Neonatal Death Incidence in Healthcare Facility in Indonesia: Does Antenatal Care Matter?

Masruroh[1,2], Ah Yusuf[3], Nikmatur Rohmah[4], Irfansyah Baharudin Pakki[5], Anita Dewi Prahastuti Prasojo[6], Qurnia Andayani[1], *Agung Dwi Laksono[7]

[1] Doctoral Program, Faculty of Public Health, University of Airlangga Surabaya Indonesia, [2] Lecturer, Faculty of Health Science Universitas Pesantren Tinggi Darul Ulum Jombang, East Java, Indonesia, [3] Faculty of Nursing, Universitas Airlangga, Surabaya Indonesia, [4] Lecturer, Faculty of Health Science, Muhammadiyah University of Jember East Java Indonesia, [5]Lecturer, Faculty of Public Health University of Mulawarman, Samarinda, Kalimantan Timur, Indonesia, [6]Lecturer, Public Health Faculty Jember University East Java, Indonesia, [7] Researcher, National Institute of Health Research and Development, The Indonesian Ministry of Health

Abstract

Despite having carried out maternity care in healthcare facilities, neonatal deaths still occur. A study was conducted to analyze the effect of antenatal care (ANC) on neonatal death incidence in healthcare facilities in Indonesia. The study used the 2017 IDHS data. With stratification and multistage random sampling, 13.104 women aged 15-49 years with live births in the last 5 years, who performed maternity care in the healthcare facility, were sampled. Apart from ANC, other independent variables analyzed were a type of place, age, education, wealth, employment, parity, and complication during pregnancy. The final stage employed a binary logistic regression test. The analysis found that women who made complete ANC visits during pregnancy (≥4 times) were 0.486 times more likely than women who did not complete ANC visits (<4 times) (OR 0.486; 95% CI 0.266-0.887). The results of this analysis inform that carrying out a complete ANC visit is a protective factor for women who perform maternity care in healthcare facilities in Indonesia from neonatal death incidence. Apart from ANC, 2 variables were also found to have a significant effect on neonatal death incidence in healthcare facilities in Indonesia. These two variables are the age group and complications during pregnancy. Meanwhile, education level, wealth status, employment status, and parity proved insignificant. It was concluded that ANC is a determinant of neonatal death incidence in the healthcare facility in Indonesia. Complete ANC visits are a protective factor for women who perform maternity care in healthcare facilities in Indonesia from neonatal death incidence.

Keywords: *neonatal death, antenatal care, healthcare, pregnancy care.*

Background

Neonatal is the most vulnerable period for a child's survival. The neonatal period, which is defined by WHO as beginning at birth and ending at the full 28 days of life. Child health services start from the time of pregnancy to childhood, which involves the mother as an inseparable part of the child. The infant mortality rate is an indicator of the quality of child health services in a country. Infant mortality is a deadly incident that occurs in the period from the time the baby is born until the baby is not exactly one year old. In 2016, 2.6 million deaths, or about 46% of all under-five deaths, occurred during the neonatal period. More than 40% of all deaths in children under 5 years of age occurred during the neonatal period[1–3].

Indonesia has a high rate of neonatal mortality, the 2017 Indonesia Demographic and Health Survey (IDHS) shows that 15/1000 live births. The figure accounts for almost half of the under-five mortality rate in Indonesia[4]. WHO reports that there are approximately 7,000 newborn deaths per day with three-quarters of neonatal deaths occurring in the first week, and one-third dying within the first 24 hours of birth[5]. The current trend is that more than 60 countries will miss the SDG target of

reducing neonatal mortality to at least 12/1000 live births by 2030. About half of them will not meet the target by 2050[1]. Identifying the causes of neonatal mortality is essential for intervening. prevention to decrease infant mortality[1,6].

