Original Research

The Indonesian Journal of Public Health
Vol 19. No. 2 August 2024
p- ISSN 1829-7005 e- ISSN 2540-8836

RISK FACTOR ANALYSIS OF INCOMPLETE BASIC IMMUNIZATION IN CHILDREN AGED 12-23 MONTHS IN EAST NUSA TENGGARA PROVINCE

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ABSTRACT

Introduction: Immunization is an effective effort to prevent some dangerous diseases in children. By providing complete basic immunization, it can reduce child mortality. East Nusa Tenggara province reached a low number of complete basic immunization coverage in 2016 (69.29%), increased in 2017 (72.2%), then decreased again in 2018 (51.72%).**Aims:** of this study is to analyze risk factors for incomplete immunization status in children aged 12-23 months in NTT province. **Method.** The method used is analytical observational with a cross-sectional design. The data used are secondary data of Basic Health Research 2018. The study population was household members who could be interviewed at the time of Basic Health Research 2018 in the NTT provincial census block area. Total sample was 674 households. The sampling technique used is two stage one phase stratified sampling. The independent variables include mother's age, father's age, mother's education level, father's education level, number of children, residence, AEFI, and ANC. The dependent variable is the incomplete basic immunization status. **Results:** In this study, it is known that the candidate in the regression test variables are father's age (p value= 0.005), mother's educational level (p value= 0.000), number of children (p value= 0.007), residence (p value= 0.000), and ANC (p value= 0.000). **Conclusion**: According to this study, most children under two years were not fully immunized (63.2%). And in this research, the candidate variables will then become a prediction model of incomplete immunization status in children 12-23 months in East Nusa Tenggara province.

Keywords: Good health, Immunization, Children 12-23 months, Incomplete Basic Immunization.

INTRODUCTION

It is know that immunization is a public health exertion that effectively and efficiently prevents dangerous diseases. The role of immunization is significant in saving people from illness, disability, and death. In immunization, there is the concept of herd immunity. Herd immunity is formed if immunization coverage reaches a high number of targets and is evenly distributed throughout the region. Thus, if there are Immunization-Preventable Diseases (PD3I) in the community, the disease will not spread, and Extraordinary Events can be prevented (Indonesian Health Ministry, 2020). Every child has the right to be protected against vaccine-preventable disease and preventing disease through immunization. It increases the security of all populations against disease and reduces inequalities (WHO, 2005). The existence of a vaccine is a public health tool, which is used to prevent up to 2-3 million deaths each year worldwide.

The immunization program will help protect people from diseases by giving them shots, and, before the vaccine is distributed, it will undergo safety monitoring before use.

Cite this as: Almeida, DV., Bebengu, YB., Syahrul, F and Hargono, A, (2024). Risk Factor Analysis of Incomplete Basic Immunization in Children Aged 12-23 Months in East Nusa Tenggara Province.The Indonesian Journal of Public Health, 19(2), 289-301. https://doi.org/10.20473/Ijph.v19i2.2024.289-301

However, vaccines can still cause Adverse Events Following Immunization (AEFI) (Laryea et al., 2022). Children need to get basic immunizations in order to protect them from diseases based on the suitability of their age. The essential immunization is a way to build your immunity against some of the most common diseases (Setiawan and Wijayanto, 2022).

In addition, the age of toddlers is also often referred to as the golden age which is a time to grow and develop physically, mentally and socially (Putra and Suyasa, 2020). Children aged 12—23 months are vulnerable groups that cannot meet basic needs and make their own decisions. At the age of under two, if you have poor health status, you can be at risk of damage to the brain. So that this age is a vulnerable age for infectious diseases, as well as disturbances in growth and development. A 12-month-old child is hoped to have gotten a total essential immunization comprising of one dose of Bacillus Calmette-Guérin (BCG) immunization, three measures of Diphtheria-Pertussis-Tetanus(DPT) immunizations, four tablets of Polio immunizations, four doses of Hepatitis B immunizations, and one dose of Measles/Measles- Rubella immunization (Setiawan and Wijayanto, 2022).

The main concern on child health is one of the SDGs targets to end preventable newborn child and young child mortality by stifling and diminishing the neonatal mortality rate in Indonesia to 12 per 1,000 live births (Wulansari and Nadjib, 2019). According to Indonesia's Complete Basic Immunization (CBI) data in 2020, several provinces are still below the national target. In 2020, the CBI target was 92.9%, while Indonesia's Complete Basic Immunization coverage is 82.6%. There are only a few provinces that exceed the national target, namely Bali (99.4%), NTB (99.1%), Central Java (98%), and East Java (97.3%). Meanwhile, other provinces are still below the target.

