

## Multilevel Analysis on Factors Affecting Measles Rubella Immunization Uptake among Toddlers in Pekanbaru, Indonesia

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### ABSTRACT

**Background:** Measles-Rubella (MR) immunization is a way to prevent measles and rubella, because the disease cannot be treated and the treatment given to patients is only supportive. Measles and rubella are spread in almost all provinces in Indonesia, so it needs a high and evenly coverage of at least 95% to break the chain of transmission. This study aimed to analyze the determinants of MR immunization uptake in infants.

**Subjects and Method:** This was a cross-sectional study conducted in 25 community health posts (posyandu) in Pekanbaru, Indonesia, from April to May 2019. A sample of 200 mothers who had children aged 9-59 months was selected by stratified random sampling. The dependent variable was Rubella-Measles immunization. The independent variables were maternal education, maternal knowledge, family support, perceived susceptibility, perceived severity, perceived benefit, perceived barrier, cues to action, and self-efficacy. The data were collected by questionnaire and analyzed by a multilevel multiple logistic regression.

**Results:** Measles-Rubella immunization uptake increased with high maternal education (b= 0.66; 95% CI= -0.07 to 1.41; p= 0.080), high maternal knowledge (b= 0.90; 95% CI= 0.14 to 1.65; p= 0.020), strong family support (b= 0.71; 95% CI= -0.05 to 1.48; p= 0.068), high perceived susceptibility (b= 1.24; 95% CI= 0.33 to 2.14; p= 0.007), high perceived severity (b= 1.19; 95% CI= 0.36 to 2.03; p= 0.005), strong perceived benefit (b= 0.93; 95% CI= 0.19 to 1.66; p= 0.013), high cues to action (b= 0.96; 95% CI= 0.19 to 1.73; p= 0.014), and high self efficacy (b= 1.45; 95% CI= 0.59 to 2.31; p= 0.001). It decreased with strong perceived barrier (b= -1.05; 95% CI= -1.81 to -0.29; p= 0.007). Posyandu had a contextual effect on Rubella-Measles immunization with ICC= 10.53%.

**Conclusion:** Measles-Rubella immunization uptake increases with high maternal education, high maternal knowledge, strong family support, high perceived susceptibility, high perceived severity, strong perceived benefit, high cues to action, and high self efficacy. It decreases with strong perceived barrier. Posyandu has a contextual effect on Rubella-Measles immunization.

**Keywords:** Measles, Rubella, immunization, health belief model, multilevel analysis

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### BACKGROUND

More than 562,000 children per year die worldwide in 2000 due to complications from measles (Indonesian Ministry of Health, 2017). Cases of Measles and Rubella in Indonesia in the period of 2010-2015, there were estimated to be 23,164 cases and

30,463 cases. Around 11,000 reported cases of measles and laboratory confirmation of the case, it was known that 12-39% of them were definite measles (confirmed), and 16-43% were definite Rubella (Ministry of Health, 2018).

Indonesia is one of the countries with the most cases of measles in the world. In 2017, suspected measles was spread in almost all provinces in Indonesia, it was reported that there were 15,104 suspected cases of measles, it was higher than in 2016, which was 12,681 cases (Ministry of Health, 2018). Outbreaks in the last three years in almost every province with a number of provinces reported that it increased from 27 provinces in 2015 to 30 provinces in 2017 (Ministry of Health, 2018). According to the age group, the proportion of measles cases in <1 year infants was the highest case, which was 778 cases (9.5%) (Indonesian Ministry of Health, 2016).

Rubella in Indonesia was one of the public health problems that required effective prevention efforts. Surveillance data over the past five years showed that 70% of Rubella cases occurred in the age group of <15 years old (Indonesian Ministry of Health, 2017). Rubella outbreaks in 2015-2017 also occurred in several provinces in Indonesia, in 2017, it was reported in 19 provinces with a frequency of 79 times (Ministry of Health, 2018).

