Relationship between Antenatal Care and Low Birth Weight (LBW) Incidence in Indonesia: Secondary Data Analysis of IDHS 2017

Eva Roslina[1], Helda[2]

[1]Master Program in Public Health, Faculty of Public Health, [2]Department of Epidemiology, Faculty of Public Health, Universitas Indonesia, Depok, Indonesia

Abstract

Maternal and child health is one indicator of health service performance in a country. The cause of death of 1 month old infant in Southeast Asia, 28% comes from infection, and 20% is caused by premature birth and Low Birth Weight (LBW) (WHO, 2016). According to WHO data, globally In 2015, 20.5 million newborns, an estimated 14.6 per cent of all babies born globally that year, suffered from low birthweight. According to Basic Health Research (Riskesdas) data in 2018, the incidence of low birth weight was 6.2% from 56.6% of under-five children who have birth weight record in Indonesia. LBW is a contributor to neonatal mortality and morbidity. The purpose of this study is to examine the relationship of antenatal care (ANC) with Low Birth Weight (LBW) in Indonesia. The study population was all women interviewed with a history of live births and reported their infant's weight at birth within 5 years before the survey with a total sample of 11,323 people. The variables studied included antenatal care (ANC), maternal age, education, parity, Fe consumption and residence. The static test used is Multiple Logistic Regression to determine the relationship of antenatal care (ANC) with LBW incidence. Bivariate test results found that variables that have the potential to be variables related to birth weight ($p < 0.05$) are antenatal care (ANC) with p value: 0,000, education with p value: 0.032, and Fe consumption with p value: 0.003. Multivariate test showed a significant relationship between antenatal care (ANC) and LBW incidence with OR 1.9 (CI 95%: 1.4-2.7), meaning that mothers who did antenatal care (ANC) examinations less than 4 times had 1.9 times greater risk for giving birth to an infant with Low Birth Weight (LBW) compared to mothers who did antenatal care (ANC) examinations more than 4 times after being controlled by the variable Fe consumption.

Keywords: *Antenatal care: LBW: Incidence: Indonesia: IDHS*

Introduction

Maternal and child health is one indicator of health service performance in a country. The cause of death of 1 month old infant in Southeast Asia, 28% comes from infection, and 20% of preterm births and Low Birth Weight (LBW) [(1)]. Based on the results of Indonesia Demographic and Health Survey (IDHS) 2017, the neonatal mortality rate (NMR) was 15 deaths per 1,000 live births. This indicates that 1 in 67 children died in the first month of life and the most common cause of neonatal death was Low Birth Weight (LBW)[(2)].

Low Birth Weight (LBW) is a infant's birth weight less than 2500 grams regardless of gestational age[(3)]. In 2015, 20.5 million newborns, an estimated 14.6 per cent of all babies born globally that year, suffered from low birthweight[(4)]. Based on the results of IDHS 2017, the incidence of low birth weight was 7% from 94% of mothers who reported birth weight of their babies[(2)]. Whereas in 2018, Riskesdas data results reported that the incidence of low birth weight was 6.2% from 56.6% of under-five children who had a birth weight record[(5)].

Many factors can influence the incidence of Low Birth Weight (LBW), maternal factors include socio-

Corresponding author:
Helda
E-mail: heldanazar1@gmail.com

economic status, consumption behavior, calorie intake, urinary tract infections and prenatal care, smoking, genital infections, maternal health and stress[6]. Fetal factors are hydramnios, multiple pregnancy and chromosomal abnormalities. Environmental factors also play a role, namely highland residence, radiation and toxic substances[7]. All these factors can be prevented by preventive measures, for example by promoting health through pregnancy visits or antenatal care. Antenatal care (ANC) is one of the important risk factors for the incidence of Low Birth Weight (LBW)[8]. A case control study conducted at Lao PDR Thailand reported that a complete ANC can help mothers and children gain weight and influence weight loss[9].

Antenatal care (ANC) is an examination of pregnancy carried out to improve the physical and mental health of pregnant women in an optimal manner, so that they can face labor, childbirth, preparation for exclusive breastfeeding, and the return of normal reproductive health organ. Pregnancy checks are performed at least 4 times during pregnancy, namely 1 time in the first trimester, 1 time in the second trimester, and 2 times in the third trimester[10]. One of the goals of antenatal care is to monitor the pregnancy process by ensuring the health of the mother and the fetus in it and to find out the complications as early as possible, so that the fetus that is conceived can grow and develop healthily and optimally. Based on IDHS data in 2017, the percentage of women who received antenatal care (ANC) services at least once (Visit 1) from competent health workers experienced a slight increase, from 93% in IDHS 2007 to 98% in IDHS 2017. Meanwhile, the coverage of visit 4 in antenatal care indicators in IDHS 2017 was 77%, an increase of 11 percent compared to IDHS 2007, which was only 66%. The percentage of women who check their first pregnancy at the age of the womb less than 4 months increased from 75% in IDHS 2007 to 82% in IDHS 2017. The increase in ANC coverage must be accompanied by an increase in the quality of services provided. According to Sistiarani (2008), poor quality of antenatal care is one of the risk factors for LBW[11].