The primary indicators that have been agreed upon nationally and internationally as a measure of success in achieving immunization programs include village/urban Universal Child Immunization (UCI) and Complete Basic Immunization (IDL) (Rasyid, Notobroto and Hargono, 2016). Basic immunization coverage in 2018 reached higher numbers than in 2017. In 2020, the complete basic immunization coverage nationally was 83.3%, which still did not meet the 2020 Strategic Plan target of 92.9% (Indonesian Health Ministry, 2021) .Immunization can reduce the mortality rate of children caused by Immunization-Preventable Diseases (IPD) by increasing the complete basic immunization coverage in each region (Hudhah and Hidajah, 2018). The Government of Indonesia has focused on total essential immunization scope within the Plan Strategy of the Immunization Program of the Service of Wellbeing of the Republic of Indonesia from 2015 to 2019.

One of the programs targeted complete immunization in 2018 with 92.5% coverage. In fact, it is known that the total coverage of basic immunization in the last five years in Indonesian itself is relatively consistent, which is at the rate above 85%. Be that as it may, it still does not reach the desired specified strategic plan. In 2018, the total number of basic immunization coverage that is classified as complete in Indonesia was at 90.61%. This number underneath slightly below the 2018 Plan Strategy target of 92.5%. Meanwhile, according to provinces, 13 provinces are known to have reached the 2018 Strategic Plan target.

With the immunization program, it is hoped that children can be protected from the dangers of disease. In addition, it can prevent infectious diseases and death caused by diseases that often afflict children. This immunization program is an important and

effective form of health intervention that can increase life expectancy (Sulistyoningrum and Suharyo, 2017).

Data obtained from the Basic Health Research in Indonesia in 2018 stated that the total essential immunization scope in children aged 12-23 months was 57.9%, and it did not reach the target. It diminished when compared to the Basic Health Research in 2013 (Indonesian Health Ministry, 2018). Based on information obtained from the Indonesian Health Profile from 2015 to 2018, the achievement of complete basic immunization in East Nusa Tenggara Province was relatively low, so it did not reach the target. The Complete Basic Immunization coverage in East Nusa Tenggara Province over the past four years has not reached the target related to the Indonesian Ministry of Health's Immunization Program for 2015—2019. East Nusa Tenggara province only reached a low number of complete basic immunization coverage in 2016 (69.29%), increased in 2017 (72.2%), then decreased again in 2018 (51.72%).

According to the results of Basic Health Research 2018, complete basic immunization coverage in East Nusa Tenggara province in children, especially aged 12—23 months, only reaches 51.6%, with incomplete immunization as much as 40.5% and not getting immunization as much as 7.9% (Indonesian Health Ministry, 2018). In addition to the low coverage total essential immunization during 2019, the scope of village/urban UCI in East Nusa Tenggara province only reached 76.2%, namely 2,555 villages/urban from 3,351 villages/urban (Indonesian Health Ministry, 2020). In 2019, there were reported cases of Immunization-Preventable Diseases (IPD), and East Nusa Tenggara province is also one of those regions. The case of IPD shows that there are still many vulnerable populations, which will affect the formation of herd immunity.

The immunization-preventable diseases are expected to be eradicated and reduce the number of cases with the implementation of immunization programs. Immunization is one of many alternatives to increase one's immunity to a disease exposure (Rahmawati and Umbul, 2014). Incomplete immunization status is one of the factors causing low health status in children, which will eventually result in high rates of child morbidity and mortality. The incidence of morbidity and death may come from hepatitis b, tuberculosis, diphtheria pertussis, measles, poliomyelitis, and neonatal tetanus (Yundri et al., 2017). Sari and Nadjib's (2019) research states that mother's age, education level, and occupation significantly influence complete basic immunization coverage. This study wants to analyze the risk factors for incomplete immunization in children aged 12—23 months in East Nusa Tenggara province.

METHODS

This study used an analytical observational study to obtain an explanation of the risk factors and causes of the disease with cross-sectional research design to determine factors that influence the incomplete immunization status in children aged 12—23 months in East Nusa Tenggara province. The secondary data are derived from the 2018 Basic Health Research. This study was conducted in the Census Block of East Nusa Tenggara province from February 2020 to November 2020. In this study, data analysis used univariable analysis with descriptive analysis, and multivariable analysis using logistic regression.

