Demographic Characteristics of Mother as Predictor of Low Birth Weight in Eastern Indonesia

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ABSTRACT

Eastern Indonesia is a region that is noted to often have a lower public health status than Western Indonesia. This study was aimed to analyze the demographic characteristics of a mother as a predictor of LBW in Eastern Indonesia. The study employed the 2017 Indonesian Demographic Health Survey data. The study population was women aged 15-49 years old who had given birth in the last 5 years in Eastern Indonesia. The analysis involved 6 independent variables, namely type of place of residence, age group, marital status, education level, employment status, and wealth status. The study employed 6,636 respondents. Binary Logistic Regression was used for the final stage. The results inform is getting older, the possibility of women in Eastern Indonesia is getting bigger to have LBW babies. Women with higher education levels are 0.400 times more likely than no education women to have LBW babies (OR 0.400; 95% 0.293-0.545). Category women in wealth poorer have a probability of 0.789 times compared to the poorest women to give birth to LBW babies (OR 0.789; 95% CI 0.671-0.928). The women in the wealth middle category had 0.773 times the probability of having LBW babies (OR 0.773; 95% CI 0.621-0.963). It could be concluded that 3 variables were proven as predictors of LBW in Eastern Indonesia, namely age group, education level, and wealth status.

BACKGROUND

Low Birth Weight (LBW) is one of the prenatal predictors of mortality and morbidity which is also an indicator of nutritional adequacy during the intrauterine period. Characterized by the child's birth weight less than 2500 grams. LBW is known to have an impact on the problem of intergenerational malnutrition¹. Babies born with LBW have the potential to experience malnutrition in adulthood due to stunting², the emergence of non-communicable diseases such as diabetes mellitus, and cardiovascular disease caused by metabolic disorders of the body^{3–5}. Moreover, when they are adults they will be malnourished and will have the potential to give birth to a malnourished generation as well. And so on, like a link that never breaks in the life cycle if optimal intervention is not done⁶.

Previous studies identified the impact of LBW on children's growth and development. Growth, which is defined as an increase in body size/cell, is characterized by an increase in weight and height according to age, while development is an increase in the ability to function in the body as a result of the maturation process such as speaking, motor skills, and social personality7. The relationship between LBW and child growth is also explained in the basic concept of nature and nurture interactions as well as heredity and the environment which in other terms is the concept of epigenetic theory. Where the growth and development of children are influenced by the interaction between biological processes and their environment. Furthermore, it was explained that the biological potential which is the natural innate nature of the body will grow and develop optimally if it is in an optimal environment too8.

This environment begins when the fetus is formed in preconception, which means during pregnancy. Maternal health and nutritional adequacy during pregnancy are factors that influence optimal pregnancy output^{9,10}. Another study identified adverse environmental effects Keywords: Low birth weight, maternal health, nutrition, Eastern Indonesia.

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such as lack of stimulation, the presence of malnutrition such as stunting, LBW, iodine deficiency, and other micronutrients as risk factors for growth failure and child development¹¹. A longitudinal study in Brazil linked the cognitive performance of pre-school age children with preterm conditions and LBW¹¹. In another study, it was stated that LBW was associated with cognitive abilities at the age of 8 years, 11 years, and 15 years after controlling for other variables such as gender, father's social class, mother's age. Children born with low birth weight babies tend to be more difficult to manage or educate because sometimes there is permanent brain damage¹².

Globally, the estimated LBW rate is still 15-20% of births worldwide from an estimated 20 million births per year³. Meanwhile, in Indonesia, the percentage of LBW according to the results of the 2018 Indonesia Basic Health Survey was 6.2% which was obtained from a cross-sectional survey that reported 56% ownership of birth records¹³This percentage is similar to the percentage of LBW in Asia Pacific which is 6%³. The percentage of LBW in Indonesia is reported to have decreased compared to the previous period. In 2010 it was 11.1% and decreased to 10.2% in 2013, and 6.2% in 2018¹³.

Indonesia is divided into three territorial times, namely Western Indonesia, Central Indonesia, and Eastern Indonesia. The three of them have different geographic and human resource potentials. Eastern Indonesia tends to be lagging behind other regions^{14,15}. The achievements of the Public Health Development Index (PHDI) are also known to be different. Based on the results of the PHDI in 2013 and 2018, the 10 lowest districts are in the Eastern Indonesia region. Meanwhile, 10 districts with the highest Public Health Development Index are in the western and central parts of Indonesia^{16–19}. This disparity cannot be separated from the demographic characteristics of the people in the three regions. Based on the background description, this study aims to analyze the demographic characteristics of the mother as a predictor of LBW in Eastern Indonesia.

METHODS

Data Source

The analysis in this study uses secondary data from the 2017 Indonesian Demographic Data Survey (IDHS). The study population was women aged 15-49 years old who had given birth in the last 5 years in Eastern Indonesia. Eastern Indonesia is a region in Eastern Indonesia that covers 5 provinces, namely East Nusa Tenggara, Maluku, North Maluku, West Papua, and Papua²⁰. By using the sampling method stratification and multistage random sampling obtained 6,636 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 occurs³.

