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Original Article

Death of Neonates Aged 0-28 days in Pangkep Regency

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Abstract
Background: Nation. Neonatal mortality is an indicator to assess the degree of public health. This study was conducted toanalyze the risk factors for neonatal death aged 0-28 days in Pangkep Regency in 2022.
Method: This Study is an observational study with a case control research design. The population in this study was mothers who had babies died 0-28 days and all mothers who had babies lived aged 0-28 days in Pangkep Regency. The sample number of case groups was 40 respondents and the sample number of control groups was 40 respondents with a total of 80 samples. The sampling technique in this study is a *non-probability* sampling method, namely *Purposive Sampling*.
Results: This study showed that significance values (1) mothers aged < 20 and > 35 years were 5.74 times more likely to experience neonatal death than mothers aged 20-35 years (CI95% = 5.74). (2) mothers with 1-time parity and 5 deliveries were 5.16 times more likely to have neonatal death than mothers with 2-4 deliveries (CI95%= 5.16) (3) mothers with a birth distance of < 1 year were 7.85 times more likely to have neonatal death than mothers with a birth distance of > 2 years (CI95%= 7.85) (4) access to health care was not at risk of neonatal death (CI95%= 0.81) (5) mothers with knowledge who were approximately 5.57 times more likely to experience neonatal death than mothers with good knowledge (CI95%= 5.57) (6) mothers with less than 4 times more than 5.57 times more risk of neonatal death than mothers with antenatal care examination≥ 4 times (CI95%= 52.76) (7) Antenatal care examination is the most risk factor for neonatal death with an Odd Ratio (EXP(B)) value of 12.767.
Suggestion: It is hoped that health workers together with the community will further improve pregnancy screening to prevent high mortality of neonates.

INTRODUCTION

Globally, 2.4 million children died in the first month of life in 2019. There are about 7,000 newborn deaths every day, which is 47% of all deaths of children under the age of 5, up from 40% in 1990. Globally, the number of neonatal deaths declined from 5.0 million in 1990 to 2.4 million in 2019. However, children face the greatest risk of death in their first 28 days (WHO, 2020). The highest Neonatal Mortality Rate (AKN) in Indonesia is in ASEAN countries. Based on the Indonesian Demographic and Health *Survey* (IDHS), in Indonesia now the Neonatal Mortality Rate (AKN) from

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35 per 1,000 live births IDHS 2002-03 decreased to 24 per 1,000 live births (Batubara &; Fitriani, 2019).

UNICEF (2015) revealed that the infant mortality rate in Indonesia is still high compared to other developing countries in Southeast Asia. Indonesia's infant mortality rate is below the global rate of 23 per 1000 live births. However, this rate is still higher when compared to neighboring countries such as Malaysia 6 per 1000 live births, Singapore 2 per 1000 live births, Thailand 11 per 1000 live births and Brunei Darussalam 9 per 1000 live births (UNICEF, 2015). The number of BBLR incidents in South Sulawesi Province in 2011 was 3,370 cases from 147,059 baby births increased in 2013 to 4,260 cases from 146,727 baby births (South Sulawesi Provincial Health Office, 2014). The most BBLR incidents occurred in the Makassar City area, namely there were 611 babies (Sulawesi Provincial Health Office, 2015). In Makassar City, the incidence of BBLR continued to increase throughout 2010 to 2014. In 2010 (0.21%), in 2011 (0.71%), in 2012 (1.96%), in 2013 (2.48%), and in 2014 (2.8%) every 100,000 live births (Makassar City Health Office, 2014). The incidence of low birth weight in Makassar City in 2015 was still high, as many as 1180 babies born under weight.

Based on data from the Pangkajene and Islands District Health Office in 2020, it was found that in the last five years AKB in Pangkajene and Islands Regency has decreased, in 2008 there were 22 deaths per 1000 live births (4.0) and in 2009 there was another decrease of 20 infant deaths per 1000 live births (3.5). In 2010 there was a decrease in the number of infant deaths of 12 babies per 1000 live births (2.07) and in 2011 there was another decrease in the number of infant deaths of 8 infants per 1000 KLH or 1.33 KLH. In 2012 the number of infant deaths increased to 17 babies per 1000 live births or 2.65 KLH. And in 2013 there was a decrease in the number of infant deaths, namely 5 babies per 1000 live births or 0.84 KLH. The neonatal period (the first 28 days of life) is a very vulnerable time for the survival of the child. Neonatal deaths are becoming increasingly important as the proportion of neonatal deaths has increased worldwide over the past 25 years and predominates the number of deaths of children under the age of five. In addition, the health interventions needed to address the leading causes of neonatal death are different from those needed to address the deaths of children under the age of five (UNICEF, 2015).

In the incidence of infant mortality 0-28 days, maternal age factors affect infant mortality, babies born to mothers aged <20 years and >35 years have a risk of death 7.69 times than babies born to mothers aged 20-35 years (Prabamurti et al., 2008). One of the causes of infant death is also caused by Asphyxia which is a condition that can be caused by several factors, namely maternal factors such as his disorders, antepartum hemorrhage. In addition, maternal age less than 20 years or more than 35 years, parity status namely giving birth to the first child (primipara) and giving birth to a fifth child or more (grande multipara), low socioeconomic, maternal vascular diseases that interfere with fetal gas exchange, such as hypertension, hypotension, uterine contraction disorders and others. Parity is one of the maternal factors that can cause asphyxia because at the time of giving birth to the first child (primipara) there is stiffness of the muscles or cervix that is stiff so that it provides much greater resistance while when giving birth to the fifth child or more (grande multipara) there is a deterioration in the elasticity of tissue that has been repeatedly stretched due to pregnancy, so that the resulting contractions will also be less.

