Factors impacting decreased basic immunization coverage in infants (Risk of dangerous diseases)

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Abstract

Background: The data reveal a consistent decrease in the overall immunization coverage for babies in Kota Pariaman over a span of four years. Specifically, the coverage rates were recorded as 81.8% in 2018, 78.6% in 2019, 55.7% in 2020, and 66.7% in 2021.
Purpose: The aim of this study is to identify the factors that contribute to the decrease in the achievement of complete basic immunization among children in Kota Pariaman.
Methods: The present study used the quantitative research method with a cross-sectional design. The study sample comprised of mothers with infants aged 12 months residing in Pariaman City. A purposive sampling method was employed to choose a total of 154 participants. The research was carried out between March 2022 and October 2022. Univariate analysis describes variable frequency, bivariate examines relationships using chi-square ($p<0.05$) and multivariate employs logistic regression, identifying influential variables.
Results: Key findings include a lack of knowledge (40.3%), non-supportive attitudes of mothers (56.5%), mistrust by mothers (42.9%), limited access to health resources (52.6%), and inadequate family support (48.1%). There was significant support from healthcare workers (94.2%) and moderate backing from community leaders (56.5%). Significantly, a noteworthy association was observed between knowledge ($p < 0.05$), attitudes ($p < 0.05$), and family support ($p < 0.05$), and the successful attainment of fundamental vaccinations.
Conclusion: Factors leading to the decreased rate of complete basic immunization for infants in Kota Pariaman include attitude, family support, and knowledge. As a remedy, local governments and health workers are urged to proactively provide health education on the significance of full basic immunization for infants. This preventive measure is paramount in safeguarding against severe acute illnesses, benefiting both the child and the broader community

Keywords: children; complete basic immunization; knowledge; attitude; family support; attendant support

Introduction

Immunization in children is an essential public health strategy to reduce morbidity and mortality in children worldwide. Complete basic immunization plays a crucial role in protecting infants from various dangerous diseases. However, immunization rates have seen a global decline. According to the WHO (2020) 68 countries are facing challenges in providing vaccination services to nearly 80 million infants. Prominent declines have been documented in several regions, including New York, California, Ohio, Virginia, the United Kingdom, and Indonesia (Bamforth, 2020; Bramer, 2020; Fernandez, 2020; Frellick, 2020; Saxena et al., 2020).

Despite the widespread recognition of the advantages associated with immunization, the efficacy of immunization programs can be influenced by several challenges and circumstances. Based on prior research,

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several factors are known to influence incomplete immunization in children." Noh et al. (2018) noted that the coverage of basic immunization in Pakistan remains low. Balgovind and Mohammadnezhad (2022) highlighted that the decision to immunize is a complex process. The perceptions, knowledge, attitudes, and behaviors (KAB) of parents regarding immunization significantly influence this decision. Moreover, healthcare professionals are often considered the most trusted source of immunization information. The utilization of immunization services is influenced by various factors, as demonstrated by the findings of Kitamura et al. (2013). These factors include family occupation, maternal age, and the receipt of vaccination date notices from village officials. Tsawe et al. (2015) conducted a study which revealed that many characteristics, such as the educational level of mothers, their media exposure, and their socioeconomic standing, had an important effect on their use of child and maternal health services.

Numerous scholarly inquiries have been conducted to examine the determinants that impact immunization rates. However, there is a lack of understanding regarding the intricate relationship between all of these variables, especially in relation to the current COVID-19 pandemic, and how they collectively impact vaccination rates within specific areas like Pariaman City. Compounded by the COVID-19 pandemic, the challenges in immunization efforts have become increasingly complex. Harahap (2019) showed that the pandemic disrupted the provision of basic immunization for infants in Pelalawan, Indonesia. Therefore, research focusing on the pandemic's impact on immunization coverage becomes highly relevant.

The objective of this study is to ascertain the determinants contributing to the suboptimal attainment of comprehensive basic immunization among newborns residing in Pariaman City, while taking into account the influence of the ongoing pandemic and other elements previously documented in scholarly investigations. Therefore, it is anticipated that the findings of this research will offer specific suggestions to improve immunization rates in Pariaman City and other areas with comparable obstacles.