In the Global Vaccine Action Plan (GVAP), measles and rubella were targeted to be eliminated in 5 WHO regions by 2020. Measles and rubella cannot be treated, the treatment given to patients was only supportive, but both diseases can be prevented by immunization (RI Ministry of Health, 2018). By giving MR immunization, it can protect children from disability and deaths from pneumonia, diarrhea, brain damage, cerebral, blindness, and congenital heart disease (Indonesian Ministry of Health, 2017).

Although the coverage of measles immunization in Indonesia tend to decrease, the government tried to reach the target of 95%. Prevention of measles and rubella has a significant role in reducing the

rate of disability and death in infants (Ministry of Health, 2018). The decrease in measles immunization coverage in 2014 and 2015 and the incidence of measles tend to increase. Measles Rubella immunization campaign activity was a very important opportunity to cover the gap above so that there was no enclave that would be a source of transmission. With a high and uniform coverage, a minimum of 95% would form group immunity (herd immunity) and break the chain of transmission of measles and rubella (Indonesian Ministry of Health, 2017).

The Pekanbaru City Health Office mentioned that based on routine measles case data collection in 2017, there were 570 cases of measles and 30 cases of rubella based on the results of examination of the measles serum in Pekanbaru in 2017. After the Rubella Measles immunization campaign was conducted, it was noted that the Province Riau was ranked as the third lowest for national events, which was 38.35%. Pekanbaru was included in 3 out of 12 regencies/cities in Riau whose achievements were still very low, it was known that the coverage up to November 4, 2018 was only 26.9%. This proved that the achievement for Measles Rubella immunization coverage in Pekanbaru was still far from the target of the Republic of Indonesia Ministry of Health which was 95%.

Mothers played an important role in giving immunization to children. Provision of immunization in children was influenced by several factors, such as education, knowledge, family support, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. The results of a preliminary study conducted on 10 mothers who have toddlers of 9-59 months old in the working area of Langsat and Rumbai Pesisir health centers, found that 7 mothers did not

provide Measles Rubella immunization to their children mostly due to lack of support from their family (husband) and negative reporting Rubella Measles immunization.

This study aimed to analyze the determinants of MR immunization uptake in infants.

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## SUBJECTS AND METHOD

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### 1. Study Design

This was a cross sectional study carried out in 25 integrated health posts (posyandu) in Langsat and Rumbai Pesisir community health centers, Pekanbaru, Riau, Indonesia, from April to May 2019.

### 2. Population and Sample

The study population was all mothers who had children aged 9-59 months old in Langsat and Rumbai Pesisir community health centers, in Pekanbaru. A sample of 200 mothers was selected by stratified random sampling.

### 3. Study Variables

The dependent variable was MR immunization. The independent variables were maternal education, maternal knowledge, family support, perceived susceptibility, perceived severity, perceived benefit, perceived barrier, cues to action, and self-efficacy.

### 4. Operational Definition of Variables

**Measles and Rubella immunization uptake.** Measles Rubella immunization uptake was status of children aged 9-59 months old who got Measles Rubella immunization. The data were obtained from maternal and child health book. The measurement scale was categorical.

**Maternal education.** Maternal education was the highest level of formal education attained by the mother. The data were collected by questionnaire. The measurement scale was categorical.

**Maternal knowledge.** Maternal knowledge was the result of mothers' under-

standing about immunization against Rubella Measles in infants. The data were collected by questionnaire. The measurement scale was continuous.

**Family support.** Family support was a variety of forms of support or assistance provided by family in MR immunization uptake. The data were collected by questionnaire. The measurement scale was categorical.

**Perceived susceptibility.** Perceived susceptibility was maternal perception of the condition or condition that was susceptible to measles and rubella in infants, so it was necessary to have MR immunization. The data were collected by questionnaire. The measurement scale was categorical.

**Perceived severity.** Perceived severity was maternal perception of beliefs regarding the dangers or effects of not being given Measles Rubella immunization in infants. The data were collected by questionnaire. The measurement scale was categorical.

**Perceived benefit.** Perceived benefit was maternal perception to assess the benefits or benefits of the results of the actions taken (giving Measles Rubella immunization to toddlers) to prevent measles and rubella. The data were collected by questionnaire. The measurement scale was categorical.