These two conditions can prolong the labor process so that the flow of O^2 is reduced, so that it can cause babies born in a state of asphyxia. In addition, infant factors such as gestational age are considered to cause asphyxia because in preterm labor, the baby's organs have not matured, especially the baby's lungs have not worked optimally, surfactant is still lacking so that there is a possibility of the lungs experiencing developmental disorders, respiratory muscles are still weak so that premature babies' cries sound weak and whimpering as a result the baby can experience asphyxia, while in postmature

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labor there is a placental aging process then The supply of food and oxygen will decrease. Both conditions can cause fetal hypoxia and asphyxia at birth.

In addition, pregnancy distance also affects infant mortality, pregnancy distance of <2 years has a risk of 1.94 times the occurrence of death compared to infants with a pregnancy distance of ≥2 years (Batubara &; Fitriani, 2019). Reducing Maternal Mortality Rate (MMR) and Infant Mortality Rate (AKB) is a priority for health development as stated in Presidential Regulation Number 18 of 2020 concerning the National Medium-Term Development Plan for 2020-2024, so referring to this, the Pangkep Regency government makes reducing Infant Mortality Rate (AKB) one of the priority programs in the health sector. In order to accelerate the reduction in the Infant Mortality Rate, it is necessary to increase the role of hospitals so that in 2024 AKB is achieved at 16 per 1000 live births.

Based on preliminary data obtained from the Pangkep Regency Health Office in 2019, the infant mortality rate aged 0-28 days was 81 babies, the cases decreased in 2020 by 77 cases. In 2021, infant mortality cases increased again from the previous year, which was 86 cases. In Pangkep Regency, the number of neonatal infant deaths is still high. This is due to the large number of babies who experience neonatal aphyxia obtained due to maternal parity, the influence of birth spacing and also influenced by maternal age, besides that external factors of health services, access and distance to health care centers are also factors that influence the occurrence of neonatal infant mortality. Based on the description of the background above, it makes researchers interested in researching related to factors who are influential on thedeath of neonatus usia 0-28 hari di Pangkep Regency in 2022**.**

METHOD

This study is an observational study with a case control research design. This study is intended to analyze the risk factors for neonatal death aged 0-28 days in Pangkep Regency in 2022. This research will be carried out in Pangkep Regency with the time this research will be carried out for 1 month starting from June to July 2022.

Population is the overall object of research to be studied (Notoatmodjo, 2010). The population in this study was all mothers who had babies dying 0-28 days and all mothers who had babies living aged 0-28 days in Pangkep Regency. The sample size was 40 people.

The ratio of cases and controls is 1:1, thus a total sample of 80 people. After the number of samples is determined, sampling is carried out using the *Purposive random sampling* method. Cases were randomly selected for a total of 40 cases. Then the control was determined by selecting mothers who had babies living 0-28 days who were the same age and sex as the cases and lived close together as many as 40 cases.

The determination of case inclusion and exclusion criteria in this study is based on several things, including: Case Inclusion Criteria**;** infants who died at the age of 0-28 days in a single delivery and domiciled in Pangkep Regency, respondents were willing to be interviewed. Case exclusion criteria**;** BayI who died at the age of 0-28 days in double labor, the respondent moved his domicile from Pangkep Regency, the respondent was not willing to be interviewed.

The determination of inclusion and exclusion criteria Control in this study is based on several things, including: Control Inclusion criteria**;** control lives close to the case, control has the same age and sex of the baby as the case with a single delivery, respondents are willing to be interviewed. Control Exclusion Criteria**; r**espondent was not willing to be interviewed**, b**ayi born alive with multiple labors. The sample in this study consisted of: the case group was 40 mothers of infants 0-28 days who died in Pangkep Regency. The control group was 40 mothers of infants aged 0-28 days who were born alive in Pangkep Regency.

Primary data is data obtained through the results of direct research on the object under study. The data was obtained by questionnaires filled out by respondents and interviews. Univariate, bivariate and odds ratio analysis was conducted in this study using SPSS.

Research Variables

The age of the research subjects is the age of the mother when giving birth to the baby; At risk: If the age < 20 years and > 35 years; Not at Risk: If the age is 20-35 years (Latifah, 2012). Parity; The

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number of children ever born alive or dead. Objective Criteria: Risk: Primiparous, which is 1 childbirth and grandemultipara, which is 5 or more childbirth; Not at Risk: Multipara (2-4 childbirths) (Nurjayanti, 2018). The pregnancy gap is the period of time between the end of a previous pregnancy and subsequent pregnancies. Objective Criteria: Risky: if the pregnancy distance is ≤ 1 year, Not risky: if the pregnancy distance is ≥ 2 years (Hastuti, 2020). Access taken or passed by mothers from home to health services. objective criteria; Easy: If access to health services is by land and travel time ≤ 1 hour. Difficult: If access to health services must pass by sea (river, sea, lake) > 1 hour (Suraya et al., 2016). The mother's knowledge is everything that the mother knows about pregnancy. Objective Criteria: Good: When respondents' scores > 75-100% (9-13 questions are correct), Less: When respondents' scores < 56% (5 questions are correct) (Yusria, 2017). Pregnancy examination that aims to improve physical and mental health in pregnant women optimally, to be able to face childbirth, postpartum, etc. Objective Criteria: Good: Minimum 4 checks. Less: Examination under 4 times (Ministry of Health, 2018).

RESULTS

This research was conducted in Pangkep Regency. This study was conducted in June-July 2022. The data were analyzed through three stages of statistical analysis, namely univariate, bivariate, and multivariate analysis. In addition, data is processed and analyzed in accordance with research objectives and presented in the form of tables equipped with explanations.

