

APPLICATION OF THE THEORY OF PLANNED BEHAVIOR TO THE UTILIZATION OF IMMUNIZATION SERVICES FOR INFANTS IN SURAKARTA CITY 2025

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Abstract

Infectious diseases are the leading cause of child mortality in Indonesia, yet many deaths can be prevented through immunization. The 2023 Indonesian Health Survey reported a national full basic immunization coverage of only 35.8%, a decrease from 57.9% in 2018 and far from the 100% target. Surakarta City achieved a coverage of 98.34% in 2023, showing strong regional commitment, although it still does not fully meet national goals. This study analyzes the influence of the Theory of Planned Behavior (TPB) on the use of immunization services for infants in Surakarta. Using a cross-sectional design, 200 mothers with infants aged 12–24 months were selected through multistage random sampling. Independent variables include intention, attitude, subjective norm, and perceived behavioral control; the dependent variable is the use of infant immunization services. Data were collected via structured questionnaires and analyzed using linear regression and path analysis. The study found that intention directly affects the use of immunization services ($b=0.20$; 95% CI=0.07 to 0.33; $p<0.00$). Attitude, subjective norm, and outcome evaluation indirectly influence immunization service use through intention. The path model demonstrated good fit (CFI = 0.979; TLI = 0.964; RMSEA = 0.079; SRMR = 0.037). Intention plays a crucial role in the use of immunization services, with attitude, subjective norm, and outcome evaluation affecting use through intention. The study model shows a good fit. Increasing immunization uptake should focus on strengthening intention through positive attitudes, social norms, and education.

Keywords: intention, attitude, subjective norm, control, outcome evaluation, and immunization

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INTRODUCTION

The main health priority issue in Indonesia to date is infectious diseases, which remain the leading cause of child mortality but are actually preventable through immunization. Immunization has been proven to improve child health as well as reduce mortality, disability, and morbidity from vaccine-preventable diseases. The World Health Organization (WHO) states that immunization can save 2-3 million lives each year from diseases such as diphtheria, pertussis, tetanus, influenza, and measles (1).

In 2018, the global immunization coverage for three doses of the basic diphtheria, tetanus, and pertussis vaccine (DTP3) reached 86%, but approximately 19.4 million infants worldwide had not received full basic immunization, most of whom were in developing countries, including Indonesia (2). These data indicate a stagnation in global immunization coverage and reveal ongoing challenges to be addressed. In Indonesia itself, active polio cases were rediscovered in 2022 in Pidie District, Aceh, and in early 2024 in Klaten District, Central Java, as evidence of the circulation of infectious diseases that should have been prevented through immunization (3). Immunization coverage in Southeast Asia shows considerable

variation, with around 62% of countries achieving immunization coverage above 90%, while the rest remain below 90%, including Indonesia (4). The 2023 Indonesian Health Survey showed a decline in full basic immunization coverage among children aged 12-23 months in Indonesia, at only 35.8%, far below the national target of 100% and representing a significant decrease compared to 57.9% in 2018 (3). Central Java Province has a relatively higher achievement, reaching 54.7%, but Surakarta City specifically demonstrated an extraordinary achievement with full basic immunization coverage reaching 98.34% in 2023. This immunization achievement in Surakarta reflects a strong commitment to implementing the immunization program (5). Such success raises an important question about the behavioral factors that contribute to this high coverage. To understand these behavioral dynamics, the Theory of Planned Behavior (TPB) provides a relevant theoretical framework. The TPB explains that behavior is influenced by three main components: attitude, subjective norm, and perceived behavioral control, which together shape an individual's intention to perform a specific action, including providing immunization (6). Applying this theory helps to explain how mothers' positive attitudes toward vaccines, social support from families and communities, and confidence in accessing health services may lead to higher immunization coverage. The role of the mother is therefore crucial in fulfilling the child's health needs, particularly immunization, which provides essential immunity to prevent various infectious and life-threatening diseases.

Immunization is one of the most cost-effective and efficient health interventions to reduce morbidity, disability, and mortality from vaccine-preventable diseases (VPD) in children (7). Research shows that complete basic immunization is highly effective in preventing serious diseases such as measles, pertussis, diphtheria, tetanus, tuberculosis, and meningitis (8). Therefore, immunization during early childhood is a strategic step to reduce under-five mortality and build sustainable child health.

