ORIGINAL ARTICLE

Assessment of the associated factors of measles immunization dropout: A community-based study in a high-dropping region

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ABSTRACT

Measles is a viral disease that can be prevented through vaccination and is a leading cause of childhood mortality. Immunizing children against measles is a highly effective and cost-efficient public health intervention. However, there are still gaps in vaccination coverage; some children do not receive complete immunization. We aimed to describe the factors related to caregivers and identify determinants of vaccine dropout. We used community-based participatory research and in-depth interviews. The study included 430 caregivers of infants aged between 12 and 36 months. Most infants came from low-income families, had only one sibling, and lived more than 1 km from the vaccination centers. The study revealed that a lack of family support (Adj. PR=4.23; 95% CI: 2.82 – 6.33; p<0.001) and social support (Adj. PR=2.43; 95% CI: 1.33 – 4.45; p= 0.04) more than doubled the likelihood of vaccine dropout. This is followed by the distance from vaccination centers (Adj. PR= 1.47; 95% CI: 1.07 – 2.00; p= 0.02) and low socioeconomic status (Adj. PR= 1.40; 95% CI: 1.05 – 1.88; p= 0.02), which increased the odds by almost one and a half times. In conclusion, the absence of support from family and local leaders, and the distance of households from measles vaccination providers were identified as determinants of the measles vaccine dropout rate. To address these issues, the study recommends that healthcare workers engage local leaders in collaborative efforts to deliver integrated health education in the local dialect. This approach will help to ensure that all children receive the full course of immunization against measles, and reduce the risk of childhood mortality.

Key words:
measles immunization, immunization dropout, determinants, cross-sectional study, high-dropping immunization region

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INTRODUCTION

Measles is a highly contagious respiratory viral disease that can cause serious illness, lifelong complications, and even death. It is characterized by a fever, maculopapular erythematous rash, cough, coryza, or conjunctivitis.[1] The measles virus is responsible for causing the disease. It is a spherical, non-segmented, enveloped, negative-sense single-stranded RNA virus that only infects humans.[2] The infection can be transmitted four days before the onset of the rash and four days after its eruption. However, vaccination is a cost-effective public health intervention that can help eradicate measles. [3,4] In fact, during the period from 2000-2022, vaccination prevented an estimated 57 million measles-related deaths. [5]

However, despite vaccination efforts, the global incidence of measles increased by 18% from 2021 to 2022. [5] Indonesia was hit particularly hard, with nearly 3,000 reported cases in 2021, making it the country with the highest measles incidence in Southeast Asia. [6,7] Within Indonesia, West Kalimantan Province, especially Mempawah Regency, saw a high number of measles cases. [7]

According to recent figures, the efforts of the Indonesian government to achieve measles-containing vaccine (MCV) coverage of 95% or more are ongoing. However, the country is still facing challenges in reaching this target. A report indicates that the coverage for the first dose at 12 to 15 months of age and the second dose of MCV at 4 through 6 years of age has declined from 87% to 84% and 76% to 67%, respectively. [6] These statistics highlight the urgent need for an increase in vaccine coverage to eliminate measles effectively. It is worth noting that the global measles vaccination program has played a crucial role in reducing measles-related diseases and deaths globally. [8,9]

Studies have identified determinants of full immunization coverage such as socio-demographic factors, family factors, and health facility factors. Specifically, factors such as having employed mothers, families with higher incomes, and residing in urban areas have increased full immunization coverage among children. [10–12] Health facility factors such as waiting time, distance to the facility, and vaccinator absences have also been identified. [13] In addition, the odds of measles dropout increase when women give birth at home or in non-clinical settings, when children lack a health card, and when they come from impoverished or urban areas. [14,15]

In Mempawah Regency, West Kalimantan Province, there is an urgent need to enhance immunization coverage, particularly for measles. Surprisingly, over 50% of health centers in the area have a measles immunization rate of less than 10%. Upon further investigation, health centers such as Sungai Kunyit (57.44%), Takong (45.53%), Anjungan (34.12%), Sadaniang (30.14%), Sungai Pinyuh (25.57%), Wajok (19.25%), and Jungkat (10.30%) are all struggling with low immunization rates. [16] The situation in Mempawah, with a low number of measles-immunized children, is especially worrying and demands immediate attention. Compounding this issue is the lack of investigation into the underlying causes. Hence, a comprehensive study to assess the contributing factors is crucial to inform policymakers in creating effective policies.

