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The Influence of Maternal Age, Parity and Education on Infant Mortality in West Aceh Regency

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Abstract
One of the important indexes to reflect health status in a certain area is Infant Mortality Rate (IMR). IMR is also global soccioeconomic indicator in a population. Besides, The Statistical index indicates the quality of life, not only the quantity and number of death. It is the main health problem In Indonesia, There was 32 deaths per 1000 live births In Indonesia. The research was to analyze the influence of maternal age, parity, and education to infant mortality in West Aceh Regency. The research was quantitative with case control design, a case group was 45 mothers whose babies died when they were under one years old and a control group was 45 mothers whose babies were alive when they were under one year old. The maching was done on the babies based on their age and sex. The Data analyzed by using univariate and bivariate analysis with Mc Nemar test, meanwhile, multivariate analysis with conditional logistic regression test at the significant level of 0.25. The Result of analysis in this research showed that maternal age and parity significanly influence of infant mortality. In the otherhand, maternal education did not significanly influence of infant mortality. The most significanly variable which influence of infant mortality was maternal age (OR=4.745). To Prevent Infant mortality from the variabel maternal age and parity, it is suggested for women to get merried at the age ≥ 20 years old, increases reproductive health education for female teenagers at schools and increases the conerage of using KONTAP (long term contracepcion) for women that have more than four children. It is also suggest to provide adequate medical equipment to support the childbirth and increase the access of health facilities by optimizing village polycliclic and It is also suggested to provide adequate medical equipment to support childbirth, increase the convenience of health facilities, and increase the access to health facilities by optimizing village polyclinics and midwives performance.

Keywords
Infant mortality; maternal age; maternal parity; maternal education

Introduction

Infant mortality is a live born babies dies under one years old. Infant mortality rate (IMR) was measured based on the number of infants death in one year per 1000 live births. IMR is an important index that reflect the health status in a certain area, regency even in a country. It is

also a accepted global indicator of socioeconomic level in a population. This statistical index not only reflect the quantity or the number of death, but also showed the quality of life. That is the reason why UNICEF maintains the infant mortality rate is the one of the most exspres concept. Globally, almost 5 million of child mortality occurs in the first year of life. The highest IMR happened in Africa (63 deaths per 1000 live births), which was six times higher from European regions (10 death per 1000 live births). Meanwhile, the global IMR was 35 death per 1000 live births (WHO 2012). According to Save The Children Report with the title "Ending Newborn Death", it describes that IMR is different in several country. Approximately, 5.9 deaths per 1000 live births happen in European regions and it happens 4 to 5 times higher in Asia and Africa (Wright et al. 2014).

The data from SDKI (Indonesia Demographic and Health Survey) in 2012 showed that the IMR occurring in the previous five years (2008-2012) was 32 deaths per 1000 live births. It describes that the IMR decreased half from 68 deaths per 1.000 live births in 1987-1991 to 32 deaths per 1.000 live births in 2008-2012 (SDKI 2012).

The similar studies in Indonesia and other countries indicate that the factors such as maternal age, birth weight, breastfeeding, type of delivery, place of delivery and interval from previous delivery can influence the possibility of infant mortality.

The research conducted by Wandira (2012) entitled "The Factors that Cause Infant Death in Sidoarjo Regency" states that the demographic characteristics of the mother (maternal age during pregnancy, parity, and interval of pregnancy) and maternal conditions (risk of health status, nutritional status and unexpected pregnancy) influence positively for infant mortality.

The IMR in Aceh Province is one of the highest in Indonesia. It is 47 deaths per 1000 live births (SDKI 2012). According to early survey in health department of West Aceh region, there were 90 cases of infant mortality in 2015 from 4.285 live births or 21 deaths per 1.000 live births. The rate was higher compared to 2014 which was 66 cases of 3.473 live births or 19 per 1.000 live births in 2014.