Materials and Methods

Design

The present study used a cross-sectional survey design.

Sample and setting

The study focused on a specific sample that met pre-established inclusion and exclusion criteria. Inclusion criteria required participants to demonstrate a willingness to engage, effective communication skills, have children aged 12 months as of July 2022, possess either a Maternal and Child Health book or a recorded immunization status within the community health center's immunization cohort, and cohabitate with family members (spouse, parent, or in-law). Exclusion criteria were applied to individuals who were absent for three consecutive visits or too preoccupied to participate. Three consecutive absences compromise data consistency, indicate potential lack of participant commitment, and strain research resources. The sampling process was conducted at seven community health centers in Pariaman City. The study included a total sample size of 154 mothers with 12-month-old infants. The study had a total of 253 participants, and the sample size was obtained using the Slovin algorithm with a margin of error of 0.05%..

Data collection

The research was centered on a specific group of participants, namely mothers with children aged 12 months, residing in Pariaman City. The total number of individuals in this community was 253. A total of 154 mothers with infants of identical age were chosen as a representative sample, employing the Slovin formula with a 0.05% margin of error.

The data gathering process utilized a validated and trustworthy questionnaire as the measurement instrument. The assessment of validity was conducted using Pearson correlation. Each variable's validity was confirmed if the calculated Pearson correlation coefficient (r) exceeded the tabulated value of 0.2787. The assessment of reliability was conducted with Cronbach's alpha, where values equal to or greater than 0.6 were indicative of satisfactory dependability.

The process of data analysis encompassed the utilization of univariate, bivariate, and multivariate methodologies.

The researchers used the univariate analysis

Variabel	Validity	Reliability
Knowledge	0.32-0.647	0.694
Attitude	0.294-0.522	0.652
Belief	0.649-0.857	0.780
Affordability of Health Resources	0.384-0.633	0.666
Family Support	0.374-0.84	0.748
Health Worker Support	0.298-0.691	0.698
Community Leaders Support	0.396-0.906	0.774

Table 1. Presents A Frequency Distribution of The Predisposing Factors And Characteristics Of The Respondents

Characteristics of respondents		F	%
Age	< 30 years	66	42.9
	> 30 years	88	57.1
Education	Tall	59	38.3
	Low	95	61.7
Work	Work	45	29.2
	Not Working	109	70.8

Table 2. Displays the frequency distribution of predisposing variables, likely factors, and reinforcing factors within the operating region of the Pariaman City Health Center. The sample size for this study is 154.

	Influencing factors		F	%
Predisposing Factors	Knowledge	Good	92	59.7
		Less	62	40.3
	Attitude	Favorable	67	43.5
		Un Favorable	87	56.5
	Belief	Good	88	57.1
		Less	66	42.9
Possible Factors	Vulnerability of health resources	Affordable	73	47.4
		Unaffordable	81	52.6
Reinforcing Factors	Family Support	Support	80	51.9
		Not Supported	74	48.1
	Health Officer Support	Good	145	94.2
		Less	9	5.8
	Community Leader Support	Support	87	56.5
		Not Supported	67	43.5

method to look at the frequency distribution of each variable being studied.

A bivariate analysis was performed to evaluate the relationship between the independent and dependent variables. The chi-square test was employed with a confidence level of 95% (α = 0.05).

Multivariate analysis is a statistical methodology that entails the investigation of three or more variables with the objective of identifying the independent variable that exerts the most significant influence on the dependent variable. Logistic regression was selected as the analytical method in this study because of the categorical character of the variables under investigation.

Study Setting: The investigation was carried out within a sample of seven community health facilities located in Pariaman City.

Study Period: The investigation was carried out for a duration of six months, spanning from March 2022 to October 2022.