Prior studies examining factors contributing to measles immunization dropout have been limited by their failure to consider the role of environmental support. A more thorough understanding of the determinants of dropout requires a careful examination of how the environment can either facilitate or hinder successful immunization. This study assesses the determinants of measles immunization dropout in high-prevalence areas. The study will consider factors such as socio-demographics, family, and

environmental support. Identifying all the determinants of measles immunization dropout is essential to develop an integrated approach that can effectively increase measles immunization coverage.

METHODS

Study setting and design

This study was conducted from January to March 2024, using a cross-sectional community-based design in Mempawah Regency, West Kalimantan. Mempawah Regency had one of the highest rates of measles immunization dropouts in 2022. It is a small town on the north-western coast of West Kalimantan, a couple of hours north of the capital city, with a total population of 310,000 based on the 2022 census population projection. [17]

Study population

The study population included mothers of children aged 12 to 36 months who were documented in a cohort study at public health centers in Mempawah, and living in the study area, as proven by their identity cards. Participants who could not actively communicate or were unwilling to participate were excluded. Informed consent was obtained from all participants.

Sample size and procedures

The sample size calculation was based on previous research on measles vaccination dropout. The study included a sample size of 430 participants. Sampling was determined based on the proportion formula for a population after considering the following assumptions; 95% confidence interval (CI), 80% power, an expected absolute value of 10%, and taking a proportion of 50%.

The subjects were mothers or caregivers of infants from 67 villages in Mempawah Regency, where the drop-out prevalence exceeded 10%. The sampling procedure was based on purposive random sampling. The cohort data documented by the Posyandu immunization book was used to identify participants at the community level. Posyandu stands for 'Pos Pelayanan Terpadu' in Bahasa, meaning 'Integrated Service Post,' a community-based health center that provides a range of services for mothers and children under five in Indonesia. The sampling population was taken from the areas served by 35 Posyandu.

Measurements

The study identified the measles vaccination dropout as the outcome variable. Measles vaccination dropout was defined as children who did not complete the measles vaccination after starting the Pentavalent 1 vaccine (DPT-HepB-Hib), based on the immunization book and verified through cohort data from Posyandu. The independent variables included socio-demographic characteristics such as the age of the parents and the child, the child's gender, the parent's education and occupation, the number of children, ethnicity, and socioeconomic status (SES). Additionally, factors related to health facilities, individual characteristics, social and cultural influences, family support, and social support from local community leaders were considered.

Socio-demographic information was collected through interviews and validated using identity and family cards. SES was determined using guidelines from the Indonesia Statistics Bureau, which assessed 12 basic needs items commonly used in Indonesia. Those meeting at least 6 of these items were categorized as having low economic status.[18]

The distance between the residence and the immunization provider (Posyandu) used a cut-off radius of 1 km. This distance was based on the participants' estimation of walking distance and validated by the investigators, as well as verified by the

previous study.[19] Mothers' attitudes and beliefs were assessed using a five-item questionnaire, with a score less than 6 categorized as having low attitudes and beliefs. Low knowledge was determined if one of the questions was answered negatively. Those with an immunization ability score below the average were categorized as having low self-efficacy. A total support score of less than 25 was considered low support, and for social support from community leaders, a score of less than 20 was also categorized as low support. A five-item questionnaire on social culture assessed the tradition or local culture regarding the beliefs about immunization. A score of at least 6 was considered indicative of a positive social culture.

Data Analysis

Data were coded, processed, and analyzed using STATA software version 17. Descriptive statistics were used to explain the baseline characteristics of the study subjects. All independent variables found to be statistically significant in chi-square/bivariate analysis at the p-value of ≤ 0.25 were considered for multivariable Cox regression analysis. After the statistically significant variables were entered into the multivariable Cox regression analysis, significant determinants were identified at a p-value of ≤ 0.05 and reported as determinants. Model fit was also checked using the Hosmer-Lemeshow test, with a statistical significance of > 0.05. The estimation used was the Adjusted Prevalence Ratio (PR) with a 95% confidence interval.

As this study is survey-based, it's crucial to acknowledge the potential impact of response bias on the results. To effectively mitigate this bias, the study utilized trained enumerators to ensure objective data collection. Furthermore, the challenge of non-response bias was addressed by enlisting the support of local leaders and health cadres to accompany the survey, ensuring a comprehensive and reliable dataset.