Table 1. Distribution of Respondents Based on Research Variables in Pangkep Regency in 2022

Research Variables	Death of Neonates				Sum	
	Case		Control			
	n	%	n	%	n	%
Mother's Age						
Risky	24	60,0	9	22,5	33	41,2
No risk	16	40,0	31	77,5	47	58,8
Total	**40**	**100**	**40**	**100**	**80**	**100**
Parity						
Risky	25	62,5	9	22,5	34	42,5
No Risk	15	37,5	31	77,5	46	57,5
Total	**40**	**100**	**40**	**100**	**80**	**100**
Birth Distance						
Risky	25	62,5	7	17,5	34	42,5
No risk	15	37,5	33	82,5	46	57,5
Total	**40**	**100**	**40**	**100**	**80**	**100**
Access to healthcare						
Difficult	21	52,5	23	57,5	44	55,0
Easy	19	47,5	17	42,5	36	45,0
Total	**40**	**100**	**40**	**100**	**80**	**100**
Mother's Knowledge						
Less	5	12,5	1	2,5	6	7,5
Good	35	87,5	39	97,5	74	92,5
Total	**40**	**100**	**40**	**100**	**80**	**100**
Antenatal Care Examination						
Less	23	57,5	1	2,5	24	30,0
Good	17	42,5	39	97,5	56	70,0

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Research Variables	Death of Neonates				Sum	
	Case		Control			
	n	%	n	%	n	%
Total	**40**	**100**	**40**	**100**	**80**	**100**

Based on table 1 The distribution of respondents based on research variables, namely maternal age variability, it is known that the highest risk maternal age frequency in the case group is 24 respondents (60.0%) while those who are not at risk in the case group are 16 respondents (40.0%). The age category of mothers at risk in the control group was only 9 respondents (22.5%) and the highest frequency in the control group was the age category of mothers who were not at risk, which was 31 respondents (77.5%).

The distribution of respondents based on the Parity variable, it can be seen that the frequency of parity with the highest risk in the case group is 25 respondents (62.5%) while the group of cases with non-risk parity is 15 respondents (37.5%). As for the highest frequency control group, the parity that is not at risk is 31 respondents (77.5%) and those who are at risk are only 9 respondents (22.5%).

The distribution of respondents based on birth spacing, it can be seen that the frequency of birth spacing with the highest risk in the case group is 25 respondents (62.5%) while the case group with birth spacing that is not at risk is 15 respondents (37.5%). As for the highest frequency control group, namely the distance of births that are not at risk as many as 33 respondents (82.5%) and those at risk are only 7 respondents (17.5%).

The distribution of respondents based on access to health services, it can be seen that the frequency of access to health services that are difficult or take > 1 hour is highest in the case group, which is 21 respondents (52.5%) while the case group with easy access to health services is 19 respondents (47.5%). As for the control group, the highest frequency was also access to difficult health services, which was 23 respondents (57.5%) and respondents with easy access to health services, which was 17 respondents (42.5%).

The distribution of respondents based on maternal knowledge, it can be seen that the frequency of good maternal knowledge in the case group is as many as 35 respondents (87.5%). While the group of cases with less maternal knowledge was 5 respondents (12.5%). As for the control group, the frequency of good maternal knowledge was 39 respondents (97.5%) and maternal knowledge was less only 1 respondent (2.5%).

The distribution of respondents based on antenatal care examination, it can be seen that antenatal care examination is lacking with the death of neonates in the case group as many as 23 respondents (57.5%). While the group of cases with less antenatal care examination and no neonatal death was only 1 respondent (2.5%). As for the control group with good antenatal care examination and neonatal mortality was 17 respondents (42.5%) and good antenatal care examination and no neonatal death as many as 39 respondents (97.5%).

Table 2. Risk Factors for Neonatal Death Aged 0-28 Days in Pangkep Regency in 2022

Research Variables	Infant Death				Total		*Odds Ratio*
	Neonates		Not				
	n	%	n	%	n	%	
Mother's Age							

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Research Variables	Infant Death				Total		*Odds Ratio*
	Neonates		Not				
	n	%	n	%	n	%	
<20 and >35 years old	25	62,5	9	22,5	34	42,5	5,74
20-35 years	15	37,5	31	77,5	46	57,5	
Total	**40**	**100**	**40**	**100**	**80**	**100**	
Parity							
1 time or 5 times	24	60,0	9	22,5	33	41,3	5,16
2-4 times	16	40,0	31	77,5	47	58,8	
Total	**40**	**100**	**40**	**100**	**80**	**100**	
Birth Distance							
≤ 1 year	25	62,5	7	17,5	32	40,0	7,85
≥ 2 years	15	37,5	33	82,5	48	60,0	
Total	**40**	**100**	**40**	**100**	**80**	**100**	
Access to healthcare							
Difficult	21	52,5	23	57,5	44	55,0	0,81
Easy	19	47,5	17	42,5	36	45,0	
Total	**40**	**100**	**40**	**100**	**80**	**100**	
Mother's Knowledge							
Less	5	12,5	1	2,5	6	7,5	5,57
Good	35	87,5	39	97,5	74	92,5	
Total	**40**	**100**	**40**	**100**	**80**	**100**	
Antenatal Care Examination							
< 4 times	23	57,5	1	2,5	24	30,0	52,76
4 times	17	42,5	39	97,5	56	70,0	
Total	**40**	**100**	**40**	**100**	**80**	**100**	

Based on table 2, it is known that the risk factors for neonatal death aged 0-28 days in Pangkep Regency in 2022. The distribution of respondents based on the relationship between maternal age risk factors and neonatal death, it is known that as many as 25 respondents (62.5%) are maternal age at risk of neonatal death while as many as 9 respondents (22.5%) are maternal age at risk with no cases of neonatal death. As for respondents with maternal age who are not at risk with neonatal death as many as 15 respondents (37.5%) while maternal age that is not at risk with no cases of neonatal death as many as 31 respondents (77.5%).

Based on the *results of the odds* ratio, CI95% = 5.74 > 1, it can be seen that mothers aged < 20 and > 35 years are 5.74 times more likely to experience neonatal death than mothers aged 20-35 years. The distribution of respondents based on the parity factor with neonatal mortality, it is known that as many as 24 respondents (60.0%) are at risk parity with neonatal death while as many as 9 respondents (22.5%) are at risk parity with no neonatal death As for respondents with parity who are not at risk with neonatal death A total of 16 respondents (40.0%) while parity that was not at risk with no neonatal death cases was 31 respondents (77.5%).