Method

The research was to analyze the influence of maternal age, parity, and education to infant mortality in West Aceh Regency. The research was quantitative with case control design that includes 90 respondents, a case group was 45 mothers whose babies died when they were under one year old and a control group was 45 mothers whose babies were alive when they were under one year old. The maching was done on the babies based on their age and sex. The Data analyzed by using univariate and bivariate analysis with McNemar test, meanwhile, multivariate analysis with conditional logistic regression test at the significant level of 0.25. The sampling method used in this study was purposive sampling. The dependent variable was infant mortality and the independent variables were maternal age, parity and education. The data were collected through questionnaires, the information from respondent and their family and infant mortality records in health department of West Aceh.

Results

Table 1. Frequency Distribution of Infants Mortality in Case and Control Based on Babies Age and Sex

Variable	Control Group (45)			
	E+		E-	
	n	%	n	%

	Age				
	Risky (E+)	5	11,1	20	44,4
	Not risky (E-)	6	13,3	14	31,1
C	**Parity**				
a	Risky (E+)	10	22,2	20	44,4
s	Not risky (E-)	8	17,8	7	15,6
e	**Education**				
s	Risky (E+)	8	17,8	17	37,8
(45)	Not risky (E-)	6	13,3	14	31,1

Table 2. Frequency of maternal age, parity and education variables in control and case and estimation Odds Ratio

	Variable	**Control Group**				**p**	**OR**	**95%CI**
		E+		**E-**				
		n	**%**	**n**	**%**			
	Age							
C	Risky (E+)	5	11,1	20	44,4	0,009*	3,333	1,291-10,143
a	Not risky (E-)	6	13,3	14	31,1			
s	**Parity**							
e	Risky (E+)	10	22,2	20	44,4	0,035*	2,5	1,054-6,562
s	Not risky (E-)	8	17,8	7	15,6			
(45)	**Education**							
	Risky (E+)	8	17,8	17	37,8	0,034*	2,833	1,065-8,776
	Not risky (E-)	6	13,3	14	31,1			

Table 3. Variable selection that includes in the model of Conditional Logistic Regression

No.	**Variable**	***p value***	**Constant Value**	**Model**
1.	Age	0,009	p < 0,25	Included in Model
2.	Parity	0,035	p < 0,25	Included in Model
3.	Education	0,034	p < 0,25	Included in Model

Table 4. Multivariate Analysis with Conditional Logistic Regression

Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
	OR(95%CI)				
Age	3,104 (1,090-8,842)	3,345 (1,186-9-428)	3,723 (1,348-10,280)	3,983 (1,458-10,882)	4,745 (1,775-12,686)
Parity	3,169 (1,159-8,663)	3,198 (1,173-8,719)	3,368 (1,249-9,078)	3,679 (1,382-9,788)	3,577 (1,369-9,347)

Education	1,823 (0,666-4,991)	1,723 (0,638-4,651)	-	-	-

Discussion

Maternal Age

The bivariate analysis results obtained p value = 0.009 (<0.05) which indicated that maternal age significantly influenced infant mortality with OR = 3.333 (95% CI 1,291-10,143). Furthermore, the results of multivariate analysis also showed the same thing that maternal age significantly affected the infant mortality in West Aceh Regency with OR = 4,745 (95% CI 1,775-12,686). Thus, it was concluded that the mothers of <20 or> 35 years old had 4,745 times more risk to losing their babies compared to the mothers outside that age group.

The results of this study were in line with the research of Indrahayani (2014) which states that 34.3% of infant mortality occurred in mothers aged <20 and> 35 years. Based on the OR test results, the babies born to the mothers with age of <20 and> 35 years old have 3.536 times more chance of experiencing infant mortality than babies born to mothers aged 20-35 years (OR = 3.536, 95% CI 1.502 -8,326).