**Perceived barrier.** Perceived barrier was the mother's perception of the obstacles associated with Measles Rubella immunization to toddlers. The data were collected by questionnaire. The measurement scale was categorical.

**Cues to action.** Cues to action was the encouragement of the mother to be able to provide Measles Rubella immunization to toddlers. The data were collected by questionnaire. The measurement scale was categorical.

**Self-efficacy.** Self-efficacy was the confidence of a mother to protect her child from

measles and rubella by giving MR immunization to toddlers. The data were collected by questionnaire. The measurement scale was categorical.

### 5. Data Analysis

Univariate analysis described the variable characteristics based on the results of the study. Characteristics of sample data were described in n, mean, elementary, minimum and maximum. The characteristics of categorical data were described in n and%. Bivariate analysis in the study was conducted to determine the relationship between the independent variables and the dependent variable measured in the categories by using the chi-square test. Multivariate analysis used multiple multilevel logistic regression run on Stata 13 program.

### 6. Research Ethic

The research ethics included informed consent, anonymity, confidentiality, and ethical research. Research ethics was obtained from Research Ethics Committee in Faculty of Medicine, Universitas Sebelas Maret, Surakarta, with Number: 451/UN-27.06/KEPK/2019.

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## RESULTS

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### 1. Univariate Analysis

Table 1 showed that the majority of mothers with tertiary education (high school, college) were 109 people (54.5%), mothers with less knowledge were 114 people (57%), strong family support was 123 people (61.5%), low perceived susceptibility were 149 people (74.5%), low perceived severity were 138 people (69%), high perceived benefit were 111 people (55.5%), strong perceived barrier were 117 people (58.5%), low cues to act were 125 people (62.5%), low self-efficacy were 137 people (68.5%), and toddlers who received Measles Rubella immunization were 111 people (55.5%).

### 2. Bivariate Analysis

Table 2 showed the results of bivariate analysis between the dependent variables and the independent variables.

There was no significant relationship between maternal education and MR immunization uptake (OR= 1.44; p= 0.198).

There was a significant relationship between maternal knowledge and MR immunization uptake (OR= 2.38; p= 0.003).

There was no significant relationship between family support and MR immunization uptake (OR= 1.37; p = 0.275).

There was a significant relationship between perceived vulnerability and MR immunization uptake (OR= 2.36; p= 0.012).

There was a significant relationship between perceived severity and MR immunization uptake (OR= 2.33; p = 0.008).

There was a significant relationship between perceived benefits and MR immunization uptake (OR= 1.99; p = 0.016).

There was a significant relationship between perceived barriers and MR immunization uptake (OR= 3.71; p <0.001).

There was a significant relationship between cues to action with MR immunization uptake (OR= 3.06; p <0.001).

There was a significant relationship between self-efficacy and MR immunization uptake (OR= 2.68; p=0.002).

### 3. Multilevel Analysis

Table 3 showed that the results of multilevel analysis. There was a positive association between maternal education and MR immunization uptake (b= 0.66; 95% CI= -0.07 to 1.41; p= 0.080). High maternal education had logodds to give MR immunization to their children by 0.66 units higher than low maternal education.

There was a positive association between maternal knowledge with MR immunization uptake (b= 0.90; 95% CI =

0.14 to 1.65;  $p = 0.020$ ). Good maternal knowledge had logodd to give MR immu-

nization to their children by 0.90 units higher than poor maternal knowledge.

**Table 1. Sample Characteristics**

<b>Independent Variables</b>	<b>n</b>	<b>%</b>
<b>Maternal Educatin</b>		
Low	91	45.5
High	109	54.5
<b>Maternal Knowledge</b>		
Poor	114	57
Good	86	43
<b>Family Support</b>		
Weak	77	38.5
Strong	123	61.5
<b>Perceived Susceptibility</b>		
Low	149	74.5
High	51	25.5
<b>Perceived Severity</b>		
Low	138	69
High	62	31
<b>Perceived Benefit</b>		
Low	89	44.5
High	111	55.5
<b>Perceived Barrier</b>		
Weak	83	41.5
Strong	117	58.5
<b>Cues to Action</b>		
Low	125	62.5
High	75	37.5
<b>Self Efficacy</b>		
Low	137	68.5
High	63	31.5
<b>Measles Rubella Immunization Uptake</b>		
No	89	44.5
Yes	111	55.5

There was a positive association between family support and MR immunization uptake ( $b = 0.71$ ; 95% CI = -0.05 to 1.48;  $p = 0.068$ ). Strong family support increased logodd of MR immunization uptake by 0.71 units.