The independent variables examined in this study are maternal characteristics (mother's age, mother's education level, number of children), father characteristics (father's age, father's education level), residence, Adverse Events Following

Immunization **(**AEFI), and Antenatal Care (ANC). The dependent variable is the incomplete basic immunization status.

In the independent variables, mother's age and father's age were defined as the latest age at the data collection interview and calculated in full years. The education level of the mother and father is defined as the level of formal education that has been achieved by the mother and father. The classification for the level of education is said to be low if the formal education achieved is a maximum of junior high school graduates, and high if the formal education achieved is at least high school, with the guidelines for compulsory 9-year basic education. The variable number of children is defined as the number of household members under the age of 0-59 months.

Then, for the residence this is defined as the classification of the place where the mother lives, i.e. village or city. The Adverse Events Following Immunization **(**AEFI) variable is defined as the answer from parents regarding any complaints experienced by the baby after getting immunized. For Antenatal Care (ANC). this is defined as the frequency of pregnancy check-ups to a health professional at 0-3 months, 4-6 months, and 7 months until delivery. And for the dependent variable, namely incomplete basic immunization status, it is defined as children who do not get complete basic immunization consisting of Hb 0 antigen, BCG, Polio 1, Polio 2, Polio 3, Polio 4, DPT/Hb/Hib1, DPT/Hb/Hib2, DPT/Hb/Hib3, and Measles/MR before the age of 1 year.

The study population was each household member who could be interviewed during Basic Health Research in 2018 at the census block area of East Nusa Tenggara province (44,782 households). This study's sample was part of the population with inclusion criteria: having children aged 12—23 months; having records of immunization status from KMS or KIA books (674 households). The sampling process in this study is the sample at the census block taken from households in East Nusa Tenggara Province using the two stage one phase stratified sampling method, with a target visit of 1088 BS and the response rate in the sample was 100%.

This was followed by a sample of households obtained from each selected census block and taken by simple random sampling. With a target of 10880 households, the total number visited was 10788 BS and the response rate in the sample was 99.15%. A target of 47782 respondent households in East Nusa Tenggara Province was sampled, and 44782 households were successfully interviewed with a success rate of 93.76%. As many as 674 households were interviewed for households with children aged 12-23 months.

The analysis was carried out utilizing the chi-square test to analyze the influence between each independent and dependent variable. The univariate test is utilized to see the frequency distribution of dependent variables (immunization status) and independent variables are mother's age, mother's education level, number of children, father’s age, father’s education, residence, AEFI, and ANC. At that point, a chi-square test is utilized to test the influence between the independent and dependent variable. The chi-square test was utilized to see the difference in extent to the dependent. In this study an ethical test was carried out at the Faculty of Public Health, Universitas Airlangga with number 105/EA/KEPK/2020.

Table 1 shows the frequency distribution of the dependent variable of immunization status, and independent variables include mother's age, father's age, mother's education level, father's education level, number of children, residence, Adverse Events Following Immunization **(**AEFI), and Antenatal Care (ANC). Meanwhile, Table 2

shows the test of the independent variable on the dependent variable. In this, the sample was 674 households in East Nusa Tenggara Province that matched the inclusion criteria.

RESULT

Table 1. Characteristic Distribution of Risk Factor Analysis of Incomplete Immunization in Children Aged 12-23 Months in East Nusa Tenggara Province

Variable	n	%
Immunization Status		
Incomplete	426	63.2
Complete	248	36.8
Mother's Age		
≤31 years old	354	52.5
>31 years old	320	47.5
Father's Age		
≤35 years old	374	55.5
>35 years old	300	44.5
Mother's Education Level		
Low	447	66.3
High	227	33.7
Father's Education Level		
Low	475	70.5
High	199	29.5
Number of Children		
≥3 children	24	3.6
≤2 children	650	96.4
Residence		
Village	107	15.9
City	567	84.1
AEFI		
Yes	300	44.5
No	374	55.5
ANC		
Incomplete	134	19.9
Complete	540	80.1

Table 1 contains the univariate analysis. The result shows that 63.2% of children did not get complete basic immunization, and only 35.8% got complete basic immunization. It was found that most respondents were mothers under 31 years old (52.5%), and the rest were over 31 years old. In addition to the mother's age, the father's age was one of the independent variables studied, where the majority of the father were

under 35 years old, as much as 55.5%, and others were over 35 years old, as much as 44.5%. However, this study found that most mother's education levels are low, namely 66.3%. Most father's education levels are also low, namely 70.5%.