Ethical Consideration

The ethical clearance has been approved by the Commission of Ethics in Health Research at Diponegoro University, with the approval letter number 547/EC/KEPK/FK-UNDIP/XI/2023.
Informed written consent was obtained from each participant after explaining the purpose and benefits of the study.

RESULTS

Table 1 Study's participant characteristics

Characteristics	Frequency (N= 430)	%
Measles immunization dropout		
No		
Yes	230	53.5
Infants' gender	200	46.5
Male	253	58.8
Female	177	41.2
Infants' age (month)		
Mean ± Std. Deviation	18.5 ± 3.1	
Min. – Max.	12 – 26 months	
Immunization record document		
Yes	414	96.3
No	16	3.7

Characteristics	Frequency (N= 430)	%
Immunization provider		
Integrated health post (Posyandu)	423	98.4
Public Health Center (Puskesmas)	7	1.6
Education		
Mother		
Low	238	55.4
High	192	44.6
Father		
Low	208	48.4
High	222	51.6
Occupation		
Mother		
Employed	61	14.2
Unemployed	369	85.8
Father		
Informal	297	30.5
Unemployed	2	0.4
Formal	131	69.1
Age		
Mother		
Mean ± Std. Deviation	28.5 ± 6.1	
Min. – Max.	17 - 50	
Father		
Mean ± Std. Deviation	31.1 ± 6.8	
Min. – Max.	19 - 55	
Economics status		
Low	167	38.8
Middle to high	263	61.2
Number of children		
1-2	298	69.3
>2	132	30.7
Ethnicity		
Bugis	46	10.7
Dayak	46	10.7
Madura	94	21.9
Melayu	216	50.2
Others (Javanese, Tionghoa, Batak, Sundanese)	28	6.5
Distance to integrated service post (Posyandu)		
>1 km	77	17.9
≤1 km	353	82.1
Mother's attitude		
Less	101	23.5
Good	329	76.5
Mother's belief		
Less	41	9.5
Good	389	90.5

Characteristics	Frequency (N= 430)	%
Social culture		
Less	4	0.9
Good	426	99.1
Self-efficacy		
Less	113	26.3
Good	317	73.7
Knowledge		
Less	343	79.8
Good	87	20.2
Family support		
Less	204	47.4
Good	226	52.6
Social support		
Less	326	75.8
Good	104	24.2

A total of 430 mothers or caregivers of children aged 12 to 36 months actively participated in the study, resulting in an impressive 100% response rate. Table 1 provides an overview of the participants' characteristics. The majority of infants included in the study were male, with an average age of 18 months. Among the participants, 46.5% reported not completing their measles immunization schedule or dropping out. Over 90% of the immunization records were verified from their immunization books, and the remainder were obtained from Posyandu records. Regarding the parents' characteristics, the majority had graduated from senior high school, and the unemployed mothers and formally employed fathers had62veragee ages of 28.5 and 31 years, respectively. Furthermore, the majority of the participants were of middle to high socioeconomic status, had at most one sibling, identified as Melayu ethnicity, and lived within 1 km of the health center. Most of the mothers and caregivers exhibited positive attitudes, beliefs, social culture, self-efficacy, and family support, with a slight lack of knowledge and social support.

Table 2. Crude estimation factors of measles immunization dropout

Factors	Measles Immunization		p-value	Crude PR (95% CI)
	Dropout n (%)	No n (%)		
Infants' gender				
Male	117 (46.2)	136 (53.8)	0.92	0.99 (0.74 – 1.31)
Female	83 (46.9)	94 (53.1)		Ref.
Infants' age (month)				
Mean ± Std. Deviation	18.3 ± 3.2	18.6 ± 3.0	0.52	1.01 (0.97 – 1.06)
Min. – Max.	12 - 26	12 - 26		
Immunization record document*				
Yes	185 (44.7)	229 (55.3)		Ref.
No	15 (93.8)	1 (6.2)	0.01	2.09 (1.24 – 3.55)

