

THE EFFECT OF PARITY ON NEONATAL MORTALITY IN INDONESIA

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ABSTRACT

The neonatal mortality rate in Indonesia is still relatively high (15 per 1,000 live births). The number of children born to a woman (parity) is also still high. The Total Fertility Rate (TFR) is 2.4 per woman. This study aims to determine the effect of parity on neonatal deaths in Indonesia. We used 2017 IDHS data with a cross-sectional design includes 14,827 live births in the 2012-2017 period. Data were analyzed using the multiple logistic regressions method. The results showed that primipara had a statistically insignificant relationship ($p\text{-value} > 0.05$) compared with multipara. While parity ≥ 4 had a risk of 1.90 times experienced on neonatal mortality compared with multipara (95% CI: 1,00-3,63) after being controlled by the maternal age, birth attendant, and place of delivery and statistically significant ($p\text{-value} \leq 0,05$). Thus, parity ≥ 4 was significantly associated with neonatal mortality. The more children born to mothers, the higher the risk of neonatal death. While parity 1 did not have a significant relationship with neonatal mortality. It is recommended that family planning programs be increased to reduce parity to avoid the risk of neonatal death. The BKKBN program should be improved in reducing TFR.

Keywords: family planning, neonatal death, parity

ABSTRAK

Angka kematian neonatal di Indonesia masih tergolong cukup tinggi (15 per 1.000 kelahiranhidup), jumlah anak yang dilahirkan oleh seorang wanita (paritas) juga masih tinggi, dengan *Total Fertility Rate* (TFR) 2,4 per wanita. Penelitian ini bertujuan mengetahui pengaruh paritas ibu terhadap kematian neonatal di Indonesia. Penelitian ini menggunakan data SDKI 2017 dengan desain *cross-sectional* mencakup 14,827 kelahiran hidup dalam kurun waktu 2012-2017. Hasil penelitian ini menunjukkan, bahwa primipara tidak menunjukkan hubungan yang signifikan secara statistik ($p\text{-value} > 0,05$) dibandingkan multipara. Sedangkan paritas ≥ 4 anak memiliki risiko 1,90 kali mengalami kematian neonatal dibandingkan dengan multipara (95% CI: 1,00-3,63) setelah dikontrol oleh usia ibu, penolong persalinan, dan tempat persalinan, serta signifikan secara statistik ($p\text{-value} \leq 0,05$). Dengan demikian, paritas > 4 secara signifikan berhubungan dengan kematian neonatus. Semakin banyak anak yang lahir ibu, semakin tinggi risiko kematian neonatus. Sedangkan, paritas 1 tidak memiliki hubungan yang signifikan dengan kematian neonatus. Disarankan perlunya peningkatan program Keluarga Berencana (KB) untuk menurunkan paritas agar terhindar dari risiko kematian neonatal. Program BKKBN harus ditingkatkan dalam menurunkan TFR.

Kata Kunci : keluarga berencana, kematian neonatal, paritas

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Introduction

The neonatal mortality rate is the infant mortality that occurs in the first month after birth which is expressed in per thousand live births and is generally caused by genetic factors acquired from parents at the time of conception or acquired during pregnancy. Neonatal mortality is the most significant contributor to infant mortality.¹ Infants aged 0-28 days are the highest health risk group, and many health problems arise.² Neonatal mortality is one of the determinants of children's health and welfare. All countries in the world, including Indonesia, have agreed to a new framework, The Sustainable Development Goals (SDGs); namely, there is one new target and commitment that has been agreed. By 2030 all countries will reduce the neonatal mortality rate by at least 12 per 1000 live births.³

In 2019, global neonatal mortality reached 17 deaths per 1000 live births. This figure was down by 52 percent from 37 deaths per 1000 live births in 1990. Globally, in 2019, 2,4 million children died in the first month of life, or about 6700 neonatal deaths every day, with about a third of neonatal deaths occurring on the first day of birth and three quarters occurring in the first week of life.⁴