Most of respondents in this study live in cities. 84.1% of respondents live in cities, and the remaining 15.9% live in villages. The number of children in households was one of the variables in this study, and most households (96.4%) had one or two children aged 12—23 months. Most children with basic immunization, which includes complete criteria status, did not feel AEFI (55.5%). The majority of respondents had completed ANC (80.1%), and the rest had incomplete ANC status (19.9%).

Table 2. The Test Result

Variable	Categories	Immunization Status		p-value
		Incomplete	Complete	
Mother's Age	≤31 years old	229 (64.7%)	125 (35.3%)	0.654
	>31 years old	197 (61.6%)	123 (38.4%)	
Father's Age	≤35 years old	242 (64.7%)	123 (35.3%)	0.104
	>35 years old	184 (61.3%)	116 (38.7%)	
Mother's Education Level	Low	302 (67.6%)	145 (32.4%)	0.004
	High	124 (54.6%)	103 (45.4%)	
Father's Education Level	Low	317 (66.7%)	158 (33.3%)	0.883
	High	109 (54.8%)	90 (45.2%)	
Number of Children	≥3 children	21 (87.5%)	3 (33.3%)	0.007
	≤2 children	405 (62.3%)	245 (36.8%)	
Residence	Village	51 (47.7%)	56 (52.3%)	0.000
	City	375 (66.1%)	192 (33.9%)	
AEFI	Yes	197 (65.7%)	103 (34.3%)	0.394
	No	229 (61.2%)	145 (38.8%)	
ANC	Incomplete	105 (78.4%)	29 (21.6%)	0.000
	Complete	321 (59.4%)	219 (40.6%)	

Table 2 shows the results of the candidate test in logistic regression. Candidate variables are those that show p value < 0.25. Thus, from the results of the candidate test, it was found that the candidate variables were father's age (p value= 0.104), mother's education level (p value= 0.004), number of children (p value= 0.007), residence, and ANC (p value= 0.000) on incomplete basic immunization status among children aged 12-23 months in East Nusa Tenggara province.

Mother's Age

From the mother's aged variable, it is known that the majority of mothers with children whose immunization status is incomplete are ≤ 31 years old (64.7%) . The mother's age variable is known to produce a

p value of 0.654, which means the p value is greater than the 0.25. So, it can be interpreted that the mother's age variable is not a candidate indicators for predicting incomplete basic immunization status in children aged 12-23 months in East Nusa Tenggara Province.

Father's Age

In the father's age variable, it is known that the majority of fathers with children who have incomplete immunization status are aged ≤ 35 years (64.7%). The test result for father's age variable shows that the p value is 0.104 so it is known that the result of p value < 0.25. Thus, it can be interpreted that the father's age is a candidate indicator for predicting incomplete basic immunization status in children aged 12-23 months in East Nusa Tenggara Province.

Mother's Education Level

The result appeared that the larger percentage of the mothers with children with incomplete immunization status had low education (67.6%). The result of the p value in this study was 0.004, which is known that the p value < 0.25. From the result of the tests that have been carried out previously, mother's education is thus a candidate indicator for predicting incomplete basic immunization status in children aged 12-23 months in East Nusa Tenggara Province.

Father's Education Level

It is known that for the majority of fathers having children with incomplete immunization status the education is low (66.7%) by. The results of tests carried out on the father's education variable for incomplete basic immunization in children show that the p value is 0.883, which means the p value is smaller than the 0.25. Thus, from the result of the test that have been carried out previously, it can be interpreted that the father's education is not a candidate indicator for predicting incomplete basic immunization status in children aged 12-23 months in East Nusa Tenggara Province.

Number of Children

The majority of respondents with children with incomplete immunization status have children under five in the house <= 2 people (62.3%). Based on tests conducted on the variable number of children under five in the house, it is known that the result of the p value is 0.007, which implies p value<0.25. So, it can be interpreted that number of children is a candidate indicator for predicting incomplete basic immunization status in children aged 12-23 months in East Nusa Tenggara Province.

Residence

The majority of respondents with children with incomplete immunization status stated that they lived in the city (66.1%). The results of the analysis showed that the p value was 0.000 which means the p value < 0.25. So, it can be interpreted that the residence is a candidate indicators for predicting incomplete basic immunization status in children aged 12-23 months in East Nusa Tenggara Province.

Adverse Events Following Immunization (AEFI)

It is known, in this study, the larger part of respondents with children with incomplete immunization status answered that their children did not have AEFI when they received immunization (61.2%) status. By conducting a test between AEFI and incomplete essential immunization in children aged 12-23 months, the result of the p value is 0.394, where the p value was > 0.25. Thus, it mean that AEFI is not a candidate indicator for predicting incomplete basic immunization status in children aged

12-23 months in East Nusa Tenggara Province.