There was a positive association between perceived susceptibility and MR immunization uptake ( $b = 1.24$ ; 95% CI = 0.33 to 2.14;  $p = 0.007$ ). Mothers with high perceived susceptibility had logodd to provide MR immunization to their children by 1.24 units.

There was a positive association between perceived severity and MR immunization uptake ( $b = 1.19$ ; 95% CI = 0.36 to 2.03;  $p = 0.005$ ). Mothers with high perceived severity had logodd to give MR immunization to their children at 1.19 units.

There was a positive association between perceived benefits and MR immunization uptake ( $b = 0.93$ ; 95% CI = 0.19 to 1.66;  $p = 0.013$ ). Mothers with high perceived benefits have logodd to provide MR immunization to their children by 0.93 units.

**Table 2. The Results of Bivariate Analysis**

Independent Variables	MR Immunization				Total		OR	p
	Yes		No		n	%		
	n	%	n	%				
<b>Maternal Education</b>								
Low	46	50.55	45	49.45	91	100	1.44	0.198
High	65	59.63	44	40.37	109	100		
<b>Maternal Knowledge</b>								
Poor	53	46.49	61	53.51	114	100	2.38	0.003
Good	58	67.44	28	32.56	86	100		
<b>Family Support</b>								
Weak	39	50.65	38	49.35	77	100	1.37	0.275
Strong	72	58.54	51	41.46	123	100		
<b>Perceived Susceptibility</b>								
Low	75	50.34	74	49.66	149	100	2.36	0.012
High	36	70.59	15	29.41	51	100		
<b>Perceived Severity</b>								
Low	68	49.28	70	50.72	138	100	2.33	0.008
High	43	69.35	19	30.65	62	100		
<b>Perceived Benefit</b>								
Low	41	46.07	48	53.93	89	100	1.99	0.016
High	70	63.06	41	36.94	111	100		
<b>Perceived Barrier</b>								
Weak	61	73.49	22	26.51	83	100	3.71	< 0.001
Strong	50	42.74	67	57.26	117	100		
<b>Cues to Act</b>								
Low	57	45.60	68	54.40	125	100	3.06	< 0.001
High	54	72	21	28	75	100		
<b>Self Efficacy</b>								
Low	66	48.18	71	51.82	137	100	2.68	0.002
High	45	71.43	18	28.57	63	100		
<b>MR immunization uptake</b>								
No	90	87.4	13	12.6	103	100	11.84	<0.001
Yes	45	36.9	77	63.1	122	100		

There was a positive association between perceived barriers and MR immunization uptake ( $b = -1.05$ ; 95% CI =  $-1.81$  to  $-0.29$ ;  $p = 0.007$ ). Mothers with strong perceived barrier have logodds to provide MR immunization to their children by 1.05 units lower than mothers who have weak perceived barriers.

There was a positive association between cues to act and MR immunization uptake ( $b = 0.96$ ; 95% CI =  $0.19$  to  $1.73$ ;  $p = 0.014$ ). Mothers with high cues to act have logodds to give MR immunization to their

children by 0.96 units higher than mothers who have low cues to act.

There was a positive association between self-efficacy and MR immunization uptake ( $b = 1.45$ ; 95% CI =  $0.59$  to  $2.31$ ;  $p = 0.001$ ). Mothers with high self-efficacy have logodds to give MR immunization to their children by 1.45 units higher than mothers who have low self-efficacy.

Integrated health post (posyandu) had a contextual effect on MR immunization uptake (ICC = 10.53%).