Neonatal mortality can be caused by various factors, including maternal factors, socio-culture, services, and health facilities. The Ethiopian study put the proportion of neonatal deaths in health facilities at 20%. The causes of neonatal mortality included preterm birth 28.58, birth asphyxia 22.45%, neonatal infection 18.36%, meconium aspiration syndrome 9.18%, respiratory distress syndrome 7.14%, congenital malformations 4.08%[7]. Previous studies reported that neonatal mortality in health facilities was 13.3% or about 30 deaths per 1000 live births. The causes of death were 60.4% low birth weight (LBW), and 55.8% preterm birth[8]. Similar information was also reported in Ethiopia, which reports that the causes of neonatal death are preterm birth, birth asphyxia, and infection[9]. Meanwhile, in Iran, it was reported that the highest causes of neonatal death were preterm birth, LBW, and anomalies[10].

The causes of neonatal mortality in Southeast Asia, in order from the largest, are premature, asphyxia, congenital abnormalities, and sepsis[11]. In previous studies in Indonesia, several factors were associated with an increased risk of neonatal mortality, namely neonatal complications at birth, lack of maternal knowledge about danger signs for neonates, history of complications during pregnancy, delivery carried out at home[12]. Information on several cases of neonatal death shows several reasons that can be prevented by monitoring during pregnancy by doing ANC[13]. Based on the background description, this study was aimed at analyzing the influence of ANC on neonatal death incidence in a healthcare facility in Indonesia.

Materials and Methods

The study employed secondary data from the 2017 IDHS as analysis material. The 2017 IDHS sample was determined through stratification and multistage random sampling. The analysis unit was women in childbearing aged, 15-49 years old, who had given birth in the last 5 years in a healthcare facility. Several 13,104 women were sampled.

The 2017 IDHS has received ethical approval from the National Ethics Committee. All respondent identities have been deleted from the dataset. Respondents have signed and agreed to their involvement in the 2017 IDHS. Utilization of 2017 IDHS data for this research has received permission from ICF through the website: https://dhsprogram.com/data/new-user-registration.cfm.

Neonatal death is death in the neonatal period or the first twenty-eight days of life. ANC was the respondent's acknowledgment of the amount of ANC utilization during pregnancy. The ANC utilization was divided into 2 criteria, namely <4 and ≥4. Apart from ANC, other independent variables involved in the analysis were the type of place of residence, age group, education level, wealth status, employment status, parity, and complication during pregnancy.

Parity is the number of living children a woman is born with. In this study, parity was divided into two, namely primiparous (<2 children) and multiparous (≥2 children). Complications during pregnancy were the respondent's acknowledgment of complications experienced during pregnancy until delivery. These problems consist of: prolonged labor, vaginal bleeding, fever, convulsions, baby in the wrong position, swollen limbs, faint, breathlessness, tiredness, and others[4,14].

This study conducted 2 stages of analysis. The first stage, performed bivariate with chi-square to analyze the relationship between ANC and other variables involved in the analysis. The second stage, multivariate with binary logistic regression to determine the effect and see the odd ratio of the independent variable to the dependent variable. All stages of analysis employed IBM Statistic SPSS 21.

Findings

Table 1 displays descriptive statistics of neonatal death incidence in a healthcare facility by ANC in Indonesia. It appears that the two categories of ANC are dominated by women who do not experience neonatal death. Based on the type of place of residence, both ANC categories are dominated by women who live in urban areas. Meanwhile, based on the age group, the two ANC categories were dominated by women in the 30-34 age group.

Based on the education level, both ANC categories are dominated by women who have secondary education. Based on wealth status, women who made incomplete ANC visits (<4 times) were dominated by the poorest women. Otherwise, women who have complete ANC visits (≥4 times) are dominated by the richest women. Meanwhile, based on employment status, both ANC categories were dominated by unemployed women. Based on parity, the two ANC categories are dominated by multiparous women. Finally, based on complications during pregnancy, both ANC categories are dominated by women who do not experience a complication during pregnancy.

Table 2 shows the results of the binary logistic regression of neonatal death incidence in a healthcare facility in Indonesia. It appears that women who made complete ANC visits during pregnancy (≥4 times) were 0.486 times more likely than women who did not complete ANC visits (<4 times)(OR 0.486; 95% CI 0.266-0.887). The results of this analysis inform that carrying out a complete ANC visit is a protective factor for women who perform maternity care in healthcare facilities in Indonesia from neonatal death incidence.