In addition to psychosocial factors, the family's economic status also plays an important role in access to and utilization of immunization services. Children from low-income families are more vulnerable to incomplete immunization due to financial constraints and limited access, as well as competing financial priorities (9). Limited healthcare infrastructure, especially in rural areas, also becomes a significant barrier to vaccine provision. Given these conditions, Surakarta City, as one of the areas with relatively good immunization coverage, can serve as a model for implementing immunization programs. However, a deeper understanding of the behavioral factors influencing infant immunization services, particularly from the parents' perspective, is needed. Previous studies have demonstrated that parental attitudes, perceived social expectations, and perceived control over accessing health services significantly influence immunization uptake(10)(11)(12). The Theory of Planned Behavior (TPB) provides a suitable framework to explain these behavioral determinants, as it has been empirically validated in predicting vaccination intention and completion in various contexts, including maternal and child health behaviors in Indonesia (13)(14)

Based on this background, the present study, titled "*Application of the Theory of Planned Behavior to the Utilization of Infant Immunization Services in Surakarta City*," aims to analyze the influence of mothers' attitudes, subjective norms, and perceived behavioral control on the utilization of complete basic immunization services. Specifically, this study

seeks to identify which behavioral components most strongly predict the successful completion of full immunization among infants in Surakarta.

The results of this study are expected to provide an evidence-based foundation for designing behavioral interventions and health promotion strategies to improve immunization coverage. By targeting the key psychosocial determinants of parental behavior, the study aims to support child health programs and reduce morbidity and mortality from vaccine-preventable diseases in Surakarta City (1–5).

METHODS

This study employed an analytical observational design with a cross-sectional approach, conducted from April to June 2025 in Surakarta City, Central Java, Indonesia. The study population comprised all mothers with children aged 12–24 months residing in the Surakarta area. A total of 200 mothers who met the inclusion criteria were selected using a multi-stage random sampling technique, consisting of stratified random sampling at the subdistrict level and simple random sampling at the *Posyandu* (community health post) level. Sample allocation was carried out proportionally across several subdistricts to ensure an even representation of data within the study area. The inclusion criteria were: (a) mothers who have children aged 12–24 months, (b) mothers who possess a Child Growth Monitoring Book (Kartu Menuju Sehat/KMS), and (c) mothers who agreed to participate as respondents. The exclusion criteria were: (a) mothers attending their child's first immunization visit at the *Posyandu*, (b) mothers who missed three consecutive routine immunization visits according to the national schedule, and (c) cases in which the child was ill during the study period.

The dependent variable in this study was the utilization of infant immunization services, measured by the frequency of immunization visits in accordance with the national immunization schedule and validated using the KMS book. The independent variables were psychosocial constructs derived from the Theory of Planned Behavior (TPB), namely intention, attitude, subjective norm, motivation to comply, perceived behavioral control, behavioral belief, and outcome evaluation, as well as demographic characteristics such as the mother's age, residence, education level, and family income. The research instrument consisted of a structured questionnaire developed based on the TPB constructs. Each construct was measured using three to six statements phrased both positively and negatively to minimize response bias. Responses were measured using a four-point Likert scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Agree*, 4 = *Strongly Agree*). Prior to data collection, a pilot test was conducted with 30 respondents of similar characteristics to assess the validity and reliability of the instrument. Construct validity was tested using the Pearson item-total correlation, while internal consistency reliability was measured using Cronbach's Alpha coefficient. All constructs achieved Cronbach's Alpha ≥ 0.70 , indicating good internal consistency.

Data were analyzed using the latest version of STATA software. Normality testing was conducted using the Shapiro–Wilk test, with data considered normally distributed if $p > 0.05$. Subsequently, parametric tests (linear regression and path analysis) were performed to examine the relationships and predictive effects among variables. The analysis consisted of univariate analysis to describe respondent characteristics, bivariate analysis to test relationships between variables, and multivariate analysis to assess the overall influence of TPB constructs on the utilization of infant immunization services. All respondents provided written informed consent

before participation. The study ensured data confidentiality and anonymity and obtained ethical approval from the Health Research Ethics Committee of Dr. Moewardi General Hospital, with approval number 478/III/HREC/2025.