Antenatal Care (ANC)

In this study, it was found that the majority of respondents in the group with children with incomplete immunization status had incomplete ANC status (78.4%). From the results of the test conducted, it was found that the p value was 0.000 <0.25. thus, ANC is a candidate indicator for predicting incomplete basic immunization status in children aged 12-23 months in East Nusa Tenggara Province.

Table 3. Logistic Regression Test Results

Variable	B	Analysis Results		CI 95%
		p value	OR	
Father's Age	-.950	0.005	0.387	0.200-0.749
Mother's Education Level	1.334	0.000	3.797	1.974-7.396
Number of Children	1.801	0.007	6.054	1.619-22.636
Residence	-4.561	0.000	0.010	0.001-0.077
ANC	4.127	0.000	61.969	8.417-456.255
Constant	-1.946	0.002		

Table 3 shows the final results of the logistic regression analysis. There were five variables that were significant and became the prediction model of incomplete basic immunization status consisting of father's age ≤ 35 years, low mother's education level, number of children ≥ 3 children, rural residence, and incomplete ANC. The results of the analysis also obtained that the odds ratio (OR) value on the father's age variable is 0.387 (95%CI; 0.200-0.749) which means the risk for incomplete basic immunization in children with father's age ≤ 35 years is 0.387. Thus, father's age ≤ 35 years is protective against the incidence of incomplete basic immunization status. Then the mother's education level variable gets an OR value of 3.797 (95%CI; 1.974-7.396) which means that the risk for incomplete basic immunization in children with a low level of maternal education has a risk of 3.797 times greater than children with a high level of maternal education.

The OR value on the number of children variable is 6.054 (95% CI; 1.619-22.636) so it means that the risk for incomplete basic immunization in children with ≥ 3 children is 6.054 times greater than the number of children in the house ≤ 2 children. The residence variable resulted in an OR of 0.010 (95%CI; 0.001-0.077). So, it means that those who live in the village are protective against the incidence of incomplete basic immunization status. The OR value of the ANC variable is 61.969 (95%CI; 8.417-456.255) so it can be interpreted that the risk for incomplete basic immunization in children with an incomplete ANC history is 61.969 times greater than those with a complete ANC history.

Based on the results of the logistic regression test, a prediction model for incomplete basic immunization status in children aged 12-23 months in East Nusa Tenggara Province can be developed, namely Thus, the formula produces :

$$p = Pr(Y_i=1 \mid X) = \frac{1}{1+e^{-(\alpha+\beta 1 \chi 1,i+\ldots+\beta k \chi k,i)}}$$

P= Pr (Incomplete basic immunization) = 1/1+e-(-0.950*Father's age+ 1.334*Mother's education level+ 1.810*Number of children+ (-4.561)*Residence+ 4.127*ANC).

DISCUSSION

A baby's or children's immunization status is considered incomplete if the baby does not get at least one of the basic immunization series that is required. By giving immunizations to children, it is trusted that children can maintain a strategic distance from illnesses that can be anticipated by giving immunization (Gustina, Wardani and Maesaroh, 2020). Immunization in Indonesia aims to reduce mortality among infants and children under five years old. So, it is hoped that by getting Complete Basic Immunization (CBI), the number of children suffering from conditions like measles, pertussis, diphtheria, and polio, as well as other diseases that can be avoided by fulfillment of total essential immunization can be lower (Agushybana et al., 2019).

In this study, it was found that children aged 12—23 months in East Nusa Tenggara province in 2018 who did not get essential immunization was 63.2%. In line with the investigation by Astuti and Fitri (2017), it was stated that among the larger part of respondents within the study, the proportion of babies who did not get total essential immunization (51.8%) was greater than those who received total essential immunization.

The effect of father's age on the incomplete basic immunization in children aged 12—23 months

Father's age in this study resulted in a p value of 0.005 so that it can be interpreted that father's age affects the status of incomplete basic immunization in children aged 12-23 months in East Nusa Tenggara Province. Furthermore, an OR value of 0.387 (95%CI 0.200-0.749) was obtained so that it can be interpreted that father's age ≤ 35 years is protective by 0.387 compared to age > 35 years against incomplete basic immunization status in children aged 12-23 months in East Nusa Tenggara Province.

Age is one of the most important characteristics of people. Age also has a close relationship with various other traits (Rahmawati and Umbul, 2014). This is in line with research conducted by Oyefara (2014) in Lagos State Nigeria that respondents with an age of 20 years tend to immunize their children compared to respondents with an age of <20 years.