Etiological Investigation: The main aim of this study was to identify the factors that influence the attainment of sufficient immunization coverage in children

The statistical analysis employed in this study consisted of bivariate analysis, which encompassed the use of chi-square tests, and multivariate analysis, which involved the application of logistic regression. The application of hypothesis testing was employed in the context of bivariate analysis in order to assess the relationship between independent and dependent variables.

In the context of statistical analysis, the test known as the chi-square test was employed for the purpose of doing bivariate analysis, whilst logistic regression was applied for the purpose of conducting multivariate analysis.

Confidence Level: The study utilized a confidence level of 95% (α = 0.05).

Variables

Independent Variables:

a) Maternal Knowledge about Immunization: Knowledge pertains to the depth of comprehension and consciousness regarding the significance of complete basic immunization. This encompasses awareness of the recommended vaccines, their

Table 3. Relationship of Predisposing Factors, Probable Factors and Reinforcing Factors with Complete Basic Immunization

Variable	Sub Variables	Complete Basic Immunization				Total		P Value
		Complete		Incomplete				
		f	%	f	%	f	%	
Contributing variables	Knowledge							
	Good	33	35.9	59	64.1	92	100	0.003
	Less	8	12.9	54	87.1	62	100	
	Attitude							
	Favorable	34	50.7	33	49.3	67	100	0.000
	Unfavorable	7	8	80	92	87	100	
	Belief							
	Good	27	30.7	61	69.3	88	100	0.258
	Less	14	21.2	52	78.8	66	100	
Potential causes	Affordability of health resources							
	Favorable	25	34.2	48	65.8	73	100	0.064
	Unfavorable	16	19.8	65	80.2	81	100	
Strengthening Elements	Family Support							
	Support	33	41.3	47	58.8	80	100	0.000
	Not Supported	8	10.8	66	89.2	74	100	
	Health Officer Support							
	Good	37	25.5	108	74.5	145	100	0.391
	Less	4	44.4	5	55.6	9	100	
	Community Leader Support							
	Support	27	31	60	69	87	100	0.220
	Not Supported	14	20.9	53	79.1	67	100	

Table 4. Bivariate Analysis at the time of selection

Step Selection	Variable	Sig
	Knowledge	0.003
	Attitude	0.000
	Belief	0.258
	Affordability of health resources	0.064
	Family support	0.000
	Health Officer Support	0.391
	Community Leader Support	0.220

Table 5. Multivariate Test Results with Logistic Regression at Stage one

Step 1	Variable	Sig	Exp (B)
	Knowledge	0.007	4.257
	Attitude	0,000	8.635
	Affordability of health resources	0.098	2.271
	Family support	0.001	5.958
	Community Leader Support	0.945	1.035

prescribed schedules, and an understanding of the potential advantages and disadvantages associated with immunization. b) Maternal Attitudes toward Immunization: Maternal attitudes toward immunization are influenced by personal experiences, cultural norms, and trust in the healthcare system. The presence of positive attitudes is associated with a higher likelihood of adhering to vaccination schedules, whereas the presence of negative attitudes may lead to hesitancy or rejection, thereby reflecting the emotional and cognitive position of mothers toward vaccines. c) Maternal Beliefs in Immunization: Belief encompasses the personal convictions, faith, or trust that individuals have in the effectiveness and safety of complete basic immunization. It includes cultural or religious beliefs that may influence immunization decisions. d) Affordability of Health Resources: Affordability of health resources pertains to the financial accessibility of immunization services and vaccines. It considers whether individuals can easily access and afford the costs associated with vaccination. e) Family Support: Family support represents the degree to which a person's family members (e.g., parents, spouse, in-laws) encourage and facilitate complete basic immunization. It reflects the presence of a supportive family environment. f) Healthcare Worker Support: Health worker support relates to the role of healthcare professionals (e.g., doctors, nurses) in promoting and providing information on complete basic immunization. It includes the assistance and guidance offered by healthcare workers. g) Community Leader Support: Community leader support refers to the endorsement and advocacy of community leaders (e.g., local authorities, influential figures) for immunization services. Their support can influence community perceptions and decisions.