RESULTS

Sample Characteristics

In this study, the sample characteristics and research variables in the form of continuous data are described in the following table.

Table 1. Sample Characteristics and Continuous Variable Data

Variables	Mean	Standard Deviation	Minimum	Maximum
Income (Rupiah)	3,823,750	4,644,446	1,000,000	1,5000,000
Infant Age (Months)	15.59	3.90	12	24
Immunization	6.62	0.64	5	7
Intention	17.10	2.88	9	20
Attitude	17.19	2.40	11	20
Subjective Norm	13.6	1.83	8	16
Perceived Behavioral Control	16.64	2.33	11	20
Behavioral Beliefs	16.98	2.43	10	20
Outcome Evaluation	17.05	2.55	10	20
Normative Beliefs	16.66	3.22	7	20
Motivation to Comply with Norms	17.05	2.40	11	20

Based on the results of the study shown in Table 4.2, the average age of infants in the sample was 15.59 months. The average family income was recorded at IDR 3,823,750. In terms of health, the average number of immunizations received by infants was 6.62. Additionally, the average parental intention score for providing immunization was 17.10, while their average attitude score was 17.19. The average subjective norm score influencing the immunization decision was 13.6, and perceived behavioral control had an average score of 16.64. The average behavioral belief score was 16.98, outcome evaluation 17.05, normative belief 16.66, and motivation to comply with norms 17.05.

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Table 2 shows that the majority of respondents in this study are female, totaling 112 people (56%). Next, the most common marital status of the parents is married, with 189 people (94.5%). The majority of respondents are Muslim, numbering 163 people (81.5%). The highest level of education of the respondents is mostly high school, with 106 people (53%). Based on occupation, the majority are housewives, totaling 103 people (51.5%).

Table 2. Sample characteristics of the study based on categorical data

Characteristics	Category	(n)	Percentage (%)
Gender	Male	88	44.00
	Female	112	56.00
Marital Status	Divorced	2	1.00
	Widowed	9	4.50
	Married	189	94.50
Religion	Islam	163	81.50
	Christian	33	16.50
	Budhist	3	1.50
	Hindus	1	0.50
Education	Elementary School	3	1.50
	Junior Hight School	15	7.50
	Senior Hight School	106	53.00
	University	76	38.00
Mother's occupation	No Employment	4	2.00
	Housewives	103	51.50
	Working from Anywhere	93	46.50

Bivariate Analysis

Bivariate analysis was conducted to examine the effect of the independent variables on the dependent variable. The results of this bivariate analysis were used to determine whether the application of the Theory of Planned Behavior influences the utilization of infant immunization services. Simple linear regression analysis of intention and utilization of infant immunization services yielded a coefficient of ($b = 0.04$; 95% CI = 0.01 to 0.075; $p = 0.004$). This finding indicates that a strong intention is associated with a 0.04-unit higher utilization of infant immunization services compared to weak intention; this relationship was statistically significant.

The analysis of attitude and utilization of infant immunization services yielded ($b = 0.02$; 95% CI = 0.01 to 0.03; $p = 0.008$), indicating that a positive attitude is associated with a 0.30-unit higher utilization compared to a low attitude; this relationship was statistically significant. The analysis of subjective norms and utilization of infant immunization services yielded ($b = 0.07$; 95% CI = 0.02 to 0.12; $p = 0.006$), indicating that positive subjective norms are associated with a 0.05-unit higher utilization compared to negative subjective norms; this relationship was statistically significant. The analysis of perceived behavioral control and utilization of infant immunization services yielded ($b = 0.05$; 95% CI = 0.01 to 0.09; $p = 0.010$), indicating that strong perceived behavioral control is associated with a 0.05-unit higher utilization compared to weak perceived behavioral control; this relationship was statistically significant.