The trend of neonatal mortality decreased by 20% from 20 per 1000 live births (IDHS 2002/2003) to 15 per 1000 live births. Neonatal mortality in 2002/2003 was 20 deaths per 1000 live births⁵, then in 2007 it fell to 19 deaths per 1000 live births, and in the next five years (in 2012), there was no change in the neonatal mortality rate (stagnant), and up to in the last survey of the 2017 IDHS, the mortality rate has decreased with 15 deaths per 1000 live births. The neonatal mortality rate in Indonesia reached 15 deaths per 1000 live births, implying that 1 in 67 children dies within the first month of life. If seen from the SDGs target, it has not yet reached the target of reducing the neonatal mortality rate to 12 per 1000 live births.⁶ It has been noted that the decline in neonatal mortality has decreased more slowly than post-neonatal, infants, and children under five years old mortality, especially in low and middle-income countries.⁷ There was an increase in the percentage of neonatal deaths from infant mortality. As much as 60% of infant deaths occurred in the first month after birth (2012 IDHS), increasing to 63% of infant deaths occurring in the first month after birth (2017 IDHS).⁶

Many factors influence neonatal mortality. According to research in Afghanistan, the causes of neonatal death can be seen from infant factors, maternal factors, antenatal factors, childbirth factors, and parents' socio-demographic characteristics. In this study, the risk factors for neonatal mortality are male, low birth weight, the age of the mother giving birth too young or too old, not being assisted by skilled attendants during delivery, giving birth at home, low education of mother or father, the mother lives in the rural area, and the primipara or parity ≥ 4 .⁸⁻¹²

Parity is one of the risk factors that influence neonatal mortality in Indonesia. Parity is the number of live births achieved by a woman. Based on research, the optimal pregnancy is the second to third pregnancy. After the third pregnancy has a high risk in pregnancy and delivery, it can endanger the condition of the mother and baby born.¹³ Primipara has a 1,18 times risk of experiencing neonatal death compared to multipara (parity 2-3).¹⁴ Likewise with a study in Afghanistan that children born in the order of grand multipara (5 or more) will be at risk of experiencing neonatal death 1,4 times. The first child will be at risk of experiencing neonatal death 1,1 times compared to parity 2-4.⁸ Mothers who give birth for the first time (primipara) are at risk of neonatal death due to rigid pelvic tissue and insufficient knowledge of pregnancy and delivery care, as well as the untested birth canal. Psychologically the mother has not been trained in fetal care.¹⁵ Meanwhile, mothers who give birth repeatedly (grand multipara) cause damage to the blood vessels in the uterine wall and a decline in the elasticity of the tissue that has repeatedly contracted at the time of delivery, thus limiting the ability to stop bleeding. TFR is a measure to determine the average number of children born by a woman. TFR in Indonesia was unchanged or stagnant from 2002 to 2012, namely 2.6 infants born by a woman. Furthermore, TFR decreased slightly in 2017 was 2.4 infants per woman. The Population and Family Planning Program targets Indonesia's Total Fertility Rate (TFR) of 2.1 in 2025. It means that a 12.5% reduction in TFR is needed to achieve the target in 2025. Although the average child born to a woman reached 2,4 children, many women still have four or more children, reaching 13.34% of the total women of childbearing age 15-49 years.⁶

Efforts to achieve the national strategy target in reducing neonatal mortality have been carried out in Indonesia such as Jampersal, Family Planning, Expanding Maternal and Neonatal Survival (EMAS), Health Operational Assistance Fund (BOK), Basic Emergency Neonatal Obstetrics Services (PONED), and Comprehensive Emergency Neonatal Obstetrics Services (PONEK).¹⁶⁻²⁰ But, there has not been a significant reduction in neonatal.²¹⁻²³ Therefore, information about the relationship between parity and neonatal mortality is needed based on the latest data. The 2017 IDHS is one of the tools for evaluating the achievement of the SDGs. For that, it is necessary to carry out further analysis. Several studies have investigated the effect of parity and other factors on neonatal mortality. However, this study is carried out again because still slightly studies proving that primipara or parity ≥ 4 has a significant effect on neonatal mortality compared to multipara (parity 2-3)^{24,25}, and the categorization of parity variables in this study is different compared to other studies. By looking at the large number of children born to every woman of childbearing age in the territory of Indonesia, which has not yet reached the set target. The neonatal mortality rate is still high in Indonesia, and the increasing percentage of neonatal mortality on infant mortality. It is necessary to have an adequate understanding of the effect of parity on neonatal mortality in Indonesia to adopt interventions that are most appropriate to the