Maternal age is one of the factors that influence infant mortality. The age range of 20-35 years old is the safest period for childbirth. This is caused by the fact that mothers who give birth under the age of 20 years old have not developed their reproductive organs optimally. From a medical perspective, they would often get some health problems such as complications of pregnancy, including premature delivery and fetal growth in the uterus that is not perfect. While the mothers who have their pregnancy at the age of more than 35 years old, they also have a problem related to reproductive organs due to aging such as the reduce of elasticity of the pelvic muscles. That condition could affect the delivery process, deteriorate the function of blood circulation to the fetus which eventually will cause mothers to give birth to babies with low weight which causes higher risk of dying.

The result of this study is also supported by Danoso (2014) that reports that the mothers at 20 to 35 years old had the lowest risk of experiencing infant mortality. Meanwhile the risk of infant mortality risk was twice higher when mother gives birth at the age of 45 to 49 years old. It is recommended that the best age for childbirth is 20 to 29 years old.

Furthermore, Mulyanawati (2015) states that the age of less than 20 years old is a transition from the childhood to the adulthood. Thus, this is more striking with the functioning of the reproductive organs such as the ovary. The ovaries begin to function under the influence of the gonadotropin hormone so that if a pregnancy occurs in adolescence, the organs in the body experience competition for a very important substance between the fetus and the mother. The mothers in this age are still in a growth stage that requires more nutrient intake than adult women. Meanwhile, the age above 35 years old is the first time for a woman experiencing a decline in the function of reproductive organs. Maternal pregnancy at the age of > 35 years old is at risk of infant mortality because the function of the female reproductive organs is reduced so that the fetus can develop imperfectly. The risk of infant mortality also occurs due to the mothers with comorbidities such as degenerative diseases, anemia, tumors, and whatnot that can causes complications during childbirth.

Another study by Kozuki (2013) states that the traditional cultures in developing countries, such as marriage at the young age, is one of the causes of infant mortality. The mothers that have their first birth at the young age <18 years old will impact infant's health and it can cause infant mortality. It is recommended to delay the time to get pregnant and give birth until the right time so that the mortality of the babies can be avoided.

In this study, the maternal age was the most influencing variable on infant mortality in West Aceh regency. For this reason, it is necessary to prevent mothers from giving birth at their risky age. Prevention efforts that can be done by improving reproductive health education for young women through counseling in schools or counseling in the mothers' family (husband, mother in law etc.), so that women can avoid getting married too young and are suggested to get married at the age of ⩾ 20 years old. Mothers are required to have qualified pregnancy checks regularly to avoid complications of pregnancy if they are at a risky age group (<20 years or> 35 years old).

Parity

Parity is the number of children born to a mother whether death or alive. A mother who often gives birth has a risk of experiencing infant mortality. In this study, the results of bivariate and multivariate analyzes concluded that parity significantly affected infant mortality. Multivariate analysis showed the OR= 3.577 (95% CI 1.369-9.334), which indicated that the mothers who have parity> 4 had 3.577 times higher tendency to have baby death than the mothers with parity <4.

The results of this study are in line with the results of Indrahayani's study (2012) which states that parity has a significant effect on infant mortality. In her study, the obtained OR value was 3.111, which indicated that the mothers with insecure parity (> 3) will have 3.111 times chance of experiencing infant mortality.

This result is also supported by the results of research by Amelia M et al (2014) which states that the parity variable significantly influences infant mortality. Mothers with insecure parity (> 4) have 3.727 times higher risk of experiencing infant death compared to mothers with safe parity (⩽4). Mothers who often give birth have risks for their health and also their children's health. Delivery > 4 times can cause damage to blood vessels in the uterine wall which affects the circulation of nutrients to the fetus. The mothers with high parity will affect subsequent pregnancies.

The same thing was found in Sugiharto's study (2010), which states that there was a significant difference between parity <4 than > 4 on infant mortality. The mothers with parity > 4 had a higher risk of having infant mortality. This is related to the uterus condition that changes gradually after giving birth for many times.

The high number of infant mortality that is caused by mothers parity, is generally followed with the condition that the couple do not use appropriate contraception. Based on the profile data from health department of West Aceh Regency in 2014, it was found that the type of contraception that was used by participants were injecting (51.6%) and pills (24.6%). It also indicated that the users of long term contraception was low.

