

ANALYSIS OF FACTORS FOR INCREASING INFANT MORTALITY RATES (IMR) IN TANAH LAUT DISTRICT

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Abstract-Many factors cause in the high mortality rate infants. The number of infant deaths in Tanah Laut Regency in 2016 was 87 babies and has increased from the previous year. This study aims to analyze the factors associated with the incidence of infant mortality in Tanah Laut Regency in 2017. This research method is a case control study. The sample in this study were 49 respondents in each group. The sampling technique uses simple random sampling. The research instrument used a questionnaire. The bivariate analysis test uses chi square and multivariate analysis uses multiple logistic regression. The results showed factors family income (p value = 0,0001), frequency of ANC visits (p value = 0,0001), LBW incidence (p value = 0,0001) and asphyxia incidence (p value = 0,0001) related to infant mortality in Tanah Laut Regency in 2017. Maternal age factors (p value = 0.686), parity (p value = 0.686), maternal education level (p value = 0.544), and gestational age (p value = 0.106) not related to infant mortality in Tanah Laut Regency in 2017. The LBW incidence factor is the most influential factor.

Keywords: family income, frequency of ANC visits, LBW incidence, asphyxia incidence, infant mortality rate

I. INTRODUCTION

Infant Mortality Rate (IMR) is the mortality rate per 1000 live births that occurs in infants less than one year old and collected from a complete history of pregnancy and birth of a mother aged 15-49 years (completed birth history) (UGM Reproductive Health Center, 2009). IMR is which one of indicator of the success of health development that has been declared in the National Health System and is even used as a central indicator of the success of health development in Indonesia (Wandira AK, 2012).

Based on data cited from the official website of the Ministry of Health, the number of cases of infant deaths decreased from 33,278 cases in 2015 to 32,007 cases in 2016. While until the middle of the year or first semester of 2017 there were 10,294 cases of infant deaths. Likewise, the maternal mortality rate during childbirth decrease from 4,999 cases in 2015 to 4,912 cases in 2016. While up to first semester in 2017 there were 1,712 cases of maternal deaths occurred during childbirth (Kemenkes RI, 2017).

Different things happen in South Kalimantan Province, where the Infant Mortality Rate (IMR) in 2017 is 10 per 1000 live births. The latest data from the South Kalimantan Provincial Health Office shows that the number of pregnant women is 78,756 and 74,766 with the

presentation of the number of maternal deaths as many as 91. The number of live births is 60,954, from the number of babies 73,509 and the number of infants 369,852 so that the total number of infant deaths is 897. The number of infant deaths in Tanah Laut Regency in 2016 was 87 babies and the number of live births in 2016 was 6,094 babies. Based on this, the infant mortality rate in 2016 was 14 per 1,000 live births (in 2015 it was 12 per 1,000 live births), compared to the previous year there was a tendency to increase even though it was lower than the MDGs target of 23 / 1,000 births life (District Health Office, Tanah Laut District, 2017).

Many factors cause the high mortality rate in infants. Infant deaths can be divided into two based on the causes, namely direct and indirect causes. The direct cause of infant death is influenced by factors brought about by the child from birth, and is directly related to the baby's health status. The direct causes of infant death include low birth weight (LBW), postnatal infections (tetanus neonatorum, sepsis), hypothermia and asphyxia. While infant mortality by indirect causes is influenced by the external environment and maternal activities during pregnancy, such as: maternal age, parity, socioeconomic factors, ANC visits, age during pregnancy, health services, and the state of the mother during pregnancy. (Tarigan) Based on the background above, it is necessary to study what factors are causing the increase in infant mortality (IMR) in Tanah Laut District in 2017.

II. MATERIAL AND METHODS

This study is an analytical survey with a quantitative approach using a case control design to analyze the factors associated with the incidence of infant mortality in Tanah Laut District. The study was conducted in the working area of the District Health Office. The population in this study were all babies who were born in 2016. Samples in this study were taken using simple random sampling technique. Calculation of determining the sample using the Lemeshow formula as many as 49 people for each group. The independent variables in this study were maternal age, parity, maternal education, family income, ANC visit, LBW, asphyxia and gestational age. The dependent variable in this study is infant mortality. The instrument used to determine the cause of infant death was a questionnaire containing questions about the research variables. Data collected is secondary data through patient medical record data. Objectives and benefits of the study were explained to respondents orally and in the format attached to the questionnaire. A written consent was obtained from those who agreed to participate. Approval of the study was obtained from the / departmental committee of the Faculty. Data were analyzed univariately with frequency and bivariate distribution tables to determine the relationship between variables using the chi square test. Data was analyzed using SPSS (ver.21.0). All tests were performed at the level of significance of 5%. Multivariate analysis was carried out as a follow-up of the bivariate test by including meaningful variables to find out the most dominant independent variables related to the dependent variable using multiple logistic regression analysis.