Based on the *results of the odds ratio*, CI 95% = 5.16 > 1 it can be seen that mothers with parity 1 time and 5 times give birth are 5.16 times more likely to experience neonatal death than mothers with parity 2-4 times giving birth. The distribution of respondents based on birth distance factors with neonatal death, it is known that as many as 25 respondents (62.5%) are birth distances at risk with neonatal

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death while as many as 7 respondents (17.5%) are birth distances at risk with no neonatal death As for respondents with birth distances that are not at risk with neonatal death As many as 15 respondents (37.5%) while the distance of births that were not at risk with no neonatal death cases was 33 respondents (82.5%).

Based on the *results of the odds ratio*, CI95% = 7.85 > 1 can be seen that mothers with a birth distance of < 1 year are 7.85 times more likely to experience neonatal death than mothers with a birth distance of > 2 years. The distribution of respondents based on the relationship of access to health services with neonatal mortality is known as many as 21 respondents (52.5%) have access to difficult health services with neonatal mortality while as many as 23 respondents (57.5%) have access to difficult health services with no neonatal death As for respondents with easy access to health services with neonatal mortality as many as 19 respondents (47.5%) while access to health services is easy with no neonatal death cases as many as 17 respondents (42.5%).

Based on the *results of the odds ratio* obtained CI95% = 0.81 < 1, it can be seen that access to health services is not at risk of neonatal death. The distribution of respondents based on maternal knowledge factors with neonatal mortality, it is known that as many as 5 respondents (12.5%) are maternal knowledge that is lacking with neonatal death while only 1 respondent (2.5%) is maternal knowledge that is lacking in the absence of neonatal death. As for respondents with good maternal knowledge with neonatal mortality as many as 35 respondents (87.5%) while good maternal knowledge with no neonatal death cases as many as 39 respondents (97.5%).

Based on the *results of the odds ratio*, CI95% = 5.57 > 1 it can be seen that mothers with knowledge are approximately 5.57 times more likely to experience neonatal death than mothers with good knowledge. The distribution of respondents based on antenatal care examination factors with neonatal death, it is known that as many as 23 respondents (57.5%) are less antenatal care examination with neonatal death while only 1 respondent (2.5%) is less antenatal care examination with no neonatal death. As for respondents with good antenatal care examination with neonatal death as many as 17 respondents (42.5%) while good antenatal care examination with no neonatal death cases as many as 39 respondents (97.5%). Based on the results of the *odds ratio*, CI95% = 52.76 > 1 it can be seen that mothers with antenatal care examinations are less than 4 times more likely to have 5.57 times the risk of neonatal death than mothers with antenatal care examinations > 4 times.

Table 3. Results of Logistic Regression Test Analysis

	Independent Variables	B	S.E	Wald	Df	Sig.
Step 1[a]	Mother's Age	.709	.712	.992	1	.319
	Parity	.944	.695	1.842	1	.175
	Birth Distance	1.868	.709	6.940	1	.008
	Mother's Knowledge	-.685	1.500	.209	1	.648
	Antenatal Care Examination	3.835	1.123	11.667	1	.001
	Constant	-2.177	.550	15.691	1	.000
Step 2[a]	Mother's Age	.629	.688	.836	1	.361
	Parity	.978	.689	2.012	1	.156
	Birth Distance	1.781	.679	6.876	1	.009
	Antenatal Care Examination	3.816	1.126	11.497	1	.001

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	Independent Variables	B	S.E	Wald	Df	Sig.
	Constant	-2.158	.545	15.668	1	.000
Step 3[a]	Parity	1.127	.669	2.842	1	.092
	Birth Distance	1.856	.675	7.565	1	.006
	Antenatal Care Examination	3.989	1.116	12.767	1	.000
	Constant	-2.022	.510	15.729	1	.000

The variable included in the logistic regression test is an independent variable that has a value of $p < 0.25$ in bivariate analysis of the relationship related to the independent variable or the variable is substantially suspected of a close relationship. Then the variable was selected by looking at the p value where the variable selection results showed that the variables of maternal age, parity, birth distance, maternal knowledge, and antenatal care examination were positive and had a value of $p < 0.25$ so that they could be included in the logistic regression model. Meanwhile, the variable access to health services cannot be included in the logistic regression model because it is negative with a value of $p>0.25$ so it does not qualify.

Based on table 5.4 Results of Logistic Regression Test Analysis, the results of step 3 of variable selection using backward selection can be seen that the variables of pregnancy spacing and antenatal care examination have a p-value of less than $\alpha = 0.05$, then the decision is to reject H_0. Therefore, the following two variables, namely pregnancy spacing variables and antenatal care examinations, significantly affect neonatal mortality cases. Based on the multivariate analysis in the table "Variables in the equation", it can be known that the variable that has the most significant effect on neonatal mortality cases is the history of antenatal care examination, judging from the Sig. value of 0.000 ($p<0.05$) and the Odd Ratio (EXP(B)) value of 12.767. The equation obtained based on the model in stage 3 is y = -2.022 + 0.789 (sex) + 3.989 (antenatal care examination) + 1.856 (birth distance). The constant value and coefficient value for each of these variables can be seen in column B.

The value of the antenatal care examination coefficient is positive, meaning that antenatal care examination has a positive effect on neonatal death, where if the mother of the neonate performs the antenatal care examination is not good, the neonatal baby is 12,767 times more likely to die compared to neonates who often do antenatal care examinations. The value of the pregnancy spacing coefficient is positive, meaning that it has a positive effect on neonatal mortality, where if the pregnancy distance is "at risk (≤1 year)" then the baby is 7,565 times more likely to die compared to babies whose birth distance is >2 years. To see the quality of the equation obtained, it can be known by looking at the calibration values of the Hosmer test and Lameshow Test. The p value in the Hosmer and Lameshow Test in stage 3 was 0.996 ($p>0.05$), this value was higher than in other models. That is, the logistics model equation has good calibration.

