

The Low Birth Weight in Indonesia: Does Antenatal Care Matter?

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Antenatal care is an effort to monitor pregnancy to provide the best output for mothers and their babies. This study aimed to analyse the determinants of low birth weight in Indonesia. The samples used were women aged 15-49 years old who had given birth in the last 5 years in Indonesia. The sample size was 36,548 women. The variables analysed included antenatal care visits, type of place of residence, age group, marital status, education level, employment status, and wealth status. The final stage uses binary logistic regression to determine predictors. The results of the study found that women who gave birth in the last five years who had complete antenatal care visits were 0.630 times more likely than women who did not complete antenatal care visits to give birth to a low birth weight baby (OR 0.630; 95% CI 0.556-0.715). This means that women who do not complete antenatal care visits have a higher likelihood of having low birth weight babies. Apart from antenatal care visits, the analysis also found 3 other variables that were also proven to be statistically significant predictors of low birth weight in Indonesia, namely age group, education level, and wealth status. It was concluded that antenatal care visits are a predictor of the incidence of women giving birth to low birth weight babies. Complete antenatal care visits reduce a woman's risk of having a low birth weight baby.

Keywords: *Low Birth Weight, Antenatal Care, Maternal Health, Nutrition.*

INTRODUCTION

Low birth weight (LBW) is defined as babies born weighing less than 2.500 grams according to the World Health Organisation (World Health Organisation, 2014). The Global Nutrition Targets 2025 set a 30% reduction in the LBW rate between 2012-2025 or the equivalent of 3% per year as a target (World Health Organisation, 2014). The number of LBW babies in 2015 worldwide is estimated at 20.5%, more than half (12.8%) are in Asia (United Nations

Children's Fund and World Health Organisation, 2019). Meanwhile, in Indonesia in 2018 the prevalence of LBW babies was 6.2% (National Institute Health Research And Development, 2019). This achievement decreased by 4.0% from 2013 of 10.2% (Health Research and Development Agency, 2013). Even though it has decreased, the recorded number has not met the target of reducing the LBW figure by 3% per year.

LBW has a higher risk of stunting in childhood, slower cognitive development, and even a risk of death compared to babies born above the low birth weight limit (normal). As adults, LBW babies are more at risk of being overweight and obese. Likewise, with non-communicable diseases, they are more at risk of developing heart disease and diabetes (United Nations Children's Fund and World Health Organisation, 2019). This statement is supported by several previous studies, which found that LBW children aged 0-2 years old in Indonesia are at 2.55 times the risk of experiencing stunting (Titaley *et al.*, 2019), and children aged 12-23 months have 1.74 times the risk of experiencing stunting compared to those born with normal weight (Aryastami *et al.*, 2017).

The meta-analysis result study informs that LBW individuals from childhood to adulthood (4-26 years old) have a lower IQ compared to normal birth, about 10-11 points adrift (Gu *et al.*, 2017). A study in Indonesia found that the risk of neonatal death due to LBW can be up to 9.89 times higher than that of normal birth babies (Suparmi, Chiera and Pradono, 2016). Meanwhile, a study in Switzerland states that middle-aged adults who are born with LBW have a higher prevalence of diabetes and obesity than adults who are born with normal weight (Jornayvaz *et al.*, 2016).

Previous studies identified risk factors for LBW with multifactorial causes. LBW is not caused by a single cause, but several factors are interrelated. Socio-economic, cultural, biological, maternal factors, pregnancy complications, and factors from the baby itself are known to be factors that contribute to the occurrence of LBW (Shome, Pal and Bharati, 2018; Kabir *et al.*, 2020). Other studies show the influence of genetic factors, demographics, pregnancy complications, nutrition, maternal morbidity during pregnancy, exposure to the environment, and also antenatal care (ANC) on the development of LBW (Abeywickrama, Padmadas and Hinde, 2020). Based on the background description, the study was aimed at analysing the effect of the ANC visits on the incidence of LBW in Indonesia.