Dependent Variable:

Fulfillment of Basic Immunization in Infants: The dependent variable measures the extent to which infants receive the recommended vaccines within the established schedule. It reflects the successful completion of basic immunization as per healthcare guidelines.

Ethical consideration

The present communication originates from the Ethics Committee of RSUP Dr. M. Djamil Padang, bearing the reference number LB.02.02/5.7/272/202.

Instruments

The research instrument underwent rigorous validity and reliability testing procedures. The validation process involved 50 respondents and was conducted at the Sungai Limau Community Health Center in Padang Pariaman Regency, selected for its resemblance to the Pariaman City Community Health Center's working area. Validity was assessed using the Pearson correlation technique, where the criterion for validity was met when the calculated correlation (Pearson's r) exceeded the table correlation value (0.2787). Conversely, if the calculated correlation was below this threshold, it was deemed invalid. Reliability testing was performed using Cronbach's alpha, and variables with a Cronbach's alpha value of ≥ 0.6 were considered reliable. Variables that did not meet this criterion were categorized as unreliable (Swarjana, 2022). The subsequent section presents the outcomes of the questionnaire's validity and reliability evaluations.

Results

The acquired results are derived from the conducted investigation.

The age of respondents (mothers) ≥ 30 years was 57.1%, 61.7% of respondents had low education and 70.8%. Mother doesn't work.

Univariate Analysis

The research results offer an examination of the elements that contribute to the likelihood of women working in the Pariaman City Health Center, including predisposing, probable, and strengthening factors. These findings are summarized in Table 2.

Factors affecting low coverage of infant complete

Table 6. Multivariate Test Results with Logistic Regression in the Second Stage

Step 2	Variable	Sig	Exp (B)
	Knowledge	0.006	4.285
	Attitude	0.000	8.618
	Affordability of health resources	0.085	2.235
	Family support	0.000	5.986

Table 7. Multivariate Test Results with linear repression at the final stage

Step 3	Variable	Sig	Exp (B)
	Knowledge	0.007	4.008
	Attitude	0.000	9.159
	Family Support	0.001	5.606

basic immunization: A) Predisposing factors: 40.3% of respondents lack knowledge, 56.5% of respondents' attitudes are not supportive and at 52.6% the respondent's trust is good. B) Possible factor: the affordability of respondents' health resources is unaffordable (42.9%). C) Enhancing factors: A significant proportion of the participants, specifically 48.1%, reported a decrease in familial support. Conversely, a substantial majority of respondents, accounting for 94.2%, reported receiving support from healthcare professionals, while 56.5% reported receiving support from community leaders.

Provision of complete basic immunization to infants

The analysis found that only 26.6% of infants were essentially fully immunized.

Bivariate Analysis

From Table 3, the results of each factor are as follows: a) Predisposition factors: The chi-square test revealed a p-value of 0.003, suggesting a statistically significant association between comprehension and completion of essential immunization in infants.. The chi-square test results indicated a strong correlation between respondents' attitudes and the administration of the full basic immunization to infants, with a value of p = 0.000. b) Possible factors: The obtained p-value of 0.064 suggests that there is insufficient evidence to support a significant link between the availability of complete basic immunization and the affordability of health services. c) Reinforcing factors: 1) A noteworthy correlation was seen between the level of family support and the achievement of complete basic immunization. The chi-square test was performed to conduct a statistical analysis, which resulted in a p-value of 0.000. This p-value suggests a strong and significant relationship between the variables under investigation. 2) There was a lack of correlation observed between officer support and the achievement of comprehensive basic immunization with chi-square result p value = 0.391. The cub is complete. 3) There was a lack of correlation observed between the level of assistance from community leaders and the achievement of complete basic immunization, with chi-square test results p = 0.220.

Multivariate Analysis

The analysis used is a logistic regression test, carried out by entering bivariate result data p<0.25 into the modeling; if all variables entered get a value of p<0.05, then it is the latter modeling in multivariate analysis.