Research by Harmasdiyani(2015) conducted in the Kanigaran Health Center area, Probolinggo City in 2014 stated that respondents in the late adolescent age group (17-25 years) had a risk of 1.643 times to cause non-compliance with complete basic immunization compared to the late adult age group. The early adult age group has mature thinking and has more experience in making decisions to immunize their children.

The effect of mother's education level on the incomplete of basic immunization in children aged 12—23 months

Bivariate analysis showed a significant value in the mother's education level variable (p=0.005). It implies that a low mother's education level is demonstrated to be a risk factor related with the incompleteness of essential immunization in children aged 12—23 months. OR

value=3.797; 95% 1.974-7.396 means that children of poorly educated mothers are at 3.797 times the risk of not being fully immunized compared to highly educated mothers. This is in line with the research by Libunelo, Paramata and Rahmawati (2018) at the Dulukapa Public Health Center, Gorontalo Utara Regency, which stated that there was a significant relationship between mother's education level and the completeness of children's immunization status. The study characterizes the education level as the most recent level of education taken by a person.

The level of education plays a role underlying a person's scientific behavior. In addition, this research is in line with research by Hudhah and Hidajah (2018) at the Gayam Public Health Center, Sumenep Regency, which states that there's an influence between the level of maternal education and the achievement of total essential immunization in children. Higher education positively influences the completeness of essential immunization in children. At the level of education, parents will influence the knowledge that their children will have. If there are differences in the level of education, it will affect differences in giving responses and understanding of receiving the message that will be given (Rumbarar et al., 2021).

The effect of the number of children on the incomplete basic immunization in children aged 12—23 months

The number of children is one of the demographic aspects that will affect community participation. Mothers with more than one child usually have more experience and often obtain immunization information so that their child will be immunized. From the results in this study (p=0.007; OR=6.054; 95% CI 1.619-22.636 it can be concluded that more children in the house (≥3 children) is 6.054 times higher risk of not fully immunizing compared to fewer children in the house (≤2 children). This research aligns with the study conducted by Yundri et al. (2017) at Kuala Tungkal Public Health Center II, which stated that the majority of children in the house in the study is ≤2. However, it is not in line because the number of children in the household (Yundri et al., 2017) is not related to the total essential immunization status of children with p=0.604. The greater the number of children, especially among mothers who still have infants who need more time to care for, the lower their possibility of visiting the immunization service site. Such as the research conducted by Aswan and Simamora (2020) at Labuhan Rasoki Padangsidimpun Tenggara Public Health Center, where the study obtained p value=0.155 which implies no relationship between the number of children and the essential immunization status in children aged 12—24 months.

The effect of residence on the incomplete basic immunization in children aged 12—23 months

The test results that have been carried out in this study show that the majority reside in a village. The p value of 0.000 was obtained so that it can be interpreted that residence has an influence on the status of incomplete basic immunization in children aged 12-23 months in East Nusa Tenggara Province. Then it obtained an OR of 0.010 (95%CI 0.001-0.007) so that it means that children who live in villages are 0.010 protective against incomplete basic immunization status in children compared to children aged 12-23 months who live in cities in East Nusa Tenggara Province.

Location of residence has a role in child immunization services. Children living in urban areas have a 1.57 times greater chance of being fully immunized compared to children living in rural areas (Nour et al., 2020). In line with research conducted by Herliana and Douiri (2017) in Indonesia,

there is a relationship between place of residence and immunization coverage. Children who live in rural areas tend not to get immunization services. An OR of 1.39 was obtained, meaning that rural children have a 1.39 greater risk of not being immunized compared to urban children.

The effect of the ANC on incomplete basic immunization in children aged 12—23 months

The test results in this study showed a p value of 0.000, so it can be interpreted that there is an influence between ANC status and incomplete basic immunization status in children aged 12-23 months in East Nusa Tenggara Province. This study resulted in an OR of 61.969 (95% CI 8.417-456.255). So it can be interpreted that incomplete ANC status has a 61.969 times greater risk of having incomplete immunization status compared to those with complete ANC status.

In line with research conducted by Rakhmanindra and Puspitasari (2019), antenatal status is categorized into < 4 times and ≥ 4 times. The categories made in the study were based on the minimum antenatal visits made by mothers. In this study, the majority of mothers (85%) who had antenatal care less than four times had children with incomplete basic immunization status. It is known that the p value is 0.000, which means that there is a relationship between antenatal status and complete basic immunization status at Wonokusumo Health Center in 2017.