The analysis of behavioral beliefs and utilization of infant immunization services yielded ($b = 0.05$; 95% CI = 0.01 to 0.08; $p = 0.009$), indicating that strong behavioral beliefs are associated with a 0.05-unit higher utilization compared to weak behavioral beliefs; this relationship was statistically significant. The analysis of outcome evaluation and utilization of infant immunization services yielded ($b = 0.05$; 95% CI = 0.01 to 0.08; $p = 0.005$), indicating that a positive outcome evaluation is associated with a 0.05-unit higher utilization compared to a negative outcome evaluation; this relationship was statistically significant.

The analysis of normative beliefs and utilization of infant immunization services yielded ($b = 0.05$; 95% CI = 0.03 to 0.08; $p < 0.001$), indicating that positive normative beliefs

are associated with a 0.05-unit higher utilization compared to negative normative beliefs; this relationship was statistically significant. Finally, the analysis of motivation to comply with norms and utilization of infant immunization services yielded ($b = 0.04$; 95% CI = -0.00 to 0.73; $p = 0.052$). This finding indicates that motivation to comply with norms was not associated with the utilization of infant immunization services, and this relationship was not statistically significant.

Table 3. Simple Linear Regression Analysis Results of Variables Influencing the Utilization of Infant Immunization Services

Variables	Path Coefficient (b)	95% CI		P-value
		Lower	Upper	
Intention	0.04	0.01	0.08	0.004
Attitude	0.02	0.01	0.03	0.008
Subjective Norm	0.07	0.02	0.12	0.006
Perceived Behavioral Control	0.05	0.01	0.09	0.010
Behavioral Beliefs	0.05	0.01	0.08	0.009
Outcome Evaluation	0.05	0.01	0.08	0.005
Normative Beliefs	0.05	0.03	0.08	<0.001
Motivation to Comply with Norms	0.04	-0,00	0.07	0.052

Path Analysis

This study examined the factors that affect infant immunization use. The model met all the requirements, so the analysis was done. Figure 1 shows how these factors are connected and how they influence the use of immunization, both directly and indirectly.

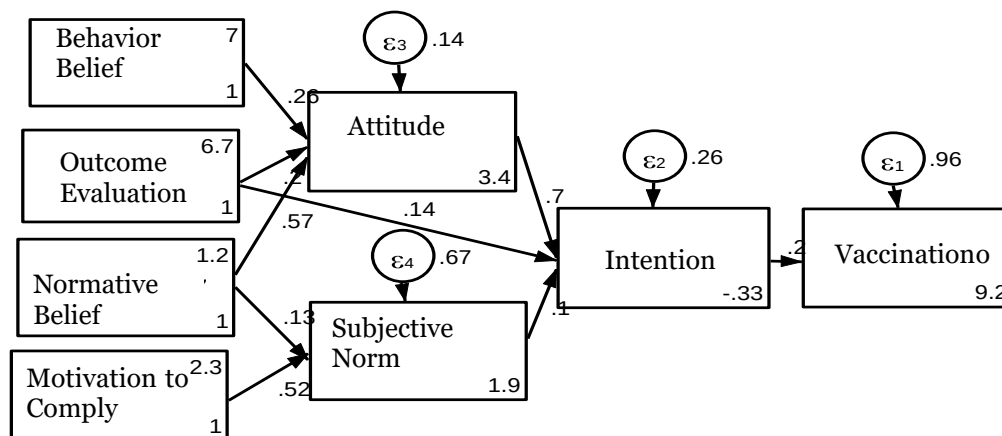


Figure 1. Path Diagram of the Influence of Theory of Planned Behavior Constructs on Infant Immunization Service Utilization Behavior

Figure 1 presents the path analysis results of the application of the Theory of Planned Behavior to the utilization of immunization services. The path analysis results show that the utilization of infant immunization services is influenced by several variables, either directly or indirectly. The utilization of immunization services is directly influenced by intention. Intention has a positive effect on the utilization of immunization services. Respondents with a

positive intention show better utilization of immunization services compared to those with a negative intention. Intention is directly influenced by attitude, subjective norm, and outcome evaluation

Table 4. Path Analysis Results of the Application of the Theory of Planned Behavior on the Utilization of Infant Immunization Services