Complete ANC visits (≥4 times) according to government recommendations, at least 4 visits during pregnancy, helping pregnant women to monitor and control risks during pregnancy[15]. ANC provides routine monitoring of height and weight gain, identification of maternal or fetal medical problems, counseling on tobacco or substance use, providing psychosocial support, nutritional advice, and early intervention that can reduce adverse pregnancy output, including the occurrence of neonatal death[16,17]. This finding is in line with previous findings conducted in urban areas in Indonesia[18].

Apart from ANC, 2 variables were also found to have a significant effect on neonatal death incidence in healthcare facilities in Indonesia. These two variables are the age group and complications during pregnancy. Meanwhile, education level, wealth status, employment status, and parity proved insignificant.

Tabel 1. Descriptive statistics of neonatal death incidence in the healthcare facility by ANC in Indonesia (n=13,104)

Variables	Antenatal Care Visits				P
	< 4 times		≥ 4 times		
	n	%	n	%	
Neonatal Death					***0.000
No	2312	96.3%	10614	99.2%	
Yes	89	3.7%	89	0.8%	
Type of place					0.532
Urban	1384	57.6%	6244	58.3%	
Rural	1017	42.4%	4459	41.7%	
Age					***0.000
15-19	64	2.7%	224	2.1%	
20-24	371	15.5%	1621	15.1%	
25-29	652	27.2%	2734	25.5%	
30-34	683	28.4%	2833	26.5%	
35-39	439	18.3%	2181	20.4%	
40-44	168	7.0%	931	8.7%	
45-49	24	1.0%	179	1.7%	
Education					***0.000
No education	25	1.0%	63	0.6%	
Primary	502	20.9%	2096	19.6%	
Secondary	1324	55.1%	6346	59.3%	

Cont... **Tabel 1. Descriptive statistics of neonatal death incidence in the healthcare facility by ANC in Indonesia (n=13,104)**

Higher	550	22.9%	2198	20.5%	
Wealth					***0.000
Poorest	548	22.8%	1813	16.9%	
Poorer	514	21.4%	2018	18.9%	
Middle	457	19.0%	2213	20.7%	
Richer	422	17.6%	2291	21.4%	
Richest	460	19.2%	2368	22.1%	
Employment					***0.000
Unemployed	1406	58.6%	5500	51.4%	
Employed	993	41.4%	5197	48.6%	
Parity					***0.000
Primiparous	237	9.9%	3584	33.5%	
Multiparous	2164	90.1%	7119	66.5%	
Complication during pregnancy					*0.005
No	619	84.8%	8623	80.6%	
Yes	111	15.2%	2079	19.4%	

Note: *p<0.05; **p<0.01; ***p<0.001.

By age group, women in the 15-19 age group were 0.210 times more likely than women in <15 age group to experience neonatal death incidence (OR 0.210; 95% CI 0.073-0.608). Women in the 20-24 age group are 0.194 times more likely than women in <15 age group to experience neonatal death incidence in healthcare facilities in Indonesia (OR 0.194; 95% CI 0.069-0.547). Women in the 25-29 age group were 0.222 times more likely than women in the <15 age group to experience neonatal death incidence (OR 0.222; 95% CI 0.076-0.648). Meanwhile, women in the 30-34 age group were 0.268 times more likely than women in <15 age group to experience neonatal death incidence in healthcare facilities in Indonesia (OR 0.268; 95% CI 0.090-0.798). Age group as a determinant of neonatal death incidence was also reported in studies in Tanzania, and Bangladesh[19,20].