III. RESULT AND DISCUSSION

1. Univariate Analysis

Tabell1.Univariate Analysis Results

Variable	Case		Control	
	F	%	F	%
Age				
At risk	26	53,1	23	46,9
No at risk	23	46,9	26	53,1
Parity				
At risk	22	44,9	25	51
No at risk	27	55,1	24	49
Family Income				
< Rp. 2.258.000	44	89,2	8	16,3
≥ Rp. 2.258.000	5	10,2	41	83,7
ANC visits Frequency				
< 4x	39	79,6	6	12,2
≥ 4x	10	20,4	43	87,8
Maternal Education				
Low	22	44,9	26	53,1
High	27	55,1	23	46,9
LBW Incidence				
Yes, LBW	44	89,2	7	14,3
No LBW/ Normal	5	10,2	42	85,7
Asphyxia Incidence				
Yes, Asphyxia	40	81,6	10	20,4
No,Asphyxia	9	18,4	39	79,6
Gestational Age				
Preterm / Postterm	28	57,1	19	38,8
Aterm	21	42,9	30	61,2

Based on table 1.it is known that the age of respondents in the case group is more classified as risky (53.1%) compared to respondents whose age is not at risk. In contrast, in the control group the age of respondents who were classified as not at risk (53.1%) was bigger than the age at risk. Parity of respondents in the case group is bigger at no risk than at risk (55.1%), while in the control group, 51% are respondents with risk parity.

As many as 89.2% of respondents in the case group were respondents with a family income that was less than the UMR of Tanah LautDistrict, which was <Rp. 2,258,000. Unlike the family income in the control group where 83.7% of respondents have a family income ≥ Rp. 2,258,000.At the ANC visit frequency, as many as 79.6% of respondents in the case group visited <4x, while in the control group, as much as 87.8% visited the ANC ≥ 4x.

As many as 55.1% of respondents in the case group had a high level of maternal education, while the rest belonged to a low level of education. Unlike in the control group, as many as 53.1% were respondents with low levels of education. In the case group, respondents with a history of LBW infants were 89.2% while in the control group 85.7% did not LBW or normal.The results also showed the same thing, where the incidence of asphyxia in the case group was 81.6% of respondents' babies were asphyxia, while in the control group as much as 79.5% said they did not experience asphyxia. As many as 57.1% of respondents in the case

group had a history of preterm / post term gestational age, while in the control group 61.2% of respondents had a history of gestational age at term.

2. Bivariate Analysis

Tabel 2. Bivariate Analysis

Variable	Infant Mortality Incidence				P value
	Yes		No		
	F	%	F	%	
Age					
At risk	26	53,1	23	46,9	0,686
No at risk	23	46,9	26	53,1	
Parity					
At risk	22	44,9	25	51	0,686
No at risk	27	55,1	24	49	
Family Income					
< Rp. 2.258.000	44	89,8	8	16,3	0,0001
≥ Rp. 2.258.000	5	10,2	41	83,7	
ANC Visits Frequency					
<4x	39	79,6	6	12,2	0,0001
≥4x	10	20,4	43	87,8	
Maternal Education					
Low	22	44,9	26	53,1	0,544
High	27	55,1	23	46,9	
LBW Incidence					
Yes, LBW	44	89,8	7	14,3	0,0001
No, Normal	5	10,2	42	85,7	
Asphyxia Incidence					
Yes, Asphyxia	40	81,6	10	20,4	0,0001
NoAsphyxia	9	18,4	39	79,6	
Gestational Age					
Preterm / Postterm	28	57,1	19	38,8	0,106
Aterm	21	42,9	30	61,2	

Based on table 2. shows that the incidence of infant mortality is more common in the age group of respondents who are at risk as many as 26 people (53.1%) compared to those who are not at risk but experienced infant mortality. Conversely, in the group who did not experienced infant mortality, the age of respondents who were not at risk was 26 people (53.1%) more than respondents with age at risk but did not experienced infant death. Statistical test results using the chi square test showed p value of 0.686 (> 0.05) so that Ho was accepted, which means there was no relationship between maternal age during pregnancy and infant death in Tanah Laut District in 2017. The results of this study were in line with research conducted by Kusumawardani and Handayani (2018) which showed the result that maternal age was not significantly related to infant mortality (p value = 0.760). In Kusumawardani and Handayani's research it was found that as many as 59.6% of infant deaths occur in mothers of relatively low age.