Factors	Measles Immunization		p-value	Crude PR (95% CI)
	Dropout n (%)	No n (%)		
Immunization provider				
Integrated health post (Posyandu)	196 (46.3)	227 (53.7)		Ref.
Public Health Center (Puskesmas)	4 (57.1)	3 (42.9)	0.68	1.23 (0.46 – 3.32)
Education				
Mother*				
Low	130 (54.6)	108 (45.4)		0.67 (0.50 – 0.89)
High	70 (36.5)	122 (63.5)	0.01	Ref.
Father*				
Low	118 (56.7)	90 (43.3)	0.003	0.65 (0.49 – 0.84)
High	82 (36.9)	140 (63.1)		Ref.
Occupation				
Mother*				
Employed	21 (34.3)	40 (65.6)	0.14	0.71 (0.45 – 1.12)
Unemployed	179 (48.5)	190 (51.5)		Ref.
Father				
Informal	140 (47.1)	157 (52.9)	0.92	1.11 (0.15 – 8.01)
Unemployed	1 (50.)	1 (50.0)	0.77	1.05 (0.77 – 1.42)
Formal	59 (45.0)	72 (55.0)		Ref.
Age				
Mother *				
Mean ± Std. Deviation	29.5 ± 6.3	27.6 ± 5.7	0.02	1.03 (1.00 – 1.05)
Min. – Max.	17 - 47	18 - 50		
Father *				
Mean ± Std. Deviation	32.4 ± 7.5	30 ± 6	0.01	1.03 (1.01 – 1.05)
Min. – Max.	19 - 55	22 - 52		
Economic status*				
Low	121 (72.5)	46 (27.5)	<0.001	2.41 (1.82 – 3.20)
Middle to high	79 (30.0)	184 (70.0)		Ref.
Number of children*				
1-2	117 (39.3)	181 (60.7)		Ref.
>2	83 (62.9)	49 (37.1)	0.001	1.60 (1.21 – 2.12)
Ethnicity*				
Bugis	34 (73.9)	12 (26.1)		Ref.
Dayak	17 (37.0)	29 (63.0)	0.02	0.5 (0.28 – 0.89)
Madura	51 (54.3)	43 (45.7)	0.16	0.73 (0.48 – 1.13)
Melayu	84 (38.9)	132 (61.1)	0.002	0.53 (0.35 – 0.78)
Others (Javanese, Tionghoa, Batak, Sundanese)	14 (50.0)	14 (50.0)	0.22	0.68 (0.36 – 1.26)
Distance to integrated service post (Posyandu) *				
>1 km	58 (75.3)	19 (24.7)	<0.001	1.87 (1.38 – 2.54)
≤1 km	142 (40.2)	211 (59.8)		Ref.

Factors	Measles Immunization		p-value	Crude PR (95% CI)
	Dropout n (%)	No n (%)		
Mother's attitude *				
Less	101 (100.0)	0 (0)	<0.001	3.23 (2.52 – 4.38)
Good	99 (30.1)	230 (69.9)		Ref.
Mother's belief*				
Less	41 (100.0)	0 (0.0)	<0.001	2.45 (1.74 – 3.45)
Good	159 (40.9)	230 (59.1)		Ref.
Social culture*				
Less	4 (100.0)	0 (0.0)	0.12	2.17 (0.81 – 5.85)
Good	196 (46.0)	230 (54.0)		Ref.
Self-efficacy *				
Less	113 (100.0)	0 (0.0)	<0.001	3.65 (2.76 – 4.82)
Good	87 (27.4)	230 (72.6)		Ref.
Knowledge *				
Less	183 (53.4)	160 (46.6)	<0.001	2.73 (1.66 – 4.49)
Good	17 (19.5)	70 (80.5)		Ref.
Family support*				
Less	169 (82.8)	35 (17.2)	<0.001	6.04 (4.12 – 8.86)
Good	31 (13.7)	195 (86.3)		Ref.
Social support*				
Less	188 (57.7)	138 (42.3)	<0.001	5.00 (2.79 – 8.96)
Good	12 (11.5)	92 (88.5)		Ref.

**p value ≤ 0.25*

Table 2 shows that immunization documents, mothers' education, parents' age, SES, ethnicity, distance to Posyandu, number of children, caregivers' attitudes, beliefs, social culture, self-efficacy, knowledge, and family and social support were statistically significant factors independently affecting measles immunization dropout rates.