METHODS

Data Source

The analysis in this study uses secondary data from the 2017 Indonesian Demographic Data Survey (IDHS). The unit of analysis in this study is women aged 15-49 years old who had given birth in the last 5 years in Indonesia. By using the sampling method stratification and multistage random sampling there were 36,548 women as respondents.

Data Analysis

LBW was defined as a birth weight of fewer than 2.500 grams (or 5.5 pounds), regardless of gestational age. Birth weight is the newborn's first bodyweight measured after birth and should be measured within the first hour of life before significant postnatal weight loss occurs (World Health Organisation, 2014).

The Ministry of Health of the Republic of Indonesia recommends that the ANC visits during pregnancy be performed at least 4 times, namely, 1 time in the first trimester, 1 time in the second trimester, and 2 times in the third trimester (Laksono, Rukmini and Wulandari, 2020). ANC visits are divided into 2 categories; incomplete ANC visits (<4 times), and complete ANC visits (≥ 4 times).

Apart from the ANC visits, other independent variables analysed included type of place of residence, age group, marital status, education level, employment status, and wealth status. All variables analysed were dichotomous variables, so the Chi-Square test was used to see the relationship between ANC visits and other variables. The binary logistic regression was used in the final stage to determine predictors and see their odds ratios. All statistical analyses were carried out using SPSS 22 software.

RESULTS

Table 1 shows the descriptive statistics of respondents. It can be seen that women who gave birth in the last five years were dominated by those who gave birth without LBW, both those who did not complete ANC visits (<4 times) and those who had complete ANC visits (≥ 4 times). Based on the type of place of residence, women who do complete ANC visits are dominated by those who live in urban areas, while those who do not complete ANC visits are dominated by those who live in rural areas.

Table 1. The descriptive statistics of ANC visits respondents (n=36,548)

Variables	ANC Visits				P
	< 4 times		≥ 4 times		
	n	%	n	%	
Low Birth Weight					***0.000
• No	1331	76.5%	11731	86.2%	
• Yes	410	23.5%	1885	13.8%	
The type of place of residence					***0.000
• Urban	599	34.4%	6972	51.2%	
• Rural	1142	65.6%	6644	48.8%	
The age group of respondents					***0.000
• 15-19	99	5.7%	317	2.3%	
• 20-24	294	16.9%	2121	15.6%	
• 25-29	380	21.8%	3467	25.5%	

• 30-34	392	22.5%	3573	26.2%	
• 35-39	330	19.0%	2729	20.0%	
• 40-44	194	11.1%	1163	8.5%	
• 45-49	52	3.0%	246	1.8%	
Marital status					***0.000
• Never in union/Divorced/Widowed	113	6.5%	395	2.9%	
• Married/Living with partner	1628	93.5%	13221	97.1%	
Education Level					***0.000
• No education	83	4.8%	121	0.9%	
• Primary	661	38.0%	3199	23.5%	
• Secondary	823	47.3%	7810	57.4%	
• Higher	174	10.0%	2486	18.3%	
Employment status					**0.001
• Unemployed	976	56.1%	7077	52.0%	
• Employed	765	43.9%	6528	48.0%	
Wealth status					***0.000
• Poorest	879	50.5%	3196	23.5%	
• Poorer	354	20.3%	2677	19.7%	
• Middle	247	14.2%	2644	19.4%	
• Richer	162	9.3%	2601	19.1%	
• Richest	99	5.7%	2498	18.3%	

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

The information in Table 1 shows that women who underwent complete and incomplete ANC were dominated by those who entered the 30-34 age group. Meanwhile, based on marital status, the two categories of ANC visits were dominated by married/living with partner women. Based on the education level, the two categories of ANC visits were dominated by women with secondary education. Based on the employment status, both categories of ANC visits were dominated by unemployed women. Meanwhile, based on wealth status in the two categories of ANC visits was dominated by the poorest women.