**Table 3. Multilevel Analysis Results**

Independent Variables	b	95% CI		p
		Lower limit	Upper limit	
<b>Fixed-Effect</b>				
Maternal Education	0.66	-0.07	1.41	0.080
Maternal Knowledge	0.90	0.14	1.65	0.020
Family Support	0.71	-0.05	1.48	0.068
Perceived Susceptibility	1.24	0.33	2.14	0.007
Perceived Severity	1.19	0.36	2.03	0.005
Perceived Benefit	0.93	0.19	1.66	0.013
Perceived Barrier	-1.05	-1.81	-0.29	0.007
Cues to Act	0.96	0.19	1.73	0.014
Self-Efficacy	1.45	0.59	2.31	0.001
<b>Random-Effect</b>				
Posyandu Var (Constants)	0.38	0.05	2.61	
N Observation = 200				
Log likelihood = - 98.11				
ICC=10.53%				

## DISCUSSION

### 1. The effect of maternal education on MR Immunization uptake

The results of this study indicated that maternal education has a positive and statistically significant effect on MR immunization uptake. Mothers with high education were more likely to provide Measles Rubella immunization to their children by 0.66 time compared to low-educated mothers (b=0.66; 95% CI= -0.07 to 1.41; p= 0.080).

Onsomu et al. (2015) stated that mothers with high education were 2.21 and 9.10 times more likely to immunize their children than mothers who have low education. Maternal education was very important in ensuring good health outcomes for children. Cao et al. (2018) also stated that maternal education levels significantly protect children's health. Better vaccine coverage was associated with higher maternal education levels.

Mother with higher levels of education can help mothers to communicate with health personnels efficiently and have a positive impact on vaccination through better understanding and acceptance of

immunization knowledge (Hu et al., 2018). Maternal education would affect the understanding of the information that was obtained. The higher the education of the mother, the higher the level of understanding of the information obtained in this case related to MR immunization.

### 2. The effect of maternal knowledge on on MR immunization uptake

The results of this study indicated that maternal knowledge has a positive and statistically significant influence on the coverage of MR immunization. Mothers with good knowledge have a higher chance to immunize Measles Rubella to their children by 0.90 time compared to mothers who have lack of knowledge (b=0.90; 95% CI= 0.14 to 1.65; p= 0.020).

Prabandari et al. (2018) stated that there was a relationship between knowledge and the utilization Rubella Measles immunization. Rejection of MR immunization was caused by poor maternal knowledge of MR immunization.

Lack of knowledge about immunization was one of the determinants of parents' hesitation in providing vaccines to children (Guay et al., 2019). Providing information

to parents about immunization would increase the coverage of child immunization (Oyo-Ita et al., 2016). Ryan et al. (2018) states that providing information through face-to-face education is more effective in populations that lack awareness or understanding of vaccinations so that they can increase the knowledge of parents to vaccinate their children. Providing complete information can lead to a reduction in missed vaccinations, especially for older people who were difficult to reach (Restivo et al., 2015).

### **3. The effect of family support on MR immunization uptake**

The results of this study indicated that family support has a statistically significant influence on MR immunization uptake. Mothers with strong family support were more likely to give MR immunization to their children by 0.71 time compared to mothers who have weak family support ( $b=0.71$ ; 95% CI= -0.05 to 1.48;  $p= 0.068$ ).

Inayati et al. (2019) stated that there is an influence of family support for the use of DPT3 immunization. Families who believe in the benefits of immunization for babies would encourage family members to use health services optimally. Support from the surrounding environment would ease someone to make behavioral changes (Jayanti et al., 2017).

Family support has an important role for mothers in making decisions to give MR immunization to their children. The stronger the family support, the more the mother's desire to give Measles Rubella immunization to her child.

### **4. The effect of perceived susceptibility on MR immunization uptake**

The results of this study indicated that perceived vulnerability has a statistically significant effect on the coverage of Rubella Measles immunization. Mothers with high perceived vulnerability were more likely to

give MR immunization to their children by 1.24 times compared to mothers who have low perceived susceptibility ( $b=1.24$ ; 95% CI= 0.33 to 2.14;  $p= 0.007$ ).