DISCUSSION

Risk Factors for Maternal Age with Neonatal Death

Based on the results of in-depth interviews conducted by researchers in Pangkep Regency, it was found that the average age of mothers who experienced cases of neonatal death in their babies was a very risky age with a vulnerable < of 20 years and > 30 years. Most mothers who experience neonatal death cases are < 20 years old, this is because many respondents claim to marry at a very young age

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because of family demands and most people feel that it is common to do without knowing the impact caused by early marriage. The respondent also said that the occurrence of infant mortality was caused when the respondent gave birth the HB condition was so low that the baby could not be saved.

The results of this study are in line with research conducted by Siti Nurhaqiqi (2019) which showed that there were 135 mothers who experienced neonatal death in their last child. Bivariate analysis shows that mothers with at-risk age (35 years) (p-value = 0.000) can increase the risk of neonatal death, while multivariate analysis shows a relationship between maternal age and neonatal death (Nurhaqiqi, 2019).

This study is also in line with research conducted by Raharni, et al (2011) which found that it was seen from the age of the mother, it turned out that the age of the mother during childbirth at the age of 18-34 years was actually the most experienced neonatal death as much as 111 (8.8%), while among mothers aged 18-34 years who experienced neonatal as much as 14 (11.2%). The age of mothers at childbirth ≥ 35 years as many as 30 (88.2%) experienced early neonatal death, among the age of mothers at childbirth > or the same 35 years as many as 4 (11.8%) experienced neonatal death. So that maternal age is very at risk of neonatal death (Raharni et al., 2011).

In line with research conducted by Diah Utari (2012), it also states that maternal age variables have a significant influence on early neonatal death, the age of mothers at risk has a greater chance of experiencing early neonatal death by 14.4 times compared to the ideal maternal age (safe) to give birth (Utari, 2013)

The age of mothers who are safe to give birth is between the ages of 20 to 34 years because at this age the risk for maternal death and infant death is less than the age of < 20 years and > 35 years, while respondents in a study conducted in Pangkep Regency found that most of those who have cases of neonatal death in infants are mothers aged < 20 years so that neonatal death cases are quite high.

In the age range of 20-30 years is the best condition for pregnancy, the process of childbirth and the mother has the psychological to be ready to conceive and give birth. However, maternal age at the time of pregnancy and birth has an important role as a risk factor for neonatal death. Pregnancy that occurs in mothers with an age that is too young (< 20 years) has a higher risk for fetal failure to grow during pregnancy, fetal distress, and fetal death in the womb. In addition, the age of the mother who is too advanced also increases the risk of fetal malformations both due to chromosomal abnormalities and not.

Age is one of the factors that can describe a person's maturity both physically, psychologically and socially. The older a person gets, the more knowledge gained. Under the age of <20 years, the uterus and pelvis often have not grown to adult size. As a result, pregnant women at that age may experience long/stalled labor or other disorders due to the mother's unreadiness to accept duties and responsibilities as parents, mothers are recommended to get pregnant at the age between 20-35 years. At this age the mother is better prepared physically and psychologically. At the age of 35 years or more, maternal health has declined, as a result pregnant women at that age have children with disabilities, long labor and bleeding (Ministry of Health RI, 2011).

Risk Factors for Parity with Neonatal Death

Based on the results of the interviews obtained, it is known that respondents do not have problems after giving birth, but most respondents stated that they had given birth 1 time to > 5 times (primipara) compared to respondents who gave birth 2-4 times (Multipara). This makes respondent parity very at risk of neonatal death.

Some respondents also stated that they had experienced a miscarriage with a percentage of miscarriage > 2 times as much as 22.5, and as many as 45.0% of respondents experienced a history of pregnancy that ended in miscarriage. This study is in line with research conducted by Nooorhalimah

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(2015) which states that most neonatal deaths (62.5%) are parity at risk for conceiving i.e. parity 1 and parity more than 5. (Noorhalimah, 2015)

The results of this study are also in line with the results of a study conducted by Efriza in 2007 where babies born to mothers with risk parity (1 and > 5) had a risk of early neonatal death 1.89 times greater than babies born to mothers with parity 2 – 4. (Efriza, 2007). Research by Renaldi, et al (2018) also found that parity is related to death status. The positive relationship with mortality status makes the higher the parity value or the more children born will make the risk of mothers giving birth to dead babies increase. Parity as a variable that has the strongest relationship with infant mortality (Kurniawan &; Melaniani, 2019).

This research is also in line with research conducted by Batubara (2019) which states the value of OR (CI95%=1.581) which means Parity is a risk factor for infant mortality 0-28 days and Parity is 1 times greater risk of infant mortality 0-28 days (Coal & Fitriani, 2019). The results of this study are not in line with research conducted by Isnaeni, Rofiqoch et al (2016) which found that there is no high risk between parity and neonatal death, seen from the value of p = 0.772 (p > 0.05). The absence of a relationship between parity and neonatal mortality in the working area of the Banjarnegara Regency health center is possible because mothers who give birth occur mostly in parity 2-3 and the age of most mothers at the age of 20-34 years (Rofiqoch et al., 2016).

According to the Mosby Pocket Dictionary (Medicine, Nursing and Health), parity is a classification of women based on the number of live and stillborn babies born at more than 20 weeks' gestation. During pregnancy, the mother's uterus is stretched by the presence of the fetus. If you give birth too often, the uterus will get weaker. If the mother has given birth to 3 or more children, it is necessary to be aware of disturbances during pregnancy, childbirth and postpartum (Ministry of Health RI, 2011).