Based on table 2. shows that the incidence of infant mortality is more common in the group of respondents with a history of parity that is not at risk, as many as 27 people (55.1%) compared to parity who are at risk but experienced infant mortality. Conversely, in the group that did not experienced infant mortality, respondents with risk parity were 25 people (51%) more than respondents with parity not at risk but did not experienced infant death. Statistical test results using the chi square test obtained p value of 0.686 (> 0.05) so that H_0 was accepted which means there is no relationship between the number of parity with infant mortality in Tanah Laut District in 2017. This is in line with research conducted by Batubara and Fitriani (2019) which shows that parity is not related to infant mortality from 0-28 days (p value = 0.362). Based on the results of the study of Batubara and Fitriani (2019) showed that of 19 primiparous people, who experienced infant deaths as many as 12 people (20%), of 35 people who were multiparous who experienced infant deaths as many as 15 people (25%). And of 6 people with multiparous grande who experienced 0-28 day infant death as many as 3 people (5%).

Based on table 2. shows that the incidence of infant mortality is more common in the group of respondents whose family income is below the UMR (minimum average wage) ($< \text{Rp. } 2,258,000$), as many as 44 people (89.8%) compared to the group of respondents whose family income is above the UMR ($\geq \text{IDR } 2,258,000$) but experienced infant death. Otherwise, in the group that did not experienced infant mortality, respondents with family income that were above on the UMR ($\geq \text{IDR } 2,258,000$) were 41 people (83.7%) more than respondents with family income below the UMR ($< \text{IDR } 2,258,000$) but did not experience infant death. The results of Statistical test using the chi square test obtained p value 0.0001 (< 0.05) so that H_0 was rejected which means there is a relationship between family income with infant mortality in Tanah Laut District in 2017. The results of this study in line with research conducted by Aisyan (2011) which shows there is a significant relation between social-economic family with infant mortality (p = 0.0001). Family income is one of the important themes in family finances, because the amount of money income will influence the amount of money that will be income. Income are fixed salaries received every month. Income will depend entirely on the needs of people to meet the nutritional needs, healthy housing, clothing and other needs related to health care (Aisyan SDS, 2011).

Based on table 2. It appears that the incidence of infant mortality is more common in the group of respondents with an ANC visit frequency of $< 4x$ ie as many as 39 people (79.6%) compared to the group of respondents with an ANC visit frequency of $\geq 4x$ but experienced infant mortality. Otherwise, in the group that did not experienced infant mortality, respondent with ANC visits frequency of $\geq 4x$ as many as 43 people (87.8%) more than respondents with ANC visit frequency which was $< 4x$ but did not experienced infant mortality. Statistical test results using the chi square test obtained p value of 0.0001 (< 0.05) so that H_0 was rejected, which means there is a relationship between ANC visits with infant mortality in Tanah Laut District in 2017. The results of this study compare with research conducted by Meisuri (2018) which shows the ANC visit is a factor influencing perinatal mortality. The death of a baby that causes the baby's condition itself cannot be separated from the mother's condition during pregnancy, causing premature babies. The majority of maternal activity during pregnancy is hard work and the information obtained during antenatal care is unclear and incomplete.

Based on table 2. showed that the incidence of infant mortality was more common in the group of respondents with a high education level as many as 27 people (55.1%) compared to respondents with a low level of education but experienced infant mortality. Otherwise, in the group that did not experience infant mortality, respondents with low education levels were 26 people (53.1%) more than respondents with higher education levels but did not experience infant mortality. Statistical test results using the chi square test obtained p value of 0.544 (> 0.05) show that H_0 was accepted, which means there is no relationship between maternal education level and infant mortality in Tanah Laut District in 2017. This is in line with research conducted by Kusumawardani and Handayani (2018) which shows the results that maternal education is not significantly related to infant mortality (p value = 0.557). In Kusumawardani and Handayani's research it was found that as much as 95.7% of infant deaths occurred in mothers who had low education, as well as in the control group it was found that 97.9% of mothers were also classified as low education.

Based on table 2. showed that the incidence of infant mortality was more common in the group of respondents with a history of birth LBW babies, as many as 44 people (89.8%) compared to the group of respondents with a history of birth babies who were not LBW / normal but experienced infant mortality. Otherwise, in the group that did not experience infant mortality, respondents with a history of giving birth to babies who were not LBW / normal were as many as 42 people (85.7%) more than respondents with a history of giving birth to a LBW baby but did not experience infant death. Statistical test results using the chi square test obtained p value of 0.0001 (< 0.05) so that H_0 was rejected, which means there is a relationship between LBW incidence and infant mortality in Tanah Laut District in 2017. The results of this study are in line with research conducted by Widayanti and Wijayanti (2018) which shows that there is a relationship between low birth weight and infant mortality (p = 0.0001). The results of this study indicate that in infants the case group (infant mortality) tends to have more LBW as many as 52 infants (69.3%), while in the control group almost all experience LBW as many as 73 babies (97.3%).