Grouped antenatal care is a comprehensive and quality antenatal care provided to all pregnant women that aims to fulfill the right of every pregnant woman to obtain quality antenatal care., so that the mother can undergo her pregnancy healthily and can deliver safely. This is in line with research conducted (Kinfe, Gebre and Bekele, 2019) in Ethiopia where there is a significant relationship between maternal ANC status and complete basic immunization in children aged 12-23 months. Mothers with ANC status ≥ 4 times were 2.21 times more likely to fully vaccinate their children than mothers who did not perform ANC (OR = 2.21 95%CI; 1.48-3.30).

CONCLUSION

In this study, most children aged 12—23 months had incomplete total essential immunization status. With the incomplete immunization status, there is a possibility that these children will experience illness. Based on the analysis that has been carried out in this study, there is no influence between mother's age, father's educational level and Adverse Events Following Immunization **(**AEFI) on incomplete immunization status of children aged 12—23 months in East Nusa Tenggara province. Several variables affect the incomplete immunization status in children aged 12—23 months maternal characteristics (mother's education level and the number of children, Antenatal Care (ANC)), father's characteristic (father's age), and residence of children aged 12—23 months in East Nusa Tenggara province. Thus, the prediction model formula for incomplete basic immunization status in children aged 12-23 months in East Nusa Tenggara Province is:

P= Pr (Incomplete basic immunization) = 1/1+e-(-0.950*Father's age+ 1.334*Mother's education level+ 1.810*Number of children+ (-4.561)*Residence+ 4.127*ANC).

This study is expected to be a consideration in helping healthcare workers in the immunization program to conduct screening for parents who are potentially unable to be able to provide complete immunization for their children. And this study is expected to educate parents so they are informed and willing to supply total essential immunizations to their children. The

results are expected to be a benefit for health workers to do socialization with parents about the schedule of immunization administration, the goals of the immunization, and matters related to fulfilling complete basic immunization for their children.

REFERENCES

Agushybana, F., BM, S., Jati, S.P., Martini, M. and Sriatmi, A., 2019. Description of complete basic immunization coverage among infant. *International Journal of Public Health Science (IJPHS)*, 8(2), p.174. https://doi.org/10.11591/ijphs.v8i2.18888

Astuti, H. and Fitri, 2017. Analisis Faktor Pemberian Imunisasi Dasar. *Jurnal Kebidanan Midwiferia*, [online] 3(1), pp.1–13. https://doi.org/10.21070/mid.v3i2.1401

Aswan, Y. and Simamora, F.A., 2020. Faktor - Faktor Yang Mempengaruhi Status Imunisasi Dasar Pada Anak Usia 12 - 24 Bulan. *Jurnal Ilmiah PANNMED (Pharmacist, Analyst, Nurse, Nutrition, Midwivery, Environment, Dentist)*, 15(1), pp.7–12. https://doi.org/10.36911/pannmed.v15i1.640

Gustina, L., Wardani, P.K. and Maesaroh, S., 2020. Faktor-Faktor yang Berhubungan dengan Kelengkapan Pemberian Imunisasi Dasar Lengkap pada Balita Usia 9-18 Bulan. *Wellness and Healthy Magazine*, [online] 2, pp.1–12. https://doi.org/10.30604/well.022.82000112

Harmasdiyani, R., 2015. Pengaruh Karakteristik Ibu Terhadap Ketidakpatuhan Pemberian Imunisasi Dasar Lengkap Pada Anak Bawah Dua Tahun. *Jurnal Berkala Epidemiologi*, 3(3), pp.304–314.

Herliana, P. and Douiri, A., 2017. Determinants of immunisation coverage of children aged 12-59 months in Indonesia: A cross-sectional study. *BMJ Open*, 7(12), pp.1–14. https://doi.org/10.1136/bmjopen-2016-015790

Hudhah, M.H. and Hidajah, A.C., 2018. Perilaku Ibu Dalam Imunisasi Dasar Lengkap Di Puskesmas Gayam Kabupaten Sumenep. *Jurnal PROMKES*, 5(2), p.167. https://doi.org/10.20473/jpk.V5.I2.2017.167-180

Indonesian Health Ministry, 2018. *Indonesian Health Profile 2017*. [online] Jakarta.

Indonesian Health Ministry, 2020. *Technical Guidelines for Immunization Services during the COVID-19 Pandemic*. [online] *Indonesian Health Ministry*. Jakarta.

Indonesian Health Ministry, 2021. *Indonesian Health Profile 2020*. Jakarta: Indonesian Health Ministry.