conditions of the people in Indonesia. In several studies in Indonesia, not many studies want to examine the effect of parity on neonatal mortality after being controlled by maternal factors, infant factors, socio-economic factors, and health service factors. This study aims to determine the effect of parity on neonatal mortality in Indonesia in the period 2012-2017.

Method

This study was a quantitative study using secondary data from the 2017 Indonesian Health Demographic Survey with a cross-sectional research design. This survey was conducted in 34 provinces in Indonesia and spread over 1,970 census blocks covering both urban and rural areas. The 2017 Indonesian Health Demographic Survey data collection was conducted from 24 July to 30 September 2017. The sample design used in the 2017 IDHS was a stratified two-stage sampling. The first stage was to select several census blocks with a systematic probability proportional to size (PPS) with the number of households resulting from the SP2010 listing. The next stage was to select 25 ordinary households in each selected census block systematically from the results of updating households in each census block.

The population in this study were all women of childbearing age (15-49 years) who had a history of live births. The sample was the respondents recorded in the 2017 IDHS who classified the inclusion and exclusion criteria. Inclusion criteria were women aged 15-49 years, had given birth live in the last five years before the survey (2012-2017). At the same time, the exclusion criteria were twins and mothers who did not know the date of birth and death of their children and incomplete data (missing data). The number of samples used in this study amounted to 14,827 samples. The main independent variable in this study was parity. The parity categorization is primipara (parity 1), multipara (parity 2-3), and parity ≥ 4 .^{24,25} The dependent variable was neonatal mortality. At the same time, the confounding was maternal age, mother's place of residence, mother's education, economic status, infants birth weight, infant's sex, place of delivery, and birth attendant. Data analysis in this study used a complex sample analysis that pays attention to strata, clusters, and weights. Data analysis was performed using multivariable multiple logistic regression to obtain the odds-adjusted parity ratio for neonatal mortality by controlling for variables that could potentially be confounders. Research Ethics Committee has approved this study of Universitas Indonesia based on approval decree number 96/UN2.F10/PPM.00.02/2019.

Results

Table 1 presents the distribution of neonatal deaths by the time of death. The results of the analysis display that the highest percentage of neonatal deaths occurred on the first day, reaching 61.5%. No cases of neonatal death occurred in the fourth week. The percentage of neonatal mortality in the period 2012-2017 was 1%, or 143 cases.

Table 1. Number of Neonatal Mortality

Time of death	n	%
Death in the first week		
First day	88	61,5
Day 2-4	29	20,3
Day 5-7	11	7,9
Death in the second week	12	8,2
Death in the third week	3	2,1
Total	143	100

Table 2 presents the distribution of respondent characteristics based on the biological and socio-demographic characteristics of maternal, infants' characteristics, and health services. The average age of the mother at delivery was 28.9 years. The largest percentage of the maternal age group was 20-34 years (68.8%), and the lowest was <20 years or >34 years (31.2%). The average number of live births born to mothers was 2.2. While the largest percentage of parity was in the multipara (53,5%), then followed by primipara (33,5%), and the smallest percentage was in parity \geq 4 (13%). Most of the mothers' last education was secondary (72.8%), followed by primary or no school (27.2%). Economic status was obtained from the calculation of the index of household goods ownership, which is categorized into two, namely low economic status (quintiles one and two) as much as 40% and high economic status (quintiles three to five) as much as 60%. Most of the respondents gave birth in health facilities (78.7%). Most of the respondents gave birth assisted by health workers (86.6%). Birth with low birth weight (LBW) that mothers have was 6.3%. Male and female gender were almost the same percentage. Housing in urban and rural areas was almost the same.