Based on table 2. showed that the incidence of infant mortality was more common in the group of respondents with a history of giving birth to asphyxia babies, as many as 40 people (81.6%) compared to the group of respondents with a history of giving birth to babies who were not asphyxia but experienced infant mortality. Otherwise, in the group that did not experience infant death, respondents with a history of giving birth to babies who were not asphyxia were 39 people (79.6%) more than respondents with a history of giving birth to babies who were asphyxia but did not experience infant deaths. Statistical test results using the chi square test obtained p value 0.0001 (< 0.05) so that H_0 was rejected, which means there is a relationship between the incidence of asphyxia and infant mortality in Tanah Laut District in 2017. The results of this study are in line with research conducted by Azizah (2017) which shows that there is a relationship between asphyxia and neonatal death, that is, babies who experience asphyxia have a risk of experiencing neonatal death 8.8 times greater when compared to babies who did not experienced asphyxia with p = < 0.001 (OR = 8.8; 95 % CI = 2,4-32,4).

Asphyxia can cause the baby to experience a rapid decrease in heart rate, the body turns blue or pale, and reflexes weaken until it disappears. Asphyxia neonatorum is a major cause of

neonatal morbidity and mortality, in developed countries the incidence of asphyxia is found to be 0.3 - 0.9% of all live births, this incidence is higher in developing countries (Azizah, 2017).

Based on table 2. showed that the incidence of infant mortality was more common in the group of respondents with preterm / postterm gestational age as many as 28 people (57.1%) compared to respondents with term gestational age but experienced infant mortality. Otherwise, in the group that did not experience infant mortality, respondents with aterm gestational age were 30 people (61.2%) more than respondents with gestational age who were preterm / postterm but did not experience infant death. Statistical test results using the chi square test obtained p value 0.106 (> 0.05) so that H_0 was accepted, which means there is no relationship between gestational age (prematurity) with infant mortality in Tanah Laut District in 2017. Babies born prematurely risk 9 times experiencing death compared to babies born just months. Babies born to mothers who experience childbirth complications are 2.6 times more likely to die than babies born to mothers who do not experience childbirth complications. Babies born to mothers who did not contact health workers during pregnancy until delivery had a risk of 2.19 times death compared to babies born to mothers who contacted health workers during pregnancy and childbirth (Tarigan et al, 2017).

3. Multivariate Analysis

Multivariate analysis result of independent variable with infant mortality can be seen in table below :

Table 3. Multivariate Analysis

Variable	B	P Value	Exp (B)	95% Confidence Interval (CI)
Family Income	4,479	0,000	88,132	7,460-1041,201
LBW	5,187	0,000	179,266	11,101-2895,032
Asphyxia	3,970	0,002	52,966	4,369-642,141
Constanta	-6,633	0,000	0,001	

Based on table 3., it is obtained data that the multivariate test carried out proves that there are only 3 factors that are simultaneously related to infant mortality in Tanah Laut District in 2017. All three factors are family income with a value of $p = 0.0001$; LBW incidence with a p value of 0.0001 and the incidence of asphyxia with a p value of 0.002 . Based on the value of Exp (B), it can be seen that the historical factor of LBW incidence is the most influential factor for infant mortality in Tanah Laut District in 2017 (Exp. B = 179.266). LBW is the biggest contributor to infant mortality. The first month after delivery is a transition period for newborns with the most critical time is the first week after birth. So that special attention is needed and intensive care for newborns in this period.

The results of this study are in line with research conducted by Susanty and Agus (2018) which shows that LBW is the most influential factor as a cause of infant mortality in Padang City. The results of this study indicate a significant relationship between LBW infants and causes of infant death from 0-12 months, where $p = 0.004 < 0.05$. From the OR = 17,200 which means that mothers with LBW infants have 17 times the chance of experiencing infant death from 0-12 months compared to mothers who are not LBW. According to LBW researchers related to the

cause of infant death because babies with LBW are very vulnerable and have enormous potential to easily experience disorders, such as mental and physical disorders that interfere with growth and development. If not handled properly, there will be death.

IV. CONCLUSION

Study concluded that there were significant correlation between infant mortality in Tanah Laut District in 2017 with family income, ANC visits frequency, incidence of LBW and asphyxia. While respondent age, parity, mother's education level and gestational age do not have a significant relationship. Then, the most important factor with infant mortality in Tanah Laut District in 2017 was the LBW incidence.

This is needed to improve education among health workers, the government and the community so that activities run optimally and effectively. Doing home care (home visits) for mothers who do not conduct ANC checks, mothers who bear LBW babies and do not receive Posyandu. In addition, announcing pregnant women to improve prahamil nutritional status and conduct pregnancy checks (routinely) so that babies are not LBW. The coordinating midwife at each Puskesmas makes youth class activities to reduce pregnancy <37 weeks and poor nutritional status.

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