The risk of early neonatal death is large in infants born to mothers with parity 1 due to pelvic tissue stiffness and knowledge of pregnancy and childbirth care is low while neonatal death in mothers with parity > 5 years has not recovered reproductive organs in accepting pregnancy, if the number of parity is small then the uterine muscles are still strong, straining strength has not decreased, The incidence of childbirth complications and old partus that can endanger the mother and baby will be smaller.

Too much parity can be the cause of problems, especially related to health. The occurrence of pregnancy accompanied by continuous labor results in the erosion of blood vessels in the uterine wall accompanied by the loss of tissue elasticity due to stretching during pregnancy to childbirth. Damage to body tissues allows abnormalities in the mother's womb to arise which will greatly affect the condition of the location of the fetus or placenta in the mother which can interfere with fetal growth. Disruption of fetal growth in the mother's womb makes the mother give birth to an unhealthy baby.

Risk Factors for Birth Spacing with Neonatal Death

Based on in-depth interviews conducted by researchers in Pangkep Regency, some respondents in the case group have a birth distance of < 1 year , and have an average birth distance of < 1 year so it is known that a birth distance of ≤ 1 year is a distance that is very risky for neonatal death. This study is in line with research conducted by Widyastuti (2013) which obtained results, namely the risk and meaningful relationship between short birth distances < 24 months with early neonatal death seen from the value of OR = 5.16 (95% CI = 2.84-9.46); p-value = 0.001. This study is also in line with research conducted by Renaldi (2018) which states that the pregnancy spacing variable results in that significantly the pregnancy distance ≤ 4 years and the pregnancy distance of > 4 years is related to infant mortality status. The chances of the mother giving birth to a baby who experienced death rose 16.94 times, if the pregnancy gap ≤ 4 years and rose 3.94 times, if the pregnancy gap > 4 years.

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Noorhalimah (2015) also states that children born with close birth distances will suffer from dwarfism or underweight, even have an impact on death in newborns. Thus children who have an ideal birth distance have better and higher survival. The results of the study are also in line with research conducted by Batubara (2019) with an OR value (CI95%=1.553) which means that Pregnancy Distance is a risk factor for infant mortality 0-28 days and the distance between the First Child's pregnancy is at 1 times greater risk of infant mortality 0-28 days.

A pregnancy gap of < 2 years means that the mother's body has not returned to its normal state due to previous pregnancies, pregnancy in this state needs to be watched out for because of the possibility of poor fetal growth, experiencing long labor or bleeding, otherwise if the pregnancy gap is > 5 years, in addition to the mother's increasing age also results in labor taking place like pregnancy and first delivery. If such a pregnancy has already occurred, the mother needs to check her pregnancy more often and ask for labor help to the midwife / doctor so that if danger signs are found that can occur at any time and unexpectedly can be overcome immediately. Pregnant women who are separated from the smallest child less than 2 years, physical health and the mother's uterus still need enough rest. There is a possibility that the mother is still breastfeeding, besides that the child still needs the care and attention of his parents. The danger that can occur is that the baby lace birth weight <2500 grams.22 The short pregnancy distance reduces the mother's nutritional reserves so that it will lose fetal weight.

Factors in Access to Health Care with Neonatal Death

Based on in-depth interviews conducted by researchers on respondents, it was found that most respondents had access to health services by land. Respondents with a control group who had access to health services > 1 hour compared to the case group. So that this is not a risk factor for infant mortality because the control group also has difficult access to health services.

The distance of access to health services according to respondents is also caused by respondents using public transportation more than private transportation, besides that there are some respondents who have to pass the river route before reaching health facilities. The results of this study are in line with research conducted by Tarigan (2017) which states that there is no difference in the percentage of infant mortality in families with access to easy and difficult health services, each 3.3 percent, and statistically there is no proven relationship between access to health services and infant mortality.

This study is also in line with research conducted by Andriani (2021) which found that there is no relationship between distance to health care facilities and maternal mortality cases as evidenced by the results of the significance correlation test of 0.2210 or > 0.05 and 0.4032 or > 0.05. The results of this study are not in line with research conducted by Budiati (2016) which states that having a place to live that must travel > 5 km from health facilities has a twofold higher risk of neonatal death (OR 2.1). The reasons why the high NMR (Neonatal Mortality Rate) observed in this study are weak healthcare system, inaccessible and inadequate geographical health facilities, proportion of women who give birth in health facilities having to travel >5 km from the nearest health facility by 56%,

This is also contrary to the research of Gizaw et al (2014) which states that the distance to health facilities > 5 km in a multivariate analysis is 1.5 times more at risk of premature neonatal death. Long distances are also affected by road conditions that must be passed. Steep road conditions and trails affect the travel time needed to get to the place of service. It is not possible even though the distance to the place of service is easy if the road conditions are steep then it can cause mothers also have difficulties in the way to health services. Conversely, if access to services is difficult or far away but the road conditions are not steep, then the mother has no difficulty in traveling to health facilities.

In addition to road conditions, the availability of public transportation is also very influential on the utilization of health services. Because respondents prefer to use public transportation to reduce

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their difficulties in finding parking spaces or respondents who cannot bring their own vehicles, so the only means that can be used is to use public transportation. Access to health services is also not the highest risk of infant death, because infant mortality is more at risk of good health services by local health workers if the mother has reached the intended hospital or puskesmas, quickly and precisely the service of health workers makes the health and safety of mothers and babies can also be guaranteed.

Risk Factors of Maternal Knowledge with Neonatal Death

The results of in-depth interviews conducted by researchers with respondents found that, most of the respondents from the control group to the case group had good knowledge about pregnancy. Some respondents admitted that they know a lot about neonatal pregnancy and death so that sometimes they have applied what is known in everyday life. But this did not create a lack of neonatal incidence in case group respondents.