Table 3 presents the bivariate analysis of the association of parity and other risk factors for neonatal mortality. A higher proportion of neonatal deaths in the group of parity \geq 4 (1.9%) and followed by multipara (0.9%). Based on the bivariate analysis results, there was no statistically significant relationship between primiparas and neonatal mortality ($p > 0,05$). However, there is a statistically significant relationship between parity \geq 4 and neonatal mortality ($p \leq 0,05$). The bivariate analysis resulted in a crude-OR value. This study obtained a crude-OR of parity \geq 4 was 2,18, which means that parity \geq 4 has the risk of increasing neonatal mortality by 2.18 times compared to multipara. Based on maternal age, the largest proportion of neonatal deaths was in the <20 or >34 years (1.6%), while the 20-34 years were only 0.7%. Based on the group of mothers living area, the largest proportion of neonatal deaths were in the urban (1%), while only 0.9% were in the rural. Based on the mother's education, the largest proportion of neonatal deaths were in primary education or not in school (1.4%), while in the secondary education group, it was only 0.8%. Based on the maternal economic status, the largest proportion of neonatal deaths was low (1.16%), while the high economic status was only 0.87%. Based on the sex of infants, the highest proportion of neonatal deaths were in the male (1.2%), while the female infants were only 0.7%.

Based on the infant birth weight, the largest proportion of neonatal deaths was the low birth weight (4%), while the normal infant weight was only 0.4%. Based on the place of delivery, the largest proportion of neonatal deaths occurred in the group giving birth in a non-health facility (1.1%). In contrast, in the group giving birth in a health facility, it was only 0.8%. Based on the group of birth attendants, the largest proportion of neonatal deaths were in the group who gave birth not assisted by health workers (1.4%), while in the group who gave birth assisted by health workers, it was only 0.8% (Table 3).

Table 2. Characteristics of Respondents

Variable	n	%
Maternal Characteristics		
Maternal age		
<20 or>34 years	4.526	31,2
20-34 years	9.990	68,8
Parity		
Primipara	4.865	33,5
Multipara (2-3)	7.743	53,5
Parity >4	1.907	13,0
Place of residence		
Urban	7.049	48,6
Rural	7.467	51,4
Maternal education level		
Primary	3.946	27,2
≥Secondary	11.000	72,8
Economic Status		
Low	5.825	40,1
High	8.690	59,9
Infants Characteristics		
Gender		
Male	7.457	51,4
Female	7.058	48,6
Birth weight		
≥ 2500 gram	13.000	93,7
< 2500 gram	867	6,3
Health services		
Place of delivery		
Health facility	11.000	78,7
Not health facility	3.081	21,3
Birth attendant		
Health worker	12.000	86,6
Not a health worker	1.920	13,4

Table 3. Analysis Bivariate of the Relationship between Parity, Confounding Variables and Neonatal Mortality

Variable	Neonatal Mortality		n	p-value	OR (95%CI)
	No (%)	Yes (%)			
Maternal Biological Factors					
Parity					
Primipara	99,2	0,8	4.866	0,558	0,87 (0,54-1,38)
Multipara (2-3) ¹	99,1	0,9	7.743	-	-
Parity \geq 4	98,1	1,9	1.907	0,001	2,18 (1,39-3,42)
Maternal age					
20-34 years ¹	99,3	0,7	9.990	-	-
<20 or>34 years	98,4	1,6	4.526	0,000	2,27 (1,53-3,35)
Socio-demographic Factors					
Place of residence					
Urban ¹	99,0	1,0	7.049	-	-
Rural	99,1	0,9	7.467	0,585	0,89 (0,62-1,32)
Maternal education level					
Primary	98,6	1,4	3.946	0,01	1,78 (1,18-2,67)
\geq Secondary ¹	99,2	0,8	11.000		1,00
Economic status					
Low	98,84	1,16	5.825	0,138	1,34 (0,90-1,97)
High ¹	99,13	0,87	8.690		1,00
Infants Characteristics					
Sex					
Male	98,8	1,2	7.457	0,019	1,62 (1,10-2,40)
Female ¹	99,3	0,7	7.058		1,00
Birth Weight					
\geq 2500 gram ¹	99,6	0,4	13.000		1,00
< 2500 gram	96,0	4,0	867	0,000	11,51 (6,87-19,27)
Health Service Factor					
Place of delivery					
Health facility ¹	99,2	0,8	11.000		1,00
Not a health facility	98,9	1,1	3.081	0,216	1,37 (0,83-2,25)
Birth attendant					
Health Worker ¹	99,2	0,8	12.000		1,00
Not a health worker	98,6	1,4	1.920	0,036	1,77 (1,03-3,03)