Table 3. Multivariate analysis of the associated factors of measles immunization dropout

Factors	Model I			Model II		
	Adj. PR	95% CI	p-value	Adj. PR	95% CI	p-value
Did not have immunization document	1.17	0.65 – 2.09	0.59	-	-	-
Low mothers' education	0.92	0.68 – 1.83	0.64	-	-	-
Low fathers' education	0.97	0.70 – 1.36	0.87	-	-	-
Employed mother	1.12	0.68 – 1.84	0.65	-	-	-
Mothers' age	0.99	0.95 – 1.04	0.78	-	-	-
Fathers' age	1.01	0.97 – 1.05	0.59	-	-	-

Factors	Model I			Model II		
	Adj. PR	95% CI	p-value	Adj. PR	95% CI	p-value
Low economic status*	1.42	1.05 – 1.93	0.02	1.40	1.05 – 1.88	0.02
No. of children	1.24	0.83 – 1.84	0.29	-	-	-
Ethnicity	0.95	0.84 – 1.08	0.25	-	-	-
Distance to Posyandu >1 km*	1.47	1.04 – 2.07	0.03	1.47	1.07 – 2.00	0.02
Lack of attitude	1.37	0.91 – 2.04	0.23	-	-	-
Lack of belief	0.94	0.62 – 1.42	0.76	-	-	-
Lack of social culture	0.89	0.32 – 2.52	0.84	-	-	-
Lack of self-efficacy	1.36	0.88 – 2.08	0.16	-	-	-
Lack of knowledge	0.98	0.55 – 1.72	0.93	-	-	-
Lack of family support*	2.93	1.84 – 4.67	<0.001	4.23	2.82 – 6.33	<0.001
Lack of social support*	2.32	1.25 – 4.28	0.01	2.43	1.33 – 4.45	0.004

**p-value ≤ 0.05*

The final predictors (Table 3) that significantly influenced measles immunization dropout were economic status, distance to Posyandu, and family and social support. Lack of family support was associated with the highest odds of immunization dropout (Adj. PR=4.23; 2.82 – 6.33; p<0.001), followed by those who lacked social support (Adj. PR=2.43; 1.33 – 4.45; p= 0.04). Participants living more than 1 km away from the integrated health post (Posyandu) had a 1.5 times higher risk of immunization dropout compared to those living closer (Adj. PR= 1.47; 1.07 – 2.00; p= 0.02). Low SES increased the risk of dropout with Adj. PR= 1.40; 1.05 – 1.88; p= 0.02).

DISCUSSION

The study found that the dropout rate for measles vaccines was as high as 70.67%, which is higher than what was reported by the WHO in a previous study. This difference could be due to the study being conducted in an area with a high dropout rate from immunization. The prevalence of measles immunization dropout in Mempawah Regency was significantly lower in 2020, 2021, and 2022 compared to the present study's findings.[20] However, it is recognized that the previous report may have been affected by the emergence of the COVID-19 pandemic.[21]

Among the predictors assessed, distance to Posyandu, socioeconomic status, family support, and social support significantly impacted the prevalence of measles immunization dropouts. Family support was found to be the most significant predictor (Adj. PR=4.23; 2.82 – 6.33) compared to other predictors. All the true values were within the confidence interval, indicating that the current estimates were unbiased. [22]

This finding demonstrates the crucial role of family support in ensuring children's complete immunization, particularly for measles. It encourages parents to vaccinate their children and this can be achieved through attention, empathy, encouragement, advice, and the sharing of knowledge. [23] The family's involvement in caring for the child has a

significant influence on the decision to vaccinate. [24] However, some parents may have concerns about the adverse effects of vaccination and may prefer their children to acquire natural immunity from diseases that could be prevented by immunization.[25] Consequently, parents may base their decision to vaccinate on past experiences or the credibility of their information sources.[26] This misunderstanding may impede the progress of child immunization rates, as vaccine hesitancy continues to pose a risk to communities and public health.

The lack of support from family members posed a significant obstacle to completing the measles vaccination schedule. Limited family support was partly attributed to community norms that placed the responsibility for vaccination solely on mothers, leading to situations where mothers, unable to bring their children for vaccination due to illness or injury, did not receive help from their husbands or other family members. It is important to recognize that fathers also play a crucial role in decisions regarding their children's well-being. [27,28] Involvement of fathers in their children's lives can have a positive impact on health-related practices, such as encouraging mothers or caregivers to ensure their infants are vaccinated.