One of the efforts to overcome the high parity in the mothers is to increase the use of long term contraception, especially for women aged > 35 years old and who have more than 4 children. Long term contraception or often called sterilization is a method of permanent contraception

performed on a woman's fallopian tubes (tubectomy) or the male canal (vasectomy) so that it can obstruct the meeting of the ovum and the sperm and it can prevent pregnancy. Long term contraception is generally permanent although there are also a number of techniques that allow recanalization of the fallopian tubes and vas deferens. The success rate of this type of contraception is quite high and the failure is low. Thus, the contingency is the right solution to overcome high parity.

Unfortunately, the condition of West Aceh Regency which is an area that implements Islamic law makes people consider the use of Kontap (MANTAP contraception) is against the religious teachings so that people are reluctant to use Kontap. The effort that can be done is to advocate local governments in order to create a policy related to gain high coverage of long term contraception. Another effort is to socialize Kontap program by involving community leaders and religious leaders. By involving community leaders and religious leaders, it is expected that the community will be more confident and will not hesitate to use Kontap.

Maternal Education

Place figures and tables at the top and bottom of columns. The bivariate analysis results obtained p value of 0.034 (<0.05) which indicated that education significantly influenced infant mortality. With OR = 2.8 (95% CI 0.065-8.776), it indicated that the mothers whose education were under high school has 2.8 times higher of tendency of having infant mortality compared to those whose education were over high school. But after being analyzed in a multivariate, the education did not influence infant mortality.

Education means guidance given by someone to others on something so they can understand. The higher mothers education is, the easier she receives information and ultimately the more knowledge she has. Conversely, if the mother has a low education, it will obstruct her from receiving information and new values regarding infant mortality. The mothers that have enough knowledge should be better at getting the information needed, so they can choose and determine the best alternative that benefit her family. The people who have higher education also will act more rationally.

The level of the latest education taken by the mothers should have an impact on the quality of health and survival of the baby. This is related to the choices of the mothers in providing health care efforts for their babies. The mother's education is the main social determinant of child health problems. Maternal education should be one of the focus in health promotion and thus will affect in the decreasing of infant mortality rates. However, in this study there were no significant differences between case and control group related to the level of mothers' education. Infant mortality occured in both mothers who have lower education (<SMA) and higher education (> SMA). Thus, it can be concluded that education does not affect infant mortality in Aceh Barat regency. The infant mortality in this study was more related to mother's risky age during their childbirth (20 or > 35 years) and high parity (> 4 children) of the mothers.

The results of this study are in line with Nursania's (2014) research on determinants of infant mortality in Indonesia by analyzing the 2012 IDHS data and obtaining the results that the mothers education had no significant effect on the infant mortality.

Conclusion

Based on the results and the discussion in the previous chapter, it is concluded that:
The results of bivariate analysis showed that the variables that had a significant influence on infant mortality in West Aceh Regency were the maternal age and parity. Maternal education did not influence infant mortality in Aceh Barat regency. Either the mothers have lower education or higher (<high school) or higher education (> high school), they both experience infant mortality. Thus, it can be concluded that education does not affect infant mortality in West Aceh Regency. The infant mortality in this study is more related to the unsafe age of the mother during childbirth (20 or> 35 years) and high maternal parity (> 4 children).

There are a number of suggestions provided from this research: There should be an improvement in the quality of health services, especially midwifery services in health facilities, provision of adequate medical equipment to support childbirth and increase of the comfortable health facilities environment. It is suggested to optimize the function of village clinic (Polindes) and the midwife performance to avoid the high rate of childbirth at home. This study requires further research with a cohort study design, it is recommended to focus more on researching the maternal age because the maternal age is the variable that most influences on infant mortality in West Aceh Regency.

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Author Contribution and Competing Interest

All of the authors contributed in collecting and analyzing the data, including preparing the manuscript. There was no competing interest related to the conduct of this study.

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