Based on the description above, it can be seen that antenatal care (ANC) has a strong role in the occurrence of Low Birth Weight (LBW). Therefore, deeper research needs to be done about the relationship between antenatal care and LBW incidence in Indonesia.

Methods

This research is an analytic research with cross sectional design. The data used are secondary data from Indonesian Demographic and Health Survey in 2017. The study population was all women interviewed with a history of live births and reported their infant's weight in birth in the 5 years before the survey with a total sample of 11,323 people. The inclusion criteria in this study were all women interviewed who had live births and reported their infant's weight at birth within 5 years before the survey. While the exclusion criteria in this study were missing data. The dependent variable in this study was Low Infant Weight (LBW). The independent variables of this study were antenatal care (ANC), maternal age, education, parity, Fe consumption, and area of residence. This study used test strength of 90% and 95% confidence level. Data were analyzed univariate, bivariate and multivariate with complex samples. Bivariate analysis used Chi Square test and multivariate analysis used Multiple Logistic Regression tests.

Result

Based on the table. 1, after weighting the univariate test is performed using complex sample frequencies, from mothers who have given birth to infants in the last 5 years before the survey in Indonesia showed that 6.4% of mothers gave birth to infants with LBW, 4.9% of mothers did ANC <4 times during pregnancy, 26.8% of mothers aged <20 and >35 years, 52.5% of mothers in the low education category, 38.2% of mothers had 1 and >4 children, and 45.3% of mothers took <90 Fe tablets during pregnancy and 48.6% lived in rural areas.

Table 1. Sample Characteristics

Characteristics	Frequency N = 11.323	Percentage (%)
LBW		
No LBW	10543	93,2
LBW	780	6,9
Antenatal Care (ANC)		
≥4 times	10626	93,8
<4 times	697	6,2
Mother's age		
No risk (20-35)	8220	72,6
Risky (<20 and >35)	3103	27,4
Education		
High ≥ High school	5818	51,4
Low < Middle School	5505	48,6
Parity		
2–4 children	7027	62,1
1 and >4 children	4296	37,9
Consumption of Fe		
≥ 90	5671	50,1
< 90	5652	49,9
Residence		
Urban	5995	52,9
Rural	5328	47,1

Table 2. Bivariate Analysis

Variables	LBW				Total		OR	P Value
	No		Yes					
	N	%	N	%	N	%		
Antenatal Care (ANC)								
≥ 4 times	9923	93,4	703	6,6	10626	100	2,098	0,000
< 4 times	620	89,0	77	11,0	697	100		
Mother's age								
No risk (20-35)	7663	93,2	557	6,8	8220	100	0,987	0,902
Risky (<20 dan >35)	2880	92,8	223	7,2	3103	100		

Cont... **Table 2. Bivariate Analysis**

Education								
High ≥ High school	5461	93,9	357	6,1	5818	100	1,212	0,032
Low < Middle school	5082	92,3	423	7,7	5505	100		
Parity								
2–4 children	6572	93,5	455	6,5	7027	100	1,116	0,247
1 and >4 children	3971	92,4	325	7,6	4296	100		
Consumption of Fe								
≥ 90	5325	93,9	346	6,1	5671	100	1,320	0,003
< 90	5218	92,3	434	7,7	5652	100		
Residence								
Urban	5590	93,2	405	6,8	5995	100	0,954	0,591
Rural	4953	93,0	375	6,9	5328	100		

Bivariate analysis was performed with Chi Square complex sample and obtained antenatal care results (p value: 0,000), age (p value: 0.901), education (p value: 0.032), parity (p value: 0.247), consumption of Fe (p value: 0.003), place of residence (p value: 0,000). There are four variables that have p value <0.25, namely antenatal care, education, parity, and Fe consumption. Furthermore, these variables can be analyzed by multivariate.

Table 3. Multivariate Analysis Model 1

Variables	**OR**	**P value**	**95% Confidence Interval**	
			Lower	**Upper**
Antenatal care (ANC)	1,900	0,000	1,370	2,637
Education	1,176	0,072	0,985	1,404
Parity	1,131	0,195	0,939	1,361
Consumption of Fe	1,234	0,026	1,025	1,485

After being analyzed using complex sample logistic regression, there are two variables that have a p value> 0.05 namely education and parity, so that both variables are excluded from the model starting from the variable with the largest p value.