Variable		Path Coefficient (b)	CI 95%		p
			Lower	Upper	
Direct Effect					
Utilization of Immunization Services	← Intention	0.20	0.07	0.33	0.003
Indirect Effect					
Intention	← Attitude	0.70	0.60	0.80	<0.001
	← Subjective Norm	0.10	0.02	0.19	0.017
	← Outcome Evaluation	0.14	0.02	0.26	0.019
Attitude	← Behavior Belief	0.26	0.17	0.35	<0.001
	← Outcome Evaluation	0.20	0.11	0.29	<0.001
	← Motivation to Comply with Norms	0.57	0.50	0.64	<0.001
Subjective Norm	← Motivation to Comply with Norms	0.13	0.14	0.25	0.029
	← Normative Belief	0.52	0.41	0.62	<0.001

N Observation = 200
 Log likelihood = -1751.6788
 Chi-Square p = 0.063 (>0.05).
 RSMEA=0.079 (<0.08). CFI=0.979 (>0.90).
 TLI=0.964 (>0.90). SRMR=0.037 (<0.05) . CD=89.4

The utilization of infant immunization services is influenced by intention, and this effect is statistically significant. Infants with strong intention have a higher likelihood of utilizing immunization services compared to those with weak intention ($b = 0.20$; 95% CI = 0.07 to 0.33; $p = 0.003$). Intention is influenced by attitude, and this effect is statistically significant. Mothers with a positive attitude are more likely to have a positive intention towards utilizing infant immunization services than those with a negative attitude ($b = 0.70$; 95% CI = 0.60 to 0.80; $p < 0.001$). Intention is influenced by subjective norm, and this effect is statistically significant. Mothers with a positive subjective norm are more likely to have a positive intention towards utilizing infant immunization services than those with a negative subjective norm ($b = 0.10$; 95% CI = 0.02 to 0.19; $p = 0.017$).

Intention is influenced by outcome evaluation, and this effect is statistically significant. Mothers with a positive outcome evaluation are more likely to have a positive intention towards utilizing infant immunization services than those with a negative outcome evaluation ($b = 0.20$; 95% CI = 0.11 to 0.29; $p = 0.019$). Attitude is influenced by behavioral beliefs, and this effect is statistically significant. Mothers with strong behavioral beliefs are more likely to have a positive attitude towards utilizing infant immunization services than those with weak behavioral beliefs ($b = 0.26$; 95% CI = 0.17 to 0.35; $p < 0.001$). Influenced by outcome evaluation, and this effect is statistically significant. Mothers with a positive outcome evaluation are more likely to have a positive attitude towards utilizing infant immunization services than those with a negative outcome evaluation ($b = 0.20$; 95% CI = 0.11 to 0.29; $p < 0.001$). Attitude is influenced by motivation to comply with norms, and this effect is statistically significant. Mothers with a positive motivation to comply with norms are more likely to have a positive attitude towards utilizing infant immunization services than those with negative motivation ($b = 0.57$; 95% CI = 0.50 to 0.64; $p < 0.001$).

Subjective norm is influenced by motivation to comply with norms, and this effect is statistically significant. Mothers with positive motivation to comply with norms are more likely to have a positive subjective norm towards utilizing infant immunization services than those with negative motivation ($b = 0.13$; 95% CI = 0.14 to 0.25; $p = 0.029$). Subjective norm is influenced by normative beliefs, and this effect is statistically significant. Mothers with positive normative beliefs are more likely to have a positive subjective norm towards utilizing infant immunization services than those with negative normative beliefs ($b = 0.52$; 95% CI = 0.41 to 0.62; $p < 0.001$).

DISCUSSION

Path analysis revealed that the utilization of immunization services was directly influenced by intention, which had a statistically significant effect ($b = 0.20$; 95% CI = 0.07 to 0.33; $p = 0.003$). Strong intention was shaped by positive attitudes toward immunization, social support from the immediate environment (subjective norms), and mothers' confidence in accessing services (1). In the local Surakarta context, this finding underscores that mothers' intentions are not formed in isolation but within a strong communal and cultural environment. Many mothers rely on family opinions, community recommendations, and *Posyandu* cadres for health decisions. Thus, fostering intention must involve reinforcing social and cultural drivers that make immunization a shared community responsibility rather than an individual act. Caso et al. (2022) found in Italy that negative attitudes and subjective norms were key predictors of non-immunization intention, with factors like risk perception and trust playing indirect roles through attitudes, confirming the importance of promoting positive attitudes and trust in health institutions (2).