Tabel 2. The result of binary logistic regression of neonatal death incidence in the healthcare facility in Indonesia (n=13,104)

The Predictors	The Neonatal Death			
	Sig.	OR	CI (95%)	
			The Lower Bound	The Upper Bound
ANC: <4 times	-	-	-	-
ANC: ≥4 times	*0.019	0.486	0.266	0.887
Age: <15	-	-	-	-
Age: 15-19	**0.004	0.210	0.073	0.608
Age: 20-24	**0.002	0.194	0.069	0.547
Age: 25-29	**0.006	0.222	0.076	0.648
Age: 30-34	*0.018	0.268	0.090	0.798
Age: 35-39	0.126	0.417	0.136	10.278

Cont... **Tabel 2. The result of binary logistic regression of neonatal death incidence in the healthcare facility in Indonesia (n=13,104)**

Age: 40-44	0.204	0.369	0.079	10.718
Education: No education	-	-	-	-
Education: Primary	0.998	1.002	0.133	7.572
Education: Secondary	0.896	0.874	0.116	60.602
Education: Higher	0.540	0.519	0.064	40.238
Wealth: Poorest	-	-	-	-
Wealth: Poorer	0.073	0.537	0.272	10.060
Wealth: Middle	0.229	0.677	0.358	10.279
Wealth: Richer	0.750	1.099	0.615	1.964
Wealth: Richest	0.682	0.872	0.452	1.682
Employment: Unemployed	-	-	-	-
Employment: Employed	0.073	1.454	0.966	2.189
Parity: Primiparous	-	-	-	-
Parity: Multiparous	0.058	1.846	0.980	3.475
Complication during pregnancy: No	-	-	-	-
Complication during pregnancy: Yes	***0.000	2.269	1.500	3.434

Note: *p<0.05; **p<0.01; ***p<0.001.

Based on complications during pregnancy, women who experience complications during pregnancy are 2.269 times more likely than women who do not experience complications during pregnancy to experience neonatal death incidence (OR 2.269; 95% CI 1.500-3.434). This information shows that experiencing complications during pregnancy is a risk factor for neonatal death incidence in healthcare facilities in Indonesia. This finding information reinforces the results of previous studies that found similar results[21–23]. It is necessary to strengthen the early identification of obstetric complications and urgent intervention to prevent neonatal mortality[24]. The results of this analysis again to confirm the importance of quality ANC during pregnancy[17].

Conclusions

Based on the research results, it could be concluded that ANC is a determinant of neonatal death incidence in healthcare facilities in Indonesia. Apart from ANC, 2 other variables were also proven to be determinant determinants of neonatal death incidence in the healthcare facility, namely age group and complication during pregnancy.

Acknowledgments: The author would like to thank the ICF International, who has agreed to allow the 2017 IDHS data to be analyzed in this article.

Source of Funding: Self-funding

Conflict of Interest: The authors declare no conflict of interest, financial or otherwise.

References

1. World Health Organisation (WHO). Making Every Baby Count : audit and review of stillbirths and neonatal deaths. WHO Libr Cat Data. 2016;144.
2. UNICEF, WHO, Bank W, Division U-DP. Child Mortality Report 2015 Organizations and individuals involved in generating country-specific estimates of child mortality Special thanks to the Technical Advisory Group of the UN IGME for providing technical guidance on methods for child mortality es. Who. 2015;
3. Pathirana J, Muñoz FM, Abbing-Karahagopian V,

Bhat N, Harris T, Kapoor A, et al. Neonatal death: Case definition & guidelines for data collection, analysis, and presentation of immunization safety data. Vaccine. 2016;34(49):6027–37.

