KESANS: International Journal of Health and Science
2808-7178 / 2808-7380
http://kesans.rifainstitute.com/index.php/kesans/index

The Association Between Maternal Knowledge of Immunization and Acceptance of Multiple Injection Immunization at Community Health Posts in an Urban Primary Healthcare Setting

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Article Information
Submitted: **29 December 2025**
Accepted: **07 January 2026**
Publish: **15 January 2026**

Keyword: Maternal Knowledge; Immunization; Multiple Injection; Immunization Acceptance;

Abstract

Introduction: *Multiple injection immunization is a service strategy that administers more than one vaccine in a single visit to improve immunization efficiency and coverage. Despite evidence of safety, parental concerns regarding adverse effects remain a major barrier to its acceptance. Maternal knowledge plays a critical role in decision-making related to childhood immunization.* ***Objective:*** *This study aimed to analyze the association between maternal knowledge of immunization and acceptance of multiple injection immunization at community health posts in an urban primary healthcare setting.* ***Method:*** *An analytical observational study with a cross-sectional design was conducted among 82 mothers with children aged 2–24 months, selected using purposive sampling. Data were collected using structured questionnaires and analyzed using the Chi-square test.* ***Result and Discussion****: More than half of respondents demonstrated a high level of immunization knowledge (57.3%), and the majority accepted multiple injection immunization (68.3%). Among mothers who accepted multiple injections, 67.9% had a high knowledge level. Statistical analysis showed a significant association between maternal knowledge level and acceptance of multiple injection immunization (p = 0.001).* ***Conclusions:*** *Maternal knowledge of immunization is significantly associated with acceptance of multiple injection immunization. Strengthening educational interventions targeting mothers and families is essential to improve acceptance and sustain optimal immunization coverage.*

How to Cite **Haifa Rafiqa Sabrina, Dominicus Husada, Woro Setia Ningtyas/The Association Between Maternal Knowledge of Immunization and Acceptance of Multiple Injection Immunization at Community Health Posts in An Urban Primary Healthcare Setting, Vol. 5, No. 4, 2026**
DOI https://doi.org/10.54543/kesans.v5i4.544
e-ISSN/p-ISSN **2808-7178 / 2808-7380**
Published by **CV Rifainstitut/KESANS: International Journal of Health and Science**

Introduction

Infants are particularly vulnerable to infectious diseases due to the immaturity of their immune systems during early life, making timely vaccination a critical preventive intervention (Luo et al., 2023). Routine childhood immunization has been consistently associated with substantial reductions in morbidity and mortality from vaccine-preventable diseases, highlighting its essential role in child health protection (Zhang et al., 2024). As immunization schedules expand to include a broader range of antigens, the administration of multiple vaccines during a single visit has become increasingly common to ensure early and comprehensive protection (Dolan et al., 2017).

The multiple-injection approach has been widely implemented without compromising vaccine safety or immunogenicity, even when three injections are administered during a single immunization visit (Preza et al., 2017; Idoko et al., 2016). Empirical evidence suggests that parental concerns related to pain or adverse events do not necessarily lead to refusal when clear information and reassurance are provided by healthcare professionals (Gupta & Ghimire, 2024). Nevertheless, hesitancy toward multiple injections persists, as emotional responses and perceived risks continue to influence parental decision-making in various healthcare contexts (Alotaibi et al., 2025).

Maternal knowledge is a central determinant of childhood immunization decisions, as mothers commonly serve as primary caregivers and decision-makers regarding child health (Sari, 2024). Adequate knowledge enables mothers to understand vaccine benefits, schedules, and safety profiles, thereby reducing uncertainty and fear associated with administering multiple (Heil et al., 2022). Conversely, limited knowledge has been associated with vaccine hesitancy, delayed immunization, and refusal, whereas higher knowledge levels are consistently linked to greater acceptance of recommended immunization practices (Yulvianti, 2024).

