($p < 0.001$) (Jusril *et al.*, 2022). These findings indicate that vaccine acceptance is a complex behavior influenced not only by ease of access but also by knowledge, perceptions, trust, service experiences, information, and the social conditions of the community.

The researchers assumed that the absence of an association between barriers and willingness to provide BCG immunization in this study may be because most mothers remained willing to provide immunization despite experiencing barriers. This is reflected in the finding that 80.3% of mothers who experienced barriers were still willing to provide BCG immunization. This condition suggests that the barriers experienced by mothers may still be manageable, possibly through family support, information from healthcare workers, adequate knowledge, and awareness of the benefits of immunization for their children.

Multivariate Analysis

Multivariate analysis was conducted to identify the variable most strongly associated with mothers' willingness to provide BCG immunization after all variables were analyzed simultaneously. Binary logistic regression was used because the dependent variable, willingness to provide BCG immunization, consisted of two categories: willing and unwilling. Variables with a p -value ≤ 0.25 in the bivariate analysis were considered candidates for inclusion in the multivariate analysis.

Table 6. Results of Logistic Regression Analysis of Mothers' Willingness to Provide BCG Immunization

Variabel	B	S.E.	Wald	P-Value	EXP (B)	95 % CI
Knowledge	-1.449	0.425	11.631	0.001	0.235	0.102–0.540
Attitude	-1.293	0.418	9.583	0.002	0.274	0.121–0.622
Barriers	0.143	0.396	0.131	0.718	1.154	0.531–2.507
Constant	2.302	0.401	32.996	0.000	9.989	-

Based on Table 6, the results of the binary logistic regression analysis showed that the variables of knowledge, attitude, and barriers were entered simultaneously into the model. The *Omnibus Tests of Model Coefficients* showed a *Chi-square* value of 41.810 with $df = 3$ and a p -value of 0.000 (< 0.05), indicating that the model consisting of knowledge, attitude, and barriers was significantly associated with mothers' willingness to provide BCG immunization. The Nagelkerke R Square value of 0.292 indicated that these three variables explained 29.2% of the variation in mothers' willingness to provide BCG

immunization, while the remaining 70.8% was explained by other variables outside the model.

Knowledge was significantly associated with willingness to provide BCG immunization ($p = 0.001$; $\text{Exp}(B) = 0.235$; 95% CI: 0.102–0.540), as was attitude ($p = 0.002$; $\text{Exp}(B) = 0.274$; 95% CI: 0.121–0.622). Meanwhile, barriers were not significantly associated with willingness to provide BCG immunization after adjustment for the other variables ($p = 0.718$; $\text{Exp}(B) = 1.154$; 95% CI: 0.531–2.507). The Hosmer–Lemeshow test yielded a p -value of 0.038 (<0.05), indicating that the model did not demonstrate a good model fit.

The findings of this study are consistent with Lawrence Green's health behavior theory, which states that health behavior is influenced by predisposing, enabling, and reinforcing factors. Knowledge and attitude are categorized as predisposing factors that can shape an individual's tendency to engage in health-related behaviors, while barriers can be associated with enabling factors related to the ease of accessing health services (Green & Kreuter, 1991). These findings indicate that predisposing factors, particularly knowledge and attitude, were more consistently associated with mothers' willingness to provide BCG immunization than barriers after all variables were simultaneously controlled.

The findings of this study are also consistent with those of Raharso *et al.* (2025), who conducted a study involving 262 parents in Indonesia. The study found a significant relationship between knowledge and vaccination practices, with a correlation coefficient of $r = 0.333$ and $p = 0.001$ (Raharso *et al.*, 2025). These findings indicate that parents' understanding of vaccination is associated with their vaccination practices.

The researchers assumed that knowledge and attitude remained significantly associated with mothers' willingness to provide BCG immunization after simultaneous adjustment because both variables are directly related to the decision-making process regarding BCG immunization. Mothers with good knowledge tend to have a better understanding of the benefits, purpose, and importance of BCG immunization in preventing tuberculosis, enabling them to weigh the benefits of immunization against potential concerns. Meanwhile, a favorable attitude reflects greater acceptance and a positive perception of immunization, thereby encouraging mothers to provide BCG immunization to their children.

The lack of a significant association between barriers and willingness to provide BCG immunization after controlling for knowledge and attitude indicates that the barriers perceived by mothers may not necessarily be the primary consideration in determining

their willingness to provide BCG immunization. The researchers assumed that when mothers have adequate knowledge and a positive attitude toward immunization, barriers such as time, distance, cost, or accessibility of immunization services may become relatively less important in their decision to provide immunization. Thus, in this study, knowledge and attitude appeared to be more consistently associated with mothers' willingness to provide BCG immunization than barriers when all three variables were analyzed simultaneously.

CONCLUSION AND SUGGESTION

Based on the results of the study on the determinants of mothers' willingness to provide BCG immunization in the working area of Paya Bakong Community Health Center, it can be concluded that the majority of mothers were willing to provide BCG immunization to their children, accounting for 76.9%. The bivariate analysis showed a significant association between knowledge and attitude and mothers' willingness to provide BCG immunization, with a *p-value* of 0.000 for each variable. Meanwhile, barriers were not significantly associated with mothers' willingness to provide BCG immunization, with a *p-value* of 0.171. The multivariate analysis showed that knowledge and attitude remained significantly associated after simultaneous analysis, with *p-values* of 0.001 and 0.002, respectively, whereas barriers were not significantly associated, with a *p-value* of 0.718. Overall, the model was statistically significant based on the *Omnibus Test* ($p < 0.001$) and explained 29.2% of the variation in mothers' willingness to provide BCG immunization.

Based on the findings of this study, Paya Bakong Community Health Center and healthcare workers are recommended to strengthen education and communication regarding BCG immunization, particularly concerning its benefits, purpose, schedule, safety, and importance in preventing tuberculosis in children. A more persuasive approach should also be provided to mothers with unfavorable attitudes or who remain hesitant about immunization. Mothers with infants are encouraged to improve their knowledge of immunization through reliable sources of information and to consult healthcare workers if they have concerns or experience barriers to immunization. Future researchers are encouraged to expand the study by considering other variables that were not examined, such as family support, confidence in vaccines, perceptions of side effects, support from healthcare workers, and exposure to information, to provide a broader understanding of mothers' willingness to provide BCG immunization.

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