4. National Population and Family Planning Board, Statistics Indonesia, Ministry of Health, The DHS Program. Indonesia Demographic and Health Survey 2017 [Internet]. Jakarta; 2018. Available from: https://www.dhsprogram.com/pubs/pdf/FR342/FR342.pdf
5. Hug L, Alexander M, You D, Alkema L. National, regional, and global levels and trends in neonatal mortality between 1990 and 2017, with scenario-based projections to 2030: a systematic analysis. Lancet Glob Heal. 2019;7(6):e710–20.
6. Simmons LE, Rubens CE, Darmstadt GL, Gravett MG. Preventing Preterm Birth and Neonatal Mortality: Exploring the Epidemiology, Causes, and Interventions. Semin Perinatol. 2010;34(6):408–15.
7. Desalew A, Sintayehu Y, Teferi N, Amare F, Geda B, Worku T, et al. Cause and predictors of neonatal mortality among neonates admitted to neonatal intensive care units of public hospitals in eastern Ethiopia: A facility-based prospective follow-up study. BMC Pediatr. 2020;20(1):1–11.
8. Seid SS, Ibro SA, Ahmed AA, Olani Akuma A, Reta EY, Haso TK, et al. Causes and factors associated with neonatal mortality in Neonatal Intensive Care Unit (NICU) of Jimma University Medical Center, Jimma, South West Ethiopia. Pediatr Heal Med Ther. 2019;Volume 10(May):39–48.
9. Adebola A, Olaniyi O, Ncama BP. Causes and Prevention of Newborn Deaths in Nigeria: Narrative Literature Review. IOSR J Nurs Heal Sci. 2019;8(4):1–09.
10. Daemi A, Ravaghi H, Jafari M. Risk factors of neonatal mortality in Iran: A systematic review. Med J Islam Repub Iran. 2019;33(1):7.
11. Acuin CS, Khor GL, Liabsuetrakul T, Achadi EL, Htay TT, Firestone R, et al. Maternal, neonatal, and child health in southeast Asia: towards greater regional collaboration. Lancet. 2011;377(9764):516–25.
12. Abdullah A, Hort K, Butu Y, Simpson L. Risk factors associated with neonatal deaths: A matched case-control study in Indonesia. Glob Health Action. 2016;9(1).
13. Wulandari RD, Laksono AD. Antenatal Care as Predictor of Neonatal Death in Rural Indonesia. Int Med J [Internet]. 2020;25(2):511–8. Available from: https://www.seronijihou.com/article/antenatal-care-as-predictor-of-neonatal-death-in-rural-indonesia
14. Wulandari RD, Laksono AD. Determinants of knowledge of pregnancy danger signs in Indonesia. PLoS One. 2020;15(5):Article number e0232550.
15. Laksono AD, Rukmini R, Wulandari RD. Regional disparities in antenatal care utilization in Indonesia. PLoS One. 2020;15(2):e0224006.
16. Siramaneerat I, Agushybana F, Meebunmak Y. Maternal risk factors associated with low birth weight in Indonesia. Open Public Health J. 2018 Aug;11(1):376–83.
17. Afrizal SH, Hidayanto AN, Handayani PW, Besral B, Martha E, Markam H, et al. Evaluation of integrated antenatal care implementation in primary health care A study from an urban area in Indonesia. J Integr Care. 2020;28(2):99–117.
18. Laksono AD, Wulandari RD. Understanding Neonatal Death in Urban Area in Indonesia. Medico-Legal Updat. 2020;20(2):825–9.
19. Ogbo FA, Ezeh OK, Awosemo AO, Ifegwu IK, Tan L, Jessa E, et al. Determinants of trends in neonatal, post-neonatal, infant, child and under-five mortalities in Tanzania from 2004 to 2016. BMC Public Health. 2019;19(1):Article number 1243.
20. Al Kibria GM, Khanam R, Mitra DK, Mahmud A, Begum N, Moin SMI, et al. Rates and determinants of neonatal mortality in two rural sub-districts of Sylhet, Bangladesh. PLoS One. 2018;13(11):Article number e0206795.
21. Xiao B, Liu A, Zhang M, Xue H, Zhu Y. Observation of the effect of the pregnancy complicated with the hepatitis B infection on the lying-in women and neonates. Saudi J Biol Sci. 2019;26(8):1978–81.
22. Walker AR, Waites BT, Caughey AB. The impact of extremes of maternal age on maternal and neonatal pregnancy outcomes in women with pregestational diabetes mellitus. J Matern Neonatal Med. 2020;33(3):437–41.
23. Wulandari RD, Laksono AD. Is parity a predictor of neonatal death in Indonesia? Analysis of the 2017 Indonesia demographic and health survey. Indian J Forensic Med Toxicol. 2020;14(3):2161–6.

24. Mersha A, Bante A, Shibiru S. Neonatal mortality and its determinates in public hospitals of Gamo and Gofa zones, southern Ethiopia: Prospective follow up study. BMC Pediatr. 2019;19(1):Article number 499.