Table 2 shows the results of the binary logistic regression test of the incidence of women giving birth to LBW babies in Indonesia. Women who gave birth in the last five years who had complete ANC visits were 0.630 times more likely than women who did not have complete ANC visits to give birth to LBW babies (OR 0.630; 95% CI 0.556-0.715). This means that women who do not have complete ANC visits have a higher probability of giving birth to LBW babies.

Table 2. Binary logistic regression of the incidence of women giving birth to LBW babies in Indonesia (n=36,548)

Predictor	Low Birth Weight			
	P	OR	Lower Bound	Upper Bound
ANC visits: < 4 times	-	-	-	-
ANC visits: ≥ 4 times	***0.000	0.630	0.556	0.715
Type of place of residence: Urban	-	-	-	-
Type of place of residence: Rural	0.173	0.931	0.840	1.032
Age group of respondents: 15-19	-	-	-	-
Age group of respondents: 20-24	0.169	0.832	0.640	1.081
Age group of respondents: 25-29	0.050	0.773	0.598	1.000
Age group of respondents: 30-34	*0.022	0.740	0.571	0.957
Age group of respondents: 35-39	*0.018	0.728	0.560	0.948
Age group of respondents: 40-44	0.205	0.833	0.628	1.105
Age group of respondents: 45-49	0.255	0.796	0.537	1.179
Marital status: Never in union/Divorced/Widowed	-	-	-	-
Marital status: Married/Living with partner	0.758	0.963	0.758	1.224
Education Level: No education	-	-	-	-
Education Level: Primary	*0.025	0.693	0.502	0.955
Education Level: Secondary	**0.001	0.585	0.424	0.808
Education Level: Higher	***0.000	0.468	0.331	0.661
Employment status: Not employed	-	-	-	-
Employment status: Employed	0.308	0.952	0.867	1.046
Wealth status: Poorest	-	-	-	-
Wealth status: Poorer	***0.000	0.768	0.674	0.875
Wealth status: Middle	***0.000	0.706	0.613	0.813
Wealth status: Richer	***0.000	0.665	0.570	0.776
Wealth status: Richest	***0.000	0.572	0.479	0.684

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

Apart from ANC visits, the analysis also found 3 other variables that were also proven to be statistically significant as predictors of LBW in Indonesia. First, the age group, which is informed about the partial effect. Women in the 30-34 age group were 0.740 times more likely than women in the 15-19 age group to deliver an LBW baby (OR 0.740; 95% CI 0.571-0.957). Women in the 35-39 age group were 0.728 times more likely than women in the 15-19 age group to have an LBW baby (OR 0.728; 95% CI 0.560-0.948).

The second variable was education status. Women who have primary education are 0.693 times more likely than women with no education to give birth to LBW babies (OR 0.693; 95% CI 0.502-0.955). Women who have a secondary education are 0.585 times more likely than women with no education to give birth to LBW babies (OR 0.585; 95% CI 0.424-0.808). Women who have higher education are 0.468 times more likely than women with no education to give birth to LBW babies (OR 0.468; 95% CI 0.331-0.661). The results of this analysis

indicate that the better the level of education a woman has, the lower the chances of giving birth to LBW babies.

Third, is wealth status. Women with the wealth status category of poorer were 0.768 times more likely than the poorest women to give birth to LBW babies (OR 0.768; 95% CI 0.674-0.875). Women with middle-class wealth status were 0.706 times more likely than the poorest women to give birth to LBW babies (OR 0.706; 95% CI 0.613-0.813). Meanwhile, women with wealth status in the richer category were 0.665 times more likely than the poorest women to give birth to LBW babies (OR 0.665; 95% CI 0.570-0.776). Finally, the richest women were 0.572 times more likely than the poorest women to give birth to LBW babies (OR 0.572; 95% CI 0.479-0.684). The results of this analysis inform that the better the wealth status of a woman, the lower the chances of giving birth to LBW babies.

DISCUSSION

The results of the study found that women who did not have complete ANC visits had a higher probability of giving birth to LBW babies. This information shows that ANC visits are one of the factors identified to be able to prevent LBW. Previous research has shown that pregnant women who make ANC visits are less likely to give birth to babies with low birth weight compared to those who do not (Siramaneerat, Agushyana and Meebunmak, 2018; Abeywickrama, Padmadas and Hinde, 2020).