It is crucial for parents, particularly both the father and mother, to work together in deciding whether to immunize their children against measles. This decision will have a significant impact on the long-term health of the child. Therefore, it is important to enhance parents' understanding of measles immunization through an approach that is sensitive to local cultural norms and more relatable and acceptable to them.

In addition to support from relatives and spouses, the social atmosphere can also influence decision-making. Our study found that social support from local community leaders significantly predicted the dropout of measles immunization. Living in a village where local leaders showed less support or concern for measles immunization increased the odds of dropouts. Social support, such as reminders from neighbors or community leaders, assistance from other caregivers in accompanying mothers to health facilities, help with household responsibilities, and support with taking care of the child when the mother is unwell, was found to be crucial. Caregivers and health workers emphasized that reliable social interactions would help address the practical challenges associated with accessing health facilities, particularly for mothers without family support.[29,30] Previous research has shown that social support promotes self-efficacy beliefs, acting as a mediator between self-efficacy and subsequent behavior.[31] Our findings suggest that social support can buffer the negative relationship with vaccination dropout. Therefore, increasing social support can reduce the negative effects of measles immunization-related misinformation, resulting in a greater willingness to complete the vaccination schedule.[32]

Socioeconomic status (SES) was also significantly associated with measles immunization dropout in the present study. The likelihood of immunization dropout was almost one and a half times higher among children born to low SES mothers or caregivers compared to their counterparts. This finding was consistent with previous studies conducted in Congo, Nepal, and India, and systematic reviews across different countries.[33–36] Our findings indicated the existence of barriers to vaccination, especially among children from low SES backgrounds regarding immunization-specific vaccines like measles. The present study indicated that improving access to health information for these individuals is essential to ensure that the correct information is easy to identify, access, and understand.

Child vaccination is not a one-time event; instead, it involves multiple visits

over a specific period. However, the distance and travel time to reach the primary health post (Posyandu) can sometimes be a hindrance, especially in remote communities.[37] Several studies have revealed that accessibility to health facilities is linked to a higher probability of getting vaccinated.[38–40] This study contributes to the evidence by demonstrating that living more than one kilometer away from a health facility reduces the uptake of the measles vaccine. This finding is even lower than the previous report that demonstrated how the proximity (within five kilometers) to a health facility is still significantly linked to a child's chances of receiving the measles vaccine. [41] However, results may differ when considering geographic access, which was not examined in this study.

These results should be considered with several limitations in mind. First, this study was conducted in an area with a high prevalence of measles immunization dropouts. This might have caused an overestimation of the study's outcome, as we only included children documented in Posyandu's cohort data. We may have overlooked another group who may have completed the measles immunization. Therefore, these findings may not be generalized to other settings, which could yield different results. Second, since this was a cross-sectional study, the distance from Posyandu was determined at the time the mothers were interviewed, without continuous monitoring of possible migration records. However, with all these limitations and strengths, we recommend a strategic policy intervention to address our findings. This could involve enhancing family and local leader support (social support), improving access to Posyandu as the nearest immunization provider, and addressing socioeconomic inequality to ensure that immunization becomes a right for every child, as envisioned by the constitution.

RECOMMENDATIONS

The present findings indicate that an important connection exists between the absence of support from family and local leaders, the distance of households from Posyandu, and socioeconomic status (SES). Specifically, when households are situated more than one kilometer away from providers, there is an increase in the number of individuals who drop out of the vaccination process. The study highlights the importance of targeting rural populations to improve vaccination access and equity. The findings underscore the vulnerability of children living far from vaccination centers, emphasizing the need to ensure that remote rural populations have fair and equal access to vaccination services. To achieve this goal, it is crucial to engage both mothers and fathers in the process and provide ongoing education. It may also be necessary to use basic measures, such as calculating the straight-line distance from facilities, to identify and reach those in need.

In addition, the government ought to incorporate local leaders into health communication campaigns that underscore the significance of complete immunization for children, particularly for measles, as this could prove to be beneficial. In some areas of Indonesia, community members continue to rely on the guidance of their local leaders. In the short term, it is essential to strengthen the skills of Posyandu cadres in encouraging caregivers to prioritize measles immunization at the healthcare provider level. The successful implementation of home visit immunization with interpersonal communication strategies in marginalized communities in Angola can serve as a model. This approach significantly altered

people's perceptions and behaviors toward immunization, resulting in positive changes in immunization practices.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to declare for this study.

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