This is assumed by researchers because respondents only focus on paying attention to things that will be done in the process of childbirth without paying attention to more intake and health during pregnancy so that many of the respondents experience difficulties during labor. There were even respondents to the case group who said that at the time of childbirth respondents had difficulties because the baby was too long at the door so it was difficult to get out. Thisstudy is in line with research conducted by Rahma (2012) which obtained a percentage of less knowledge in the case group (30.0%) greater than the control group (12.9%). The results of the Odds Ratio test conducted in this study on the knowledge of mothers with premature neonatal death at the confidence level CI = 95% with lower limit (LL) = 1.221 and upper limit (UL) = 6.910 (1.221<OR<6.910), then obtained an OR of 2.905. Because the lower limit and upper limit values do not include a value of one, Ho is rejected, so the OR value of 2.905 is considered meaningful between maternal knowledge and premature neonatal death. Thus maternal knowledge is a risk factor for early neonatal death.

This research is also in line with research conducted by Mahmuda (2011) which states that the group of cases with low knowledge is 40.4%, the value is higher than the control group which is 14.9%. The percentage in the high-knowledge case group was 59.6%, this value was lower than the percentage in the control group which was 85.1%. The odd ratio (OR) obtained in this study was 3.878, which means that respondents who have low knowledge have a 3.878 times greater risk of perinatal death than mothers who have good knowledge. A person's actions can be influenced by knowledge and skills. Knowledge is an indicator of a person in carrying out actions. If a person is based on good knowledge of health, then that person will understand the importance of maintaining health and motivate to be applied in his life.

Knowledge is the dominant of a behavior so that a person without knowledge has no basis in making decisions and determining actions that must be taken on various problems. So that maternal knowledge is less influential on infant mortality. This is because the factor of insufficient level of knowledge will cause low knowledge of mothers during pregnancy so that mothers do not know the importance of pregnancy checks. Therefore, knowledge is needed to improve one's intellect which can affect insight, way of thinking, both in making decisions and policies. Low levels of maternal education can lead to a lack of maternal knowledge about health, including the importance of prenatal checks. One factor that gives a lot of knowledge to humans is education, both formal and non-formal education.

Risk Factors for Antenatal Care Screening with Neonatal Death

Based on the results of in-depth interviews conducted by researchers, it was found that respondents already knew that antenatal care examinations are very important for the baby's health during pregnancy. But some respondents admitted that they did not do routine antenatal care checks at

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midwives or obstetricians, in addition to the costs incurred slightly higher, respondents also felt more often checking pregnancy only if there were complaints.

Most respondents in the first trimester to the third trimester never checked their pregnancy more than 1 time, they admitted that antenatal care checks were not routine every month because of time constraints that did not allow them to use to go to health services, besides that some respondents felt there were no abnormalities they experienced during pregnancy so they did not need to go to health services to do examinations.

The lack of knowledge of respondents in Pangkep Regency regarding antenatal care examinations that must be carried out at least 4 times makes the death of neonates in infants high because mothers feel that they have no complications or danger signs during pregnancy so that the possibility of infant death is very small. This makes the lack of mothers who routinely check pregnancy at health workers. The results of this study are in line with research conducted by Marti (2016) which states that there is an increased risk of neonatal death in those who are not ANC compared to those who are ANC but do not meet the standard.

This study is also in line with research conducted by Neupane and Nwaru (2014) which found that children whose mothers did not make antenatal visits increased the risk of neonatal death 2.03 times (95%: 1.28-3.23) compared to those who had antenatal visits ≥3 times. The results of this study are also in line with research conducted by Desy (2013) which showed a significant relationship between antenatal services and neonatal mortality after controlling for maternal age variables and pregnancy history. Infants born to mothers with incomplete antenatal care were 16.32 times more likely to have neonatal death than infants to mothers with complete antenatal care, at intervals of 7.30 to 36.45 times.

This study is also in line with research conducted by Abdullah, et al (2012) which found that pregnant women who checked pregnancy less than 4 times the risk of neonatal death 7.3 times greater than pregnant women who checked their pregnancy more than 4 times. Another study in Banyumas Regency found that babies born to mothers who received inadequate ANC services had a 5.6 times greater risk of perinatal death than mothers who received adequate ANC services.

The results of this study are not in line with research conducted by Haksari and Sarjono in 2001 which stated that there was no risk of neonatal death from less than 4 pregnancy check-up visits and research conducted by Sambolon in 2006 where the completeness of the components of pregnancy examination did not seem to be significantly related to the survival of the baby, even though contact with health workers should be able to reduce the risk of infant death due to Can detect early pregnancy complications and refer them to a more complete health facility.

The results of this study are also contrary to research conducted by Izza, et al (2016) which states that the increase in the incidence of death in the early neonatal period is not significantly related to access to health services (ORadjusted = 0.42; 95% CI (0.11 – 1.64). However, through appropriate ANC visits and improved health services during childbirth, early neonatal deaths can be avoided.

The recommended frequency of visits during pregnancy is 1 time in the 1st trimester, 1 time in the 2nd trimester and 2 times in the 3rd trimester. A quality ANC visit is if the pregnant woman has a pregnancy check at least 4 times during pregnancy. The results showed that there are still quite high pregnant women who do not make visits in accordance with the advice of health workers so that pregnant women do not get important information related to their pregnancy and even worse if there are pregnancy complications that should be diagnosed earlier in the prenatal period but because of the influence of less frequency of visits during pregnancy causes mothers not to get information or pregnancy checks.

Problems that often occur in pregnancy are pregnancy complications. This situation can be known early by doing a pregnancy check at least 4 times, namely 1 time in the first trimester, 1 time in the second trimester and 2 times in the third trimester. The service time standard is recommended to

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ensure protection for pregnant women and / or fetuses in the form of early detection of risk factors, prevention, and early treatment of pregnancy complications.