This study was in line with a study of Puri et al. (2016) which states that there is an indirect influence between perceived vulnerability and completeness of immunization through the perceived threats. Perceived susceptibility was one of the strong perceptions in encouraging people to adopt healthy behaviors. The greater the risk felt, the greater the likelihood of being involved in behavior to reduce the risk (Sulaeman, 2016).

Communicating effectively with parents by including vaccine-related risks in such conversations can have a positive impact on the intention of vaccinating parents (Gowda et al., 2013). Vulnerability and fear that someone felt about the severity of an illness would encourage someone to do prevention (Fitriani et al., 2018).

Perceived susceptibility to measles and rubella in infants was a very important factor to be considered by mothers. Given that the disease can only be prevented through immunization against Measles Rubella, so this can encourage mothers to immunize their children. Mothers who have the perception of their children to experience measles and rubella were more likely to give Measles Rubella immunization to their children.

### **5. The effect of perceived severity on MR immunization uptake**

The results of this study indicated that perceived severity has a statistically significant effect on the coverage of Rubella Measles immunization. Mothers with high perceived severity were more likely to give Measles Rubella immunization to their children by 1.19 times compared to mothers



who have low perceived severity ( $b=1.19$ ; 95% CI= 0.36 to 2.03;  $p= 0.005$ ).

Puri et al. (2016) explained that there was a positive relationship between perceived seriousness or severity and completeness of immunization status. The seriousness that was felt determined whether there were any preventive actions on the disease.

Measles and rubella was one of the main causes of death in infants. Information about the serious impacts caused by the disease made a person try to take preventive action. So that it can be interpreted that the higher the perceived severity of the mother against measles and rubella, the higher the mother's desire to give Measles Rubella immunization to her child.

#### **6. The effect of perceived benefit on MR immunization uptake**

The results of this study indicated that the perceived benefit has a statistically significant effect on the coverage of Rubella Measles immunization. Mothers with high perceived benefits were more likely to give Measles Rubella immunization to their children by 0.93 time compared to mothers who have low perceived benefits ( $b=0.93$ ; 95% CI= 0.19 to 1.66;  $p= 0.013$ ).

Puri et al. (2016) stated that there was a direct and positive effect between perceived benefits and completeness of immunization status. Perceived benefit referred to a person's assessment of the value or efficacy of carrying out healthy behavior to reduce the risk of experiencing disease (Murti, 2018).

Perceived benefit in this case was Measles Rubella immunization in children can increase a child's immunity and prevent measles and rubella. Indonesian Ministry of Health (2018) stated that with the Measles Rubella immunization campaign, it would break the transmission of measles and rubella virus, reduce the rate of measles and rubella, and reduce the

incidence of Congenital Rubella Syndrome (CRS). It can be interpreted that, the higher the mother's perceived benefits generated from Measles Rubella immunization, the higher the mother's desire to immunize her child.

#### **7. The effect of perceived barrier on MR immunization uptake**

The results of this study indicated that perceived barriers have a statistically significant effect on the coverage of Rubella Measles immunization. Mothers with strong perceived barriers were less likely to give Measles Rubella immunization to their children by 1.05 time compared to mothers who have weak perceived barriers ( $b=-1.05$ ; 95% CI= -1.81 to -0.29;  $p= 0.007$ ).

The results of this study were in line with Prabandari et al., (2018) which states that there was a relationship between perceived barriers to the utilization of Rubella Measles immunization.

Perceived barriers referred to subjective judgments which include a person's perception of barrier to change a behavior (Murti, 2018). The obstacle encountered in this study was that Measles Rubella immunization would have a negative effect on children's health, such as the occurrence of autism and the law of this immunization was still doubtful. This was one of the factors that influenced the mother's decision to immunize her child. The stronger the perceived barrier, the lower the mother's desire to provide Measles Rubella immunization to her children.

Wolff et al. (2014) explained that Somali parents were more likely to ignore MMR vaccine than non-Somali parents (OR= 4.6; 95% CI = 1.2-18.0). Most of them ignored the vaccine because they heard about the adverse effects associated with the vaccine or personally knew someone who has a bad effect.