These findings reinforce the concept in the Theory of Planned Behavior (TPB) that intention is a key factor driving health behavior. Mothers with strong intentions to immunize tend to be more compliant with their infant's immunization schedule than mothers with weak intentions (15). Recent research in the Philippines by Dizon et al. (2025) showed that parents' intentions towards immunization were influenced by perceptions of ease of access to services, social support, and belief in the benefits of vaccines (16).

This study demonstrated that positive attitudes toward immunization influenced mothers' intentions to immunize. These findings suggest that mothers' perceptions of vaccine safety and effectiveness are important factors in shaping immunization behavior. Consistent with this, a national study in Jordan showed that parents with positive knowledge and attitudes toward vaccines tended to have higher immunization compliance rates than parents with negative perceptions of vaccines (17).

Attitudes significantly influenced immunization intention, with mothers holding positive attitudes more likely to intend to immunize their infants ($b = 0.70$; 95% CI = 0.60 to 0.80; $p < 0.001$), consistent with Capasso (2024), who identified parental attitudes as crucial for immunization behavior(3). Sariatmi et al. (2024) reported negative attitudes as drivers of low immunization coverage, whereas positive attitudes promoted timely immunization(4). Garcia et al. (2023) emphasized the role of family attitudes and perceptions in shaping immunization uptake in Brazil, reinforcing that education and clear messaging are vital (5). These results show that behavioral beliefs such as confidence in vaccine safety and benefits directly form positive attitudes ($b = 0.26$; 95% CI = 0.17 to 0.35; $p < 0.001$) (18). In Surakarta, this can be interpreted as improving mothers' trust in healthcare professionals and providing transparent communication through the *Posyandu* cadre or midwives, which can reinforce these positive beliefs. Trust, information clarity, and social support further strengthen attitudes that increase immunization intentions and behaviors globally(8)(9).

In addition to attitudes, subjective norms also influence mothers' intentions to utilize immunization services. Support provided by husbands, family, Posyandu (Integrated Health Post) cadres, and health workers can strengthen mothers' decisions to complete their children's immunizations. In Indonesian society, which still values collectivism, the social environment plays a crucial role in shaping family health behaviors (15). Research in Indonesia also shows that child immunization coverage increased when parents received adequate social support and access to health information during the COVID-19 pandemic.(19)(20).

The outcome evaluation results in this study indicate that mothers who believe the benefits of immunization outweigh the risks of side effects are more likely to receive immunization. Research on the hepatitis B immunization program also indicates that the vaccine is effective in preventing infectious diseases and causes minimal side effects. Therefore, belief in the benefits of vaccines can improve community immunization behavior. (21)(22).

Subjective norms indirectly affected immunization utilization via intention ($b = 0.10$; 95% CI = 0.02 to 0.19; $p = 0.017$), with family support crucial in Indonesia, where only 27% of mothers decide independently (6). This finding illustrates the collectivist nature of Indonesian families, where mothers' decisions are often influenced by their husbands, parents, or community figures. Liu et al. (2024) and Elbert (2023) underscore the powerful influence of social pressures from family and community on vaccination behavior, supporting interventions involving community leaders and social norms to boost coverage (6) (7). Within TPB, this interaction reflects the indirect causal pathway in which *normative beliefs* and *motivation to comply* strengthen subjective norms, which in turn shape intention and behavior. In this study, subjective norm was influenced by motivation to comply ($b = 0.13$; 95% CI = 0.14 to 0.25; $p = 0.029$) and normative beliefs ($b = 0.52$; 95% CI = 0.41 to 0.62; $p < 0.001$) (23) (24) (25) (26). Mothers who believe that important others, such as husbands, parents, or

religious figures, support immunization are more likely to feel social pressure to vaccinate, strengthening subjective norms that encourage immunization behavior. Studies among teachers and community members confirm the role of normative beliefs and social expectations in vaccination decisions (27)(28)(29).