Description: OR= Odds Ratio; CI= Confidence Interval; ¹= reference

Table 4 displays the relationship between the independent variable (parity) and the dependent variable (neonatal mortality) by controlling for the confounding variables. Statistical analysis used was multiple logistic regression. This statistical test obtained the adjusted-odds ratio for neonatal mortality by controlling for variables that were considered as confounders in order to minimize the occurrence of odds ratio bias. After the interaction test and confounding test were carried out, it was found that there was no interaction and had three confounding variables, namely maternal age, birth attendant, and place of delivery. It was declared confounding if there was a change in OR > 10%. Multivariate results found that primipara showed a statistically insignificant relationship (p-value > 0.05) compared with multipara. While the parity \geq 4 has risk 1.90 times experienced on neonatal mortality compared with multipara (95% CI: 1,00 to 3,63) after being controlled by the maternal age, birth attendant, place of delivery, birth weight, and sex infants, as well as the analysis of test results were significant (p-value \leq 0,05). In multivariate analysis, there was an increase in the risk of neonatal death and the number of children born.

Table 4 Multivariate Final Model

Variable	OR	95% CI	P-value
Parity			
Primipara	0,63	0,33-1,19	0,147
Multipara (2-3) ¹	-	-	-
Parity \geq 4	1,90	1,00-3,63	0,049
Birth Weight			
< 2500 gram	12,69	7,51-21,46	0,001
\geq 2500 gram ¹	-	-	-
Sex			
Male	2,73	1,56-4,78	0,001
Female ¹	-	-	-
Maternal age			
<20 or>34 years	1,69	0,97-2,92	0,059
18-34 years ¹	-	-	-
Place of delivery			
Health facility ¹	-	-	-
Not health facility	0,71	0,34-1,43	0,339
Birth attendant			
Health Worker ¹	-	-	-
Not a health worker	0,57	0,20-1,56	0,274

Description: OR= Odds Ratio; CI= Confidence Interval; ¹= reference

Discussion

Parity is the order of the last child (number of children) ever born to the mother. Most mothers had children with a relatively ideal number in this study, namely multipara (2-3 children). It shows that Indonesia is in the process of achieving the Total Fertility Rate (TFR) target of 2.1 in 2025.^{6,26} TFR in Indonesia stagnated from 2002 to 2012. Hence, it takes hard work to reduce TFR according to the target.²⁷ In bivariate analysis, it was found that most neonatal deaths occurred in parity \geq 4. The results of this study are in line with previous research in Cilacap. Mothers with parity \geq 4 contributed 93.4% to neonatal mortality.²⁸ The multivariate analysis of the final model found the relationship between parity and neonatal mortality in Indonesia in 2017. There was no relationship between primipara and neonatal mortality after controlling for maternal age, birth attendant, place of delivery, birth weight, and sex infants. However, there was an association between parity \geq 4 parity and neonatal mortality with statistically significant results after controlling for maternal age, birth attendant, place of delivery, birth weight, and sex infants. Maternal age, birth attendant, and place of delivery were confounding variables for parity (as the main variable).

There was no significant p-value change in the bivariate analysis results compared to the multivariate analysis results, but there was a change in the OR value. Primiparas had a crude-OR of 0.87 and an adjusted-OR of 0.63. Meanwhile, parity \geq 4 had a crude-OR of 2.18 and an adjusted-OR of 1.90. The more children the mother has, the more neonatal mortality will be.