Kinfe, Y., Gebre, H. and Bekele, A., 2019. Factors associated with full immunization of children 12-23 months of age in Ethiopia: A multilevel analysis using 2016 Ethiopia Demographic and Health Survey. *PLOS ONE*. [online]. https://doi.org/10.1371/journal.pone.0225639

Laryea, E.B., Frimpong, J.A., Noora, C.L., Tengey, J., Bandoh, D., Sabblah, G., Ameme, D., Kenu, E. and Amponsa-Achiano, K., 2022. Evaluation of the Adverse Events Following Immunization Surveillance System, Ghana, 2019. *Journal PLoS ONE*, 17(3), pp.1–9. https://doi.org/10.1371/journal.pone.

0264697

Libunelo, E., Paramata, Y. and Rahmawati, R., 2018. Hubungan Karakteristik Ibu dan Jarak Pelayanan Kesehatan Dengan Kelengkapan Imunisasi Dasar di Puskesmas Dulukapa. *Gorontalo Journal of Public Health*, 1(1), p.08. https://doi.org/10.32662/gjph.v1i1.142

Nour, T.Y., Farah, A.M., Ali, O.M., Osman, M.O., Aden, M.A. and Abate, K.H., 2020. Predictors of immunization coverage among 12–23 month old children in Ethiopia: systematic review and meta-analysis. *BMC Public Health*, 20(1), pp.1–19. https://doi.org/10.1186/s12889-020-09890-0

Oyefara, J.L., 2014. Mothers' characteristics and immunization status of under-five children in Ojo local government area, Lagos State, Nigeria. *SAGE Open*, 4(3). https://doi.org/10.1177/2158244014545474

Putra, I.G.N.B.S. and Suyasa, I.N.G., 2020. Jurnal skala husada: the journal of health. *Jurnal Skala Husada: The Jurnal Of Health*, 17(1), pp.17–23.

Rahmawati, A.I. and Umbul, C., 2014. Faktor Yang Mempengaruhi Kelengkapan Imunisasi Dasar di kelurahan Krembangan Utara. *Jurnal Berkala Epidemiologi*, 2, pp.59–70.

Rakhmanindra, L. and Puspitasari, N., 2019. The Correlation Between Mother Characteristics And Complete Basic Immunization In Wonokusumo Community Health Service, Surabaya. *Indonesian Journal of Public Health*, 14(2), pp.174–185. https://doi.org/10.20473/ijph.v14i2.2019.175-186

Rasyid, M.Z., Notobroto, H.B. and Hargono, A., 2016. Pengembangan Basis Data Imunisasi Dasar Lengkap dan Booster Batita (Studi Kasus di Puskesmas Blega Kabupaten Bangkalan). *Jurnal Wiyata*, 3(2), pp.187–198.

Rumbarar, C.P., Nurjanah, Rosdianah and Sahibu, S., 2021. Faktor Yang Berhubungan Dengan Ketidaklengkapan Pemberian Imunisasi. *Hasanuddin Journal of Midwifery*, 3(1), pp.73–79.

Setiawan, M.S. and Wijayanto, A.W., 2022. Determinants of immunization status of children under two years old in Sumatera, Indonesia: A multilevel analysis of the 2020 Indonesia National Socio-Economic Survey. *Vaccine*, [online] 40(12), pp.1821–1828. https://doi.org/10.1016/j.vaccine.2022.02.010

Sulistyoningrum, D. and Suharyo, 2017. Kelengkapan Imunisasi Dasar Pada Bayi Usia 9-12 Bulan Dan Faktor Determinan Di Kelurahan Randusari Kota Semarang Tahun 2017. *Jurnal Kesehatan Masyarakat*, 17(1), pp.35–50.

WHO, 2005. *Vaccine-preventable Diseases and Immunization programme*.

Wulansari and Nadjib, M., 2019. Determinan Cakupan Imunisasi Dasar Lengkap pada Penerima Program Keluarga Harapan. *Jurnal Ekonomi Kesehatan Indonesia*, 4(1), pp.1–9. https://doi.org/10.7454/eki.v4i1.3087

Yundri, Y., Setiawati, M., Suhartono, S., Setyawan, H. and Budhi, K., 2017. Faktor-Faktor Risiko Status Imunisasi Dasar Tidak Lengkap pada Anak (Studi di Wilayah Kerja Puskesmas II Kuala Tungkal). *Jurnal Epidemiologi Kesehatan Komunitas*, 2(2), p.78. https://doi.org/10.14710/jekk.v2i2.4000