Behavioral frameworks such as the Knowledge–Attitude–Practice model and the Health Belief Model emphasize that knowledge constitutes a foundational cognitive component influencing health-related attitudes and behaviors, including immunization acceptance (Alabadi & Aldawood, 2020). However, existing literature indicates that knowledge alone may not fully account for acceptance of multiple-injection immunization, as affective and social factors can moderate how knowledge is translated into behavior (Ayo-Farai et al., 2025). Empirical studies specifically examining the relationship between maternal knowledge and acceptance of multiple injections remain limited.

Given the increasing use of multiple-injection strategies and the persistence of parental hesitancy, further investigation is warranted to clarify the role of maternal knowledge in shaping acceptance of multiple injections within routine immunization programs (Miraglia et al., 2025). Therefore, this study aims to analyze the relationship between mothers' level of knowledge about immunization and their acceptance of multiple-injection immunization.

Method

This study employed an analytical observational design with a cross-sectional approach. The study was conducted at community health posts (Posyandu) within an urban primary healthcare setting, from May to September 2025. The study population consisted of all mothers with children aged 2–24 months registered at the selected Posyandu. A total of 82 respondents were included using purposive sampling based on

predefined inclusion and exclusion criteria. Inclusion criteria were mothers who had children aged 2–24 months, attended Posyandu during the study period, and provided informed consent. Mothers whose children had medical contraindications to immunization were excluded.

Data were collected using a structured questionnaire designed to assess maternal knowledge of immunization and acceptance of multiple injection immunization. Maternal knowledge was categorized into low, moderate, and high based on total scores. Acceptance of multiple injection immunization was classified as accepting or not accepting based on the mother's decision regarding immunization records.

Data analysis was performed using statistical software. Descriptive statistics were used to summarize respondent characteristics. The Chi-square test was applied to examine the association between maternal knowledge level and acceptance of multiple injection immunization, with a significance level set at $p < 0.05$. Ethical approval was obtained from the Health Research Ethics Committee of the Faculty of Medicine, Universitas Airlangga.

Result and Discussion

1. Result

A total of 86 mothers with children aged 2–24 months were initially assessed for eligibility. Four respondents were excluded due to incomplete questionnaire data that did not meet the predefined completeness criteria. Thus, a final sample of 82 mothers was included in the analysis.

Table 1
Characteristics of the Respondent

No	Variable	Category	Frequency	Percentage
1	Age (years)	< 20	1	1.22 %
		20 – 29	33	40.24 %
		30 – 39	34	41.46 %
		> 40	14	17.07 %
		Total	**82**	**100%**
2	Educational Level	Not Attending School	1	1.22 %
		Elementary School	10	12.20 %
		Junior High School	15	18.29 %
		Senior High School	48	58.54 %
		Higher Education	8	9.76 %
		Total	**82**	**100%**
3	Occupation	Not Employed	65	79.27%
		Employed	17	20.73%
		Total	**82**	**100%**

Table 1 shows the characteristics of the respondents. Nearly half of the respondents were aged 20–29 years, while almost the same proportion were aged 30–39 years. In terms of educational attainment, more than half of the respondents had completed senior high school as their highest level of education. Regarding occupation, the majority of respondents were not employed.

Table 2
Distribution of Maternal Knowledge Level and Acceptance of Multiple-Injection Immunization

Variable	Category	Frequency	Percentage
Knowledge Level	Low	10	12.2 %
	Middle	25	30.5 %
	High	47	57.3 %
	Total	**82**	**100%**
Acceptance	Accept	56	68.3 %
	Refuse	26	31.7 %
	Total	**82**	**100%**

The distribution of maternal knowledge level about immunization and acceptance of multiple-injection immunization are shown in Table 2. More than half of the respondents were categorized as having high level of knowledge. Respondents with low level of knowledge constituted the smallest proportion of the sample. More than half of the respondents accepted multiple-injection immunization.