Most Dominant Risk Factors for Neonatal Death

The results of this study are in line with research conducted by Alifariqi (2019) which found that the incidence of neonatal death in the case group was more in people who had a history of risky antenatal care (frequency < 4 times) as many as 25 people (69.4%). Then in the control group more were less at risk (frequency ≥ 4 times) as many as 44 people (61.1%), OR = 3.6 (CI95%; 1.522-8.380). This means that antenatal care history < 4 times the risk of causing neonatal death by 3.6 times compared to antenatal care history ≥ 4 times.

The results of this study are also in line with research conducted by Dina et al (2015) which states that Based on the OR value above, it can be concluded that: mothers with age groups during childbirth are at risk (< 20 years or > 35 years), antenatal care is not met at 4.3 times risk of giving birth to children who will die in the early neonatal period compared to mothers with antenatal care examination is met after controlling for gestational age variables and complications Labor.

Research conducted by Noviani (2011) also states that the frequency of pregnancy checks in pregnant women less than 4 times has a 1.47 times chance of experiencing neonatal mortality in their babies compared to mothers who visit ANC > 4 times during pregnancy. The purpose of routine examination of pregnant women is to prepare physically and mentally for mothers and children as optimally as possible, childbirth and postpartum so that healthy children and mothers are obtained. Pregnancy examination also has a special purpose of identifying and treating complications found during pregnancy, childbirth, and postpartum.

ANC is an important way to monitor and support the health of normal pregnant women and detect mothers with abnormal pregnancies. Pregnant women should be advised to visit a midwife or doctor as early as possible since she feels she is pregnant to get ANC. Pregnant women who do not get inadequate ANC are at risk of perinatal death. ANC is very important because you will get health education about healthy behaviors to prevent the incidence of babies with low birth weight. Antenatal care has a great influence on neonatal mortality. Through antenatal care can be ascertained whether a person is pregnant, provide education about pregnancy and efforts to keep the pregnancy going well, detect pregnancy complications early and carry out appropriate management, and plan a safe birth.

The results of antenatal services can be seen from the coverage of KI and K4 pregnant women visit services or also called access to pregnant women services which is an illustration of the size of pregnant women who have made their first visit to a health service facility to get antenatal services. While the K4 coverage of pregnant women is a description of the number of pregnant women who have received pregnant women services in accordance with standards and at least four visits (Noor Latifah, 2012). It is also stipulated that the frequency of antenatal services is at least 4 times during pregnancy, with time provisions (1) At least 1 time in the first quarter (2) At least 1 time in the second quarter (3) At least 2 times in the third quarter (Ministry of Health, 2004).

Improvement in neonatal mortality can be achieved by providing antenatal care supervision for all pregnant women by finding and improving several factors that affect fetal and neonatal safety.

Cunningham et al (2007) added that 40% of the 705 neonatal deaths could be prevented with good antenatal care. Mothers with high risk pregnancy should give birth in hospitals that have adequate facilities, improvement of fetal distress diagnosis techniques should also be improved such as the provision of special care centers for BBLR babies, improvement of resuscitation of babies born with asphyxia and improvement in newborn care techniques (especially premature babies), and investigation

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of the causes of intrauterine undernutrition has an important role in reducing the incidence of mortality Neonatal. Of course, these efforts need support and participation from all parties concerned.

CONCLUSION

Based on the results of research and discussion, the following conclusions were obtained: 1). The maternal age factor obtained *an odds ratio* value of CI95% = 5.74 > 1 so that it is known that mothers aged < 20 and > 35 years are 5.74 times more likely to experience neonatal death than mothers aged 20-35 years. 2). The parity factor obtained odds *ratio* value CI95% = 5.16 > 1 can be so that it is known that mothers with parity 1 time and 5 times give birth are 5.16 times more likely to experience neonatal death than mothers with parity 2-4 times. 3). The birth distance factor obtained *an odds ratio* value of CI95% = 7.85 > 1 so that it is known that mothers with a birth distance of ≤ 1 year are 7.85 times more likely to experience neonatal death than mothers with a birth distance of > 2 years. 4). The Access to Health Care factor obtained *an odds ratio* value of CI95% = 0.81 < 1 so that it can be known that access to health services is not at risk of neonatal death. 5). Maternal Knowledge Factor obtained *odds ratio* value CI95% = 5.57 > 1 it can be seen that mothers with knowledge are approximately 5.57 times more likely to experience neonatal death than mothers with good knowledge. 6). The Antenatal Care examination factor obtained *an odds ratio* value of CI95% = 52.76 > 1 so that it can be seen that mothers with antenatal care examination are less than 4 times more likely to have 5.57 times the risk of neonatal death than mothers with antenatal care examination > 4 times. 7). The factor most at risk for neonatal death is antenatal care examination *odds ratio* (EXP(B)) which is 12.767, which means antenatal care examination is 12.76 times more risk of infant mortality than birth spacing, parity, maternal age, and maternal knowledge.

RECCOMENDATIONS

Based on the results of the research from the conclusions that have been carried out, the researcher provides several suggestions, namely: 1). It is expected that health workers will further develop and maximize health promotion related to the importance of paying attention to the ideal age during pregnancy to avoid the impact of neonatal death. 2). The public can pay attention to and understand the risk factors posed to the number of children born both alive and dead. 30. It is expected that the community is assisted by health workers to pay attention to the distance of pregnancy, which is the period of time between the end of a previous pregnancy and the next pregnancy, and not to rush to carry out subsequent pregnancies < 1 year so that the risk of neonates can also be reduced. 4). The community is expected to maximize the use of private transportation compared to public transportation in communities with difficult access to services in order to prevent possible delays in people heading to health facilities to get health services. 5). Health workers are expected to provide more education to the public about pregnancy so that public knowledge can increase again. 6). It is hoped that the community can maximize antenatal care examinations for more optimal maternal and infant health and it is hoped that health workers can pay more attention to the participation of pregnant people in antenatal care examinations so that they are more optimal.

Declaration of Conflicting Interest

The author (s) declared no potential conflict of interest with respect to the research, authorship, and/or publication of this article

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