Primipara showed a statistically insignificant relationship with multipara on neonatal mortality. A more detailed analysis found that primipara had the most maternal age at the age of 20-34 years (74%), where this age became a protective factor for experiencing neonatal death. When viewed from birth attendants, most primiparas were assisted by health workers (88%), and

the majority were assisted in health facilities (82%). It explains that mothers who have just had one child are more aware of the importance of good prenatal care to prevent pregnancy complications and childbirth because there is no previous childbirth experience. Mothers are aware of the risk factors for neonatal death. So that the effect of primipara on neonatal mortality was statistically insignificant. This study result is in line with the previous research that says that the primipara is statistically insignificant on neonatal mortality.^{29,30} However, this study is not in line with the research in Ethiopia, which found that primipara has a 5.45 times risk of experiencing neonatal death compared to the parity 2-4th after being controlled by other variables.²⁹ The difference in the results of this study could be due to differences in the variables categorization were; the previous studies in Ethiopia used a parity 2-4 children as a reference.

On bivariate and multivariate analysis, parity \geq 4 showed a statistically significant relationship with multipara (2-3 child) on neonatal mortality. More children will increase the risk of neonatal death and the results obtained in this study.^{11,31,32} The risk of neonatal death in parity \geq 4 is because, during pregnancy, the mother's uterus is stretched by the presence of the fetus. If the mother gives birth too often, the uterus will get weaker. If the mother has given birth to 4 or more children, it is necessary to watch out for disturbances during pregnancy, childbirth, and the puerperium.¹ Mother who experiences disturbances during pregnancy can endanger their babies so that they can cause neonatal death. In addition, at the time of delivery, the blood vessels in the damaged uterine wall cannot fully recover as before giving birth. Therefore, repeated pregnancy and childbirth cause damage to the blood vessels in the uterine wall.³¹ The higher the maternal parity, the lower the endometrium quality. Repeated pregnancies will affect the circulation of the nutrients to the fetus, where the number of nutrients will be reduced compared to previous pregnancies.³³ The effect of increased parity on neonatal mortality is in line with previous studies. A study in the Philippines found that parity \geq 4 had a 2.03 times risk of experiencing neonatal death compared to multipara (parity 2–3) with a statistically significant.³⁴ In Ethiopia, mothers with grand-multipara have a 1.7 times risk of neonatal death compared to multipara.³⁵

The limitation of this study was that this study used secondary data from the 2017 IDHS, so the researcher cannot control the quality of the data directly. The data available in the IDHS came from interviews with women of childbearing age. Respondents were asked to recall events in the past 5 (five) years, where the mother may not remember with certainty the baby's age at the time of death, thus causing information bias. So the results obtained in this study do not describe the actual conditions at the time of neonatal death. The variables of education and economic status indicate the latest condition at the time of the interview, not based on the baby's condition at birth, thus affecting the study results. Data only came from women who were still alive at the time of the survey, so the number of neonatal deaths may be lower than it was.

Conclusion

Primipara did not have a statistically significant relationship with neonatal mortality after controlling for maternal age, birth attendant, place of delivery variables, infant's birth weight, and infant's sex. Meanwhile, parity ≥ 4 has a statistically significant relationship after being controlled by the variables of maternal age, birth attendant, place of delivery, infants birth weight, and infant's sex. Parity ≥ 4 has a 1,9 times higher risk of experiencing neonatal death than parity 2-3 after being controlled by the variable of maternal age, birth attendant, place of delivery, infants birth weight, and infant's sex. This study found three confounding variables, namely maternal age, birth attendant, and place of delivery. In this study, it is hoped that the government program can reduce the parity rate of pregnant women in Indonesia to reduce the risk of neonatal death, by increasing the socialization of family planning programs in public service media to make people aware of the importance of having two children. Improving the BKKBN program in reducing TFR, namely, it is necessary to work on Communication, Information, and Education as well as family planning services that are focused on areas at risk and low family planning participation.

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Conflict of Interest

There is no conflict of interest in this study

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