From the results of the analysis, the variables of belief support of health workers value is p > 0.25 so that the two variables were excluded from the model. The other variable with p = <0.025 was followed by multivariate test with logistic regression stage one, as shown in the following table.

From Table 5 showing the multivariate test results with logistic regression in stage one, it turns out that public figure support cannot be included in the next stage of multivariate analysis, because the p value >0.25.

The results of the second stage multivariate test in Table 6 show that there is still a variable with a sig result of p > 0.05, namely the variable of affordability of health resources with a value of p = 0.085 excluded from modeling.

In the final stage of multivariate analysis using logistic regression, significant results were obtained for three variables: knowledge, attitudes, and family support, with p-values less than 0.05. These three factors emerged as the dominant influencers in providing complete basic immunization. Specifically, the results showed that the maternal attitude factor had the most significant impact, with a value of 9.159 times. Following that, the family support factor had an impact of 5.60 times, and the maternal knowledge factor had an impact of 4.008 times.

Discussion

The objective of this study is to gain insight into the obstacles that hinder the achievement of high rates of newborn immunization, as well as to explore strategies to improve immunization rates, reduce the likelihood of severe diseases, and enhance overall infant health outcomes. The findings given in this study are consistent with previous research that has emphasized the need of addressing the several factors that contribute to insufficient coverage of baby immunizations (Noh et al., 2018). Furthermore, the COVID-19 pandemic has brought attention to the consequences on immunization initiatives, emphasizing the necessity for policies that guarantee the uninterrupted provision of immunization services (Harahap, 2019). By addressing these factors and conducting ecological analyses, we can better inform targeted interventions to enhance immunization coverage and contribute to better health outcomes for infants (Devi et al., 2021; Hardiyanti et al., 2023; Susanti, 2019).

The provision of comprehensive basic immunization in babies is primarily influenced by three things. The maternal comprehension of immunization, including its advantages, timetable, and possible adverse reactions, performs a pivotal position in guaranteeing the proper immunization of the infant. Adequate knowledge regarding the advantages of immunization helps mothers comprehend the significance of vaccinating their infants effectively (Swarjana, 2022). By being aware of the benefits, mothers are more likely to be motivated to take their babies to the immunization site and ensure that they complete the entire immunization schedule. Similarly, understanding the immunization schedule holds great importance for mothers. Knowing the immunization schedule enables mothers to plan the appropriate time and location for their babies to receive vaccinations. Mothers lacking adequate understanding of the

immunization schedule may exhibit suboptimal adherence in terms of timely attendance or complete omission of immunization appointments for their infants. Additionally, it is essential for mothers to be aware of the potential side effects of immunization

The mother's mindset also plays a significant role in ensuring the proper immunization of her baby. Mothers who hold a positive outlook toward immunization are more inclined to take the initiative to vaccinate their infants (Notoadmodjo & Prasetya, 2019). They view immunization as a crucial and effective method to safeguard their babies from perilous diseases and to prevent the spread of illnesses throughout society. On the contrary, mothers with a negative attitude toward immunization may exhibit hesitation in vaccinating their babies. They might perceive immunization as unnecessary or even risky. These unfavorable attitudes can arise from baseless fears or misinformation concerning immunization (Harahap, 2019; Kartini, 2021).

Some mothers may hold a neutral stance regarding immunizations. Although this attitude is not harmful, they might require more information and comprehension about the advantages of immunization to make well-informed decisions about vaccinating their infants. This underscores the importance of the mother's disposition in facilitating the immunization of infants (Astuti, 2021). Mothers who possess a favorable disposition toward immunization demonstrate increased inclination to vaccinate their infants, whilst those who hold negative or indifferent attitudes may find it advantageous to enhance their comprehension of the advantages associated with immunization (Swarjana, 2022). Therefore, it is imperative for mothers to proactively pursue precise and dependable information on immunizations and to participate in dialogues with their healthcare provider if they possess any apprehensions or inquiries regarding the immunization procedure. Furthermore, the provision of family support plays a crucial role in ensuring the immunization of infants (Harahap, 2019; Kartini, 2021).