Table 4
Association between Maternal Knowledge Level and Acceptance of Multiple-Injection Immunization

Knowledge Level	Accept	Refuse	Total	*p - value*
Low	2	8	10	
Medium	16	9	25	
High	38	9	47	0.001
Total	**56**	**26**	**82**	

The association between maternal knowledge level and acceptance of multiple-injection immunization is summarized in Table 4. Acceptance of multiple injections increased across knowledge categories, with the highest proportion of acceptance observed among mothers with high level of knowledge. Statistical analysis using the chi-square test demonstrated a significant association between maternal knowledge level and acceptance of multiple-injection immunization ($p = 0.001$).

2. Discussion

The present study demonstrates a statistically significant association between mothers' level of knowledge about immunization and their acceptance of multiple-injection immunization ($p = 0.001$). In this study, 68.29% of mothers accepted multiple injections, indicating a relatively high level of acceptance within a primary healthcare setting. The findings of this study demonstrate a statistically significant association between mothers' level of knowledge about immunization and their acceptance of multiple-injection immunization, indicating that knowledge plays an important role in maternal decision-making processes (Alyafei & Easton-Carr, 2025). Mothers with higher knowledge levels showed a greater tendency to accept multiple injections, while refusal was observed across all knowledge categories, reflecting the multifactorial nature of immunization-related behavior (Ayo-Farai et al., 2025).

The acceptance rate observed in this study is comparable to findings from other low- and middle-income countries. In The Gambia, acceptance of multiple injections reached 90.9% despite reported parental concerns, while in Albania approximately 87% of parents agreed to three injections in a single visit following the introduction of IPV.

These studies indicate that high acceptance can be achieved even when discomfort or anxiety is present, provided that parents trust healthcare providers and understand the benefits of timely immunization (Idoko et al., 2016).

Comparable results have also been documented in Indonesia. Previous studies conducted in primary healthcare and posyandu settings reported acceptance rates ranging from 65% to 72%, particularly for schedules involving DPT-HB-Hib combined with PCV or IPV. The acceptance rate in the present study falls within this range, suggesting consistency with national evidence and indicating that the implementation of multiple-injection strategies in Indonesia is generally acceptable to mothers when supported by adequate counseling (Sari, 2024; Yulvianti & Ningrum, 2024).

Despite the predominance of high knowledge among mothers who accepted multiple injections, refusal was observed across all knowledge categories, including among those with high knowledge levels. This finding suggests that knowledge alone is insufficient to fully explain immunization behavior. Similar observations have been reported in studies from Turkey and Southern Europe, where emotional concerns such as fear of side effects and feelings of pity toward the child, as well as social influences from family members, contributed to vaccine refusal even among well-informed parents (Heil et al., 2022). Refusal of multiple injections was frequently associated with emotional and social barriers, including fear of side effects and influence from family members, which are well-documented contributors to vaccine hesitancy (Uğrak et al., 2025). Such barriers highlight the role of interpersonal dynamics and social norms in shaping immunization decisions (Heil et al., 2022)

Differences in acceptance rates across settings may be attributed to variations in enabling and reinforcing factors. In high-income settings such as Saudi Arabia, acceptance rates exceeding 80% have been reported, largely due to strong trust in healthcare systems, consistent counseling practices, and clear communication regarding vaccine safety (Alotaibi et al., 2025). Overall, the results reinforce the conceptual understanding that maternal knowledge is a necessary but not sufficient condition for acceptance of multiple-injection immunization, as affective and social factors also exert substantial influence on decision-making (Ayo-Farai et al., 2025). Strengthening maternal knowledge through structured education, combined with empathetic communication and family engagement, may enhance acceptance of multiple injections and support optimal immunization outcomes (Alabadi & Aldawood, 2020).

Conclusion

There is a significant association between maternal knowledge of immunization and acceptance of multiple injection immunization at community health posts in an urban primary healthcare setting. Improving maternal knowledge through targeted education and strengthening the role of healthcare providers in delivering clear and persuasive information are essential to enhance acceptance of multiple injection immunization.

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