Table 4. Multivariate Analysis Model 2

Variables	**OR**	**P value**	**95% Confidence Interval**	
			Lower	**Upper**
Antenatal care (ANC)	1,941	0,000	1,400	2,689
Fe consumption	1,246	0,019	1,036	1,499

Based on the results of the multivariate analysis above, it can be seen that the variables that are significantly related to LBW are antenatal care (ANC) with Odds Ratio (OR) 1.9 (95% CI: 1.4-2.7), meaning that the mother is undergoing antenatal examination care (ANC) less than 4 times has 1.9 times greater risk for giving birth to an infant with Low Birth Weight (LBW) compared to mothers who do antenatal care (ANC) examinations more than 4 times after being controlled by the variable Fe consumption.

Discussion

Based on the results of this study, it was found that the variable that had the most significant influence in the incidence of Low Birth Weight was antenatal care (ANC). Antenatal care (ANC) is a comprehensive pregnancy check-up performed by health worker at least 4 times during pregnancy, in accordance with care service standards to prevent and recognize pregnancy complications as early as possible, so that the mother and fetus can grow and develop healthily and optimally. The service standard performed at antenatal care (ANC) consists of weighing weight, measuring Mid-Upper Arm Circumference (MUAC), measuring blood pressure, measuring Uterine Fundus Height (UFH), calculating Fetal Heart Rate (FHR), determining fetal presentation, giving Tetanus Toxoid (TT) immunization, giving Fe tablets at least 90 tablets during pregnancy, routine and special laboratory examinations include blood type, hemoglobin, urine protein, blood sugar levels, malaria, syphilis testing, examination of human immunodeficiency virus (HIV) and Acid Fast Bacilli (AFB). Case management and Information and Education Communication (IEC) are carried out effectively[12].

The results of this study indicate that there is a significant relationship between antenatal care (ANC) and Low Birth Weight (LBW). The results of logistic regression analysis showed that mothers who visited antenatal care (ANC) at least 4 times during pregnancy had a 1.9 times greater chance or risk of giving birth to an infant with Low Birth Weight (LBW) compared to mothers who did antenatal care (ANC) examinations more than 4 times. This is in line with Nurhayani's research (2017) at RSUP Dr. M. Djamil Padang said that mothers who did antenatal care less than 4 times had a risk of 3,692 times to give birth to LBW than mothers who did complete antenatal care more than 4 times[13]. Dilaram Acharya (2018) in Nepal also stated that mothers who did ANC less than four times, had a risk three times more OR 3.4 (CI 95%: 1.1-10.2) likely to have LBW infants than mothers who did ANC four times or more[14]. This is supported by Tayie and Lartey (2008) in Ghana who stated that early antenatal care is very important for good pregnancy outcomes. The study also showed that mothers who did antenatal care (ANC) in the third trimester had 3.2 times more risk of giving birth to infants with normal birth weight compared to mothers who did not do antenatal care (ANC) in the third trimester of pregnancy (CI 95%: 1.9-5.2, P <0.0001)[15].

The cause of LBW is multifactorial, so sometimes it is difficult to take precautions. The risk of occurrence of problems in the body system in LBW infants is greater than the infants with normal birth weight because the infants with LBW conditions are unstable. Perinatal and neonatal deaths in LBW infants are 8 times greater than in normal infants. Causes of death include asphyxia, aspiration, pneumonia, intracranial hemorrhage and hypoglycemia. Nerve damage, speech disorders, and low levels of intelligence will be found if he survives[16]. However, pregnant women who routinely carry out antenatal care or ANC pregnant women can obtain comprehensive pregnancy care, so that prevention is expected to be done as early as possible such as an increase in nutrition of pregnant women and compliance with consumption of Fe tablets at least 90 tablets during pregnancy. In accordance with research conducted by Iriyani (2016) at Abdul Wahab Sjahrane Hospital in Samarinda, it is stated that pregnant women who consume less than 90 tablets of Fe tablet had 8.25 times the chance of giving birth to infants with LBW compared to pregnant women who consume more than 90 Fe tablets[17].

Conclussion

Based on data from 11,323 mothers who had given birth to infants in the last 5 years before IDHS 2017, it was found that 6.4% of mothers gave birth to infants with LBW, 4.9% of mothers had ANC <4 times during pregnancy, 26.8% of mothers aged <20 and >35 years, 52.5% of mothers with low education category, 38.2% of mothers had 1 and >4 children, and 45.3% of mothers took <90 Fe tablets during pregnancy and 48.6% lived

in rural area. The results of bivariate and multivariate analysis showed that antenatal care (ANC) was the most influential and dominant factor in the incidence of Low Birth Weight (LBW) after being controlled by Fe consumption variables. Based on the results of the study, researchers recommend increasing maternal adherence in antenatal care (ANC) examinations, which is at least 4 times during pregnancy to prevent and recognize complications as early as possible, such as LBW which can cause neonatal mortality and morbidity.

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Ethical Clearance: This research was conducted after obtaining approval from the National Population and Family Planning Board (BKKBN) via online/ website from IDHS 2017 for data processing.

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