Meanwhile, based on the IDHS report, it was stated that one ANC visit was associated with a 1.04% point decrease in the chance of neonatal death and a 1.07% point lower chance of infant mortality (National Population and Family Planning Board *et al.*, 2018). A previous study conducted in Nepal also informed that mothers who did ANC <4 times, did not get iron and folic acid tablets, caring drugs, and did not consume additional food during pregnancy had a risk of giving birth to LBW babies (Acharya *et al.*, 2018).

Age group was found to be one of the predictors for a woman to deliver LBW babies. Similar findings were also confirmed in previous research in Indonesia. Children born to young mothers (15-19 years old) have a 94% higher risk when compared to children born to mothers aged between 20-35 years (Suparmi, Chiera and Pradono, 2016). Another study in Indonesia found that mothers who gave birth to babies aged between 20-34 years had a risk of giving birth to LBW babies of 0.723 compared to those who gave birth at the age below 20 years old. (Siramaneerat, Agushyana and Meebunmak, 2018). Meanwhile, Hutagalung's research results indicate that the dominant factor in LBW is related to the mother's age (Hutagalung, 2017)

The result shows that the better the level of education a woman has, the lower the chances of having an LBW baby. Better education allows a better understanding of the needs of pregnant women to prevent LBW babies. Several previous studies found the same thing, that women



who are less educated have a higher chance of giving birth to LBW babies (Shome, Pal and Bharati, 2018; Apte *et al.*, 2019; Alemayehu, Chernet and Dumba, 2020). Better levels of education are often found to be positive predictors of health performance (Ipa *et al.*, 2020; Wulandari and Laksono, 2020b, 2020a). Otherwise, lower levels of education are potentially a barrier to performance in the health sector (Laksono and Wulandari, 2020; Rohmah *et al.*, 2020).

Based on the wealth status, it was found that the better the wealth status of a woman, the lower the chances of giving birth to LBW babies. Poverty as a predictor of the likelihood of a woman giving birth to LBW babies was also found in research in Sub-Saharan Africa. The study reported that the incidence of LBW was high in poor women with a doubled risk of developing LBW. The study also informed that pregnant women who did not implement ANC had a 1.6 times risk of giving birth to LBW babies (Assefa, Berhane and Worku, 2012). While the results of a demographic survey in Ethiopia show maternal age, welfare index, marital status, education are significant factors affecting infant size and newborn weight (Nigatu *et al.*, 2019). Poor households have limitations in providing food for all family members, including pregnant women. Food availability is not applicable in quantity and quality. This is related to the increased need for macro and micronutrition in pregnant women and their importance for both mother and fetus. For pregnant women, the mother's nutritional status is an indicator of adequate food and nutrition. Longitudinal studies in rural and urban areas in Malaysia identified predictors of LBW in both regions. Maternal age, malnutrition, and parity are risk factors for LBW in pregnant women in rural areas, however, these risk factors do not appear to have a significant relationship in urban areas (Kaur *et al.*, 2019). A previous study identified acute and chronic malnutrition concerning food insecurity and intake. Prenatal interventions and the provision of additional food for children during food insecurity can help reduce malnutrition in children (Rogawski McQuade *et al.*, 2019).

CONCLUSIONS

Based on the research results, it can be concluded that the ANC visits are a predictor of the incidence of women giving birth to LBW babies. Complete ANC visits reduce a woman's risk of having an LBW baby. Three other variables were also found as predictors of a woman to deliver LBW babies. The three of them were age group, education level, and wealth status.

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ETHIC AND CONSENT

The National Ethics Commission has approved the ethical clearance of the 2017 IDHS. The respondents' identities have all been deleted from the dataset. Respondents have provided written approval for their involvement in the study. The author has obtained permission to use



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the 2017 IDHS data from ICF International through its website:
<https://dhsprogram.com/data/new-user-registration.cfm>.



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