Indonesian Ministry of Health (2018) states that Rubella Measles vaccine did not cause autism. Until now, there was no evidence to support that any type of immunization can cause autism. It can be concluded that the way to overcome this problem was to provide correct and accurate information about Measles Rubella immunization through an approach to the community, especially for mothers who have toddlers.

### **8. The effect of cues to action on MR immunization uptake**

The results of this study indicated that cues to action had a statistically significant effect on the coverage of Rubella Measles immunization. Mothers with high cues to act were more likely to give Measles Rubella immunization to their children by 0.96 time compared to mothers who have a low cues to act ( $b=0.96$ ; 95% CI= 0.19 to 1.73;  $p= 0.014$ ).

The results of this study were in line with Suryawati et al. (2016), which stated that there was a relationship between cues to action and the completeness of basic childhood immunizations. Children from mothers who have low cues to action have a chance of incomplete immunization by 10.43 times compared with children from mothers with high cues to action. Cues to act can be from internal or external sources (Sulaeman, 2016). Internal encouragement can be in the form of intention to do health behavior in anticipation of an outbreak of an illness. While encouragement from outside can be from family history of contracting the disease, friend invitation, and counseling from health personnel (Nugrahani et al., 2017).

There was an encouragement from the mother and the influence of the surrounding environment such as invitation from health personnel, neighbors who have given Measles Rubella immunization to

their children, and a good understanding of health information that it was important to immunize Measles Rubella to children would increase the mother's desire to immunize her child.

### **9. The effect of self-efficacy on MR immunization uptake**

The results of this study indicated that self-efficacy has a statistically significant influence on the coverage of Rubella Measles immunization. Mothers with high self-efficacy were more likely to give Measles Rubella immunization to their children by 1.45 time compared to mothers who have low self-efficacy ( $b=1.45$ ; 95% CI= 0.59 to 2.31;  $p= 0.001$ ).

The results of this study were in line with the research of Jayanti et al. (2017) which states that there is an effect between self-efficacy and completeness of basic immunization. Self-efficacy referred to the perception of someone to succeed in carrying out a health behavior. Self-efficacy can be seen as a person's beliefs about the extent to which he/she was able to control the motivation, behavior, and social environment needed to produce a behavior (Murti, 2018).

Self-efficacy in this case was the mother's confidence to be able to provide Measles Rubella immunization to prevent measles and rubella in her child. A mother who has high self-efficacy was more likely to increase the mother's desire to give Measles Rubella immunization to her child.

### **10. The effect of posyandu on MR immunization uptake**

The results of this study indicated that there was a contextual effect of the posyandu level on the Measles Rubella immunization coverage (ICC= 10.53%).

Posyandu was one form of Community-based Health Efforts (UKBM) carried out by, from and with the community, to empower and provide convenience to the

community to obtain health services for mothers, babies and toddlers. One of the benefits of posyandu for the community was obtaining convenience to obtain health information and services for toddlers, such as immunization (Indonesian Ministry of Health, 2012).

Posyandu or village health posts played a role in immunization programs in Indonesia, because the village midwife program provided immunization and other maternal and child health services through a wide range of village health posts. The village health post program ease the community members to access immunization programs. Good coordination between health centers and village health posts was an effective element in increasing the number of children who receive full immunization (Holipah *et al.*, 2018).

Increasing the number of village health centers (posyandu) increased the likelihood of children to receive full immunization (Maharani *et al.*, 2014). Support from the village head and village health committee was very important for the success of the posyandu activities. By improving the quality of posyandu services and providing quality resources, it can encourage maternal participation (Nazri *et al.*, 2016).

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#### **AUTHOR CONTRIBUTIONS**

Wahyuni Rosadi as the main researcher in this study has a role in determining the topic of research, analyzing data, and writing articles. Endang Sutisna Sulaeman has role to provide the theoretical basis of the problem of this study. Hanung Prasetya has role in providing input for a discussion related to the theory of Health Belief Model (HBM).

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#### **CONFLICT OF INTEREST**

Nil.

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