Furthermore, motivation to comply with norms strongly influenced attitude ($b = 0.57$; 95% CI = 0.50 to 0.64; $p < 0.001$), as demonstrated by research in Indonesia and Saudi Arabia emphasizing social and healthcare worker influence (30) (31) (32). This suggests that mothers who are motivated to align with social expectations tend to develop positive attitudes toward vaccination, especially when health workers or respected figures advocate for it. Such findings highlight that behavioral change programs in Indonesia should integrate community-based reinforcement and role modeling strategies to sustain social influence. Interestingly, intention was also influenced by outcome evaluation, where mothers with positive evaluations of immunization benefits were more likely to intend use ($b = 0.20$; 95% CI = 0.11 to 0.29; $p = 0.019$). Positive perceptions of vaccine safety and benefits enhance immunization behavior, supported by findings from Elemuwa et al. (2024), Salim et al. (2025), and Burch et al. (2025), emphasizing knowledge, healthcare support, and risk communication (8) (9). Attitude was significantly affected by positive outcome evaluation ($b = 0.20$; 95% CI = 0.11 to 0.29; $p < 0.001$) (33)(34)(35)(36), reinforcing that positive cognitive assessment of vaccine benefits strengthens affective readiness to act. Within the TPB framework, these findings confirm that behavioral beliefs shape attitudes, normative beliefs influence subjective norms, and both pathways converge to form intention, which directly predicts the utilization of immunization services. The exclusion of perceived behavioral control (PBC) due to its insignificant association suggests that in Surakarta, psychological and social factors such as belief, trust, and cultural conformity play a more dominant role than access barriers.

This research also shows that social and demographic factors influence immunization behavior. A longitudinal study in the UK showed that education level, culture, and ability to understand health information were associated with childhood vaccination coverage (37). Furthermore, research in Nigeria found that women's empowerment in family decision-making was associated with increased child immunization coverage. This suggests that increased immunization is not solely dependent on individual factors but is also influenced by social conditions (38). The goodness of fit model results (CFI=0.979; TLI=0.964; RMSEA=0.079; SRMR=0.037) indicate that the TPB is able to optimally explain infant immunization service utilization behavior. Research by Chu and Liu (2021) also demonstrated that the TPB is effective in explaining vaccination behavior in various developing countries. Therefore, a TPB-based approach can be used as a basis for developing public health interventions to increase infant immunization coverage (39).

Increasing immunization coverage in Surakarta City requires not only the availability of health services, but also strengthening health education, increasing social support, and effective communication from health workers. Community-based strategies through integrated health posts (Posyandu), health cadres, and community leaders can help increase mothers' intention to utilize complete and timely infant immunization services. (40).

This study's limitations include the focus on internal psychological factors without considering external influences such as health policies, family support, and service quality. Economic and religious variations were not analyzed, and the cross-sectional design limits

causal interpretation. Future research should integrate contextual and structural determinants like accessibility and communication quality to better explain immunization behavior. Practically, public health programs should strengthen intention by improving attitudes, reinforcing social norms, and building trust. Community-based interventions through *Posyandu*, peer role models, and family-centered education can translate positive psychosocial factors into sustained immunization practices, supporting Indonesia's goal of full immunization coverage.

CONCLUSION AND RECOMMENDATION

This study found that intention is the strongest direct predictor of infant immunization service utilization, while attitude and subjective norms influence immunization behavior indirectly through intention. Behavioral beliefs, outcome evaluation, normative beliefs, and motivation to comply with social norms shape mothers' attitudes and perceptions, which then strengthen their intention and actual immunization practices. These results confirm the applicability of the Theory of Planned Behavior in explaining preventive health behaviors and emphasize the need to address mothers' psychological and social factors to increase immunization coverage effectively.

Based on these findings, strategies to improve immunization rates should focus not only on providing information but also on fostering positive attitudes and reinforcing supportive social norms through engagement with community leaders, health cadres, and religious figures. Health institutions are encouraged to create accessible, mother-child friendly services that facilitate mothers' use of immunization programs. Mothers themselves should be motivated to actively participate in immunization according to recommended schedules, supported by clear communication and health education. Further research is recommended to examine additional factors such as family income and religious beliefs to better understand their impact on immunization behavior in diverse populations.

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