The provision of familial assistance plays a crucial role in ensuring the proper immunization of infants. The provision of emotional support by family members, including spouses, parents, or siblings, has the potential to significantly enhance a mother's self-assurance and drive to immunize her infants (Harahap, Suroyo, & Silaen, 2020). This type of assistance offers mothers a feeling of assurance and aid in ensuring the well-being of their infants. In addition, the provision of practical assistance, such as aiding in the organization of immunization appointments or accompanying the mother and infant to the designated immunization facility, can effectively facilitate the timely administration of immunizations to infants. The provision of practical assistance serves to facilitate the prompt immunization of infants, while concurrently addressing maternal apprehensions or uncertainties pertaining to the vaccination procedure.

Families have a key role in offering diverse types of support to mothers, encompassing informational support. By providing precise and dependable information regarding immunization, families may assist them in comprehending the advantages and importance of administering vaccines to their infants. Consequently, this phenomenon serves to enhance the mothers' incentive to ensure their infants' attendance at vaccination facilities and adherence to the full immunization regimen (Saxena et al., 2020). The provision of emotional, practical, and informational support by the family unit serves to enhance the empowerment of mothers, so bolstering their confidence, motivation, and perception of aid in the preservation of their infant's well-being. Therefore, it is vital for mothers to seek support from their families and engage in conversations with them about the advantages and importance of immunization for their babies (Swarjana, 2022).

The study findings reveal a concerning trend where a significant number of babies are not receiving complete basic immunizations. This poses a severe threat to their health, as the absence of complete basic immunizations can lead to potentially grave consequences. Ensuring the comprehensive implementation of fundamental immunization is of paramount significance in safeguarding infants against potentially fatal illnesses, including polio, diphtheria, pertussis, tetanus, hepatitis B, and haemophilus influenza type B (Hib) (Devi, 2021). Choosing not to immunize children raises the risk of contracting preventable, hazardous, and sometimes fatal diseases, such as measles, polio, and diphtheria. This risk extends not only to the unvaccinated child but also to others in their vicinity, including susceptible adults. Consequently, foregoing immunization can result in the dissemination of dangerous and potentially deadly diseases (Astuti, 2021).

Failure to immunize a child by parents or guardians could be viewed as neglecting their responsibility to ensure the child receives sufficient care and protection. If this persists and the child contracts a vaccine-preventable illness, such actions may be regarded as akin to child neglect (Paul et al., 2020). Various reasons may lead parents or guardians to opt against immunization, such as religious convictions or apprehensions about potential side effects. However, as a responsible parent or guardian, it is essential to carefully assess the risks and benefits of not immunizing a child and prioritize providing the utmost care and protection for them.

Conclusion

There are several factors that exert influence on the suboptimal attainment of comprehensive basic immunization among newborns residing under the jurisdiction of the Pariaman City Health Center. These factors include attitudes, familial support, and knowledge. To overcome this problem, it is

strongly recommended that local governments, especially health workers, actively conduct health education about the importance of complete basic immunization for all babies. This proactive approach serves as an initial preventive measure against severe acute illness, benefiting not only the infant but the entire community in which he or she lives.

Comprehensive efforts are needed to increase public interest in basic infant immunization, including education initiatives, increased access to health facilities, provision of high-quality and safe vaccines, involvement of community leaders in campaigns, and strengthening of vaccine side-effect monitoring systems. With long-lasting results, it is hoped that public interest in basic immunization for infants will increase, thus contributing to the maintenance of public health as a whole.

This research has been conducted to the best of its abilities, but it has identified certain limitations. The obtained results are not entirely flawless as they rely solely on the responses provided by the respondents in the questionnaire. To gain a more comprehensive understanding, it is suggested that qualitative research be undertaken in the future. This qualitative approach will help uncover precise reasons why some mothers may exhibit a lack of interest in bringing their babies for complete basic immunization.

Declaration of Interest

No conflicts of interest were identified in regard to this study.

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Data Availability

All data is available

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