The analysis involved 6 independent variables, namely type of place of residence, age group, marital status, education level, employment status, and wealth status. At the initial stage, a bivariate test was carried out with the chi-square test. The binary logistic regression was used in the final stage to determine predictors and see their odds ratios. All statistical tests were carried out using SPSS 22 software.

Ethical Statement

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

RESULTS

Table 1 presents descriptive statistics of the demographic characteristics of the respondents. Based on the type of place of residence, it can be seen that the LBW category is dominated by women who live in rural areas. Based on the age group, women who gave birth to LBW babies were dominated by women in the 35-39 age group. Meanwhile, based on marital status, is dominated by married women. Moreover, Table 1 informs that the two categories of LBW status are dominated by women with secondary education. Based on employment status, the two categories of LBW status are dominated by employed women. Finally, based on wealth status, the two categories of LBW status are dominated by the poorest women.

Tabel 1. Descriptive s	tatistics of demographi	c characteristics o	of respondents ((n=6.636)
The second secon				

	Low Birth Weight				
Demographic Characteristics	No		Yes		Р
	n	%	n	%	
Type of Place of residence					***0.000
Urban	694	29.4%	1031	24.1%	
Rural	1665	70.6%	3246	75.9%	
Age group					***0.000
15-19	62	2.6%	31	0.7%	
20-24	364	15.4%	170	4.0%	
25-29	580	24.6%	572	13.4%	
30-34	637	27.0%	1098	25.7%	
35-39	470	19.9%	1329	31.1%	
40-44	188	8.0%	809	18.9%	
45-49	58	2.5%	268	6.3%	
Marital status					*0.010
Never in union/Divorced/Widowed	108	4.6%	142	3.3%	
Married/Living with partner	2251	95.4%	4135	96.7%	
Education level					***0.000
No education	89	3.8%	262	6.1%	
Primary	615	26.1%	1694	39.6%	
Secondary	1194	50.6%	1955	45.7%	
Higher	461	19.5%	366	8.6%	
Employment status					***0.000
Unemployed	1157	49.1%	1905	44.6%	
Employed	1200	50.9%	2371	55.4%	
Wealth status					***0.000
Poorest	1475	62.5%	3092	72.3%	
Poorer	402	17.0%	578	13.5%	
Middle	212	9.0%	258	6.0%	
Richer	173	7.3%	237	5.5%	
Richest	97	4.1%	112	2.6%	

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

Table 2 shows the result of binary logistic regression of the LBW in Eastern Indonesia. In this final analysis, "no LBW" was chosen as the reference.

Table 2 informs that omen in the 25-29 age group were 2.160 times more likely than women in the 15-19 age

group to have LBW babies (OR 2.160; 95% CI 1.375-3.392). Women in the 35-39 age group were 5.908 times more likely than women in the 15-19 age group to have LBW babies (OR 5.908; 95% CI 3.767-9.266). Women in the 45-49 age group were 8.510 times more likely than women in the 15-19 age group to have LBW babies (OR 8.510; 95% CI 5.038-14.375). The results of this analysis inform that the older the women in Eastern Indonesia are, the greater the chance of having LBW babies.

Women with higher education levels are 0.400 times more likely than no education women to have LBW babies (OR 0.400; 95% 0.293-0.545). This information shows that higher education is a protective factor for women in Eastern Indonesia from giving birth to LBW babies.

Category women in wealth poorer have a probability of 0.789 times compared to the poorest women to give birth to LBW babies (OR 0.789; 95% CI 0.671-0.928). The women in the wealth middle category had 0.773 times the probability of having LBW babies (OR 0.773; 95% CI 0.621-0.963). The results of this study inform that wealth status is one of the predictors for women giving birth to LBW babies in Eastern Indonesia.

	Low Birth Weight				
Predictor	Р	OR	Lower	Upper	
Place of residence			Bound	Bound	
Urban	-	-	-	-	
Rural	0.530	1.045	0.911	1.199	
Age group					
15-19	-	-	-	-	
20-24	0.887	0.966	0.603	1.549	
25-29	**0.001	2.160	1.375	3.392	
30-34	***0.000	3.760	2.402	5.887	
35-39	***0.000	5.908	3.767	9.266	
40-44	***0.000	8.290	5.197	13.224	
45-49	***0.000	8.510	5.038	14.375	
Marital status					
Never in union/Divorced/Widowed	-	-	-	-	
Married/Living with partner	0.637	1.070	0.808	1.417	
Education level					
No education	-	-	-	-	
Primary	0.841	1.028	0.783	1.350	
Secondary	0.094	0.792	0.603	1.040	
Higher	***0.000	0.400	0.293	0.545	
Employment status					
Not employed	-	-	-	-	
Employed	0.367	1.053	0.941	1.179	
Wealth status					
Poorest	-	-	-	-	
Poorer	**0.004	0.789	0.671	0.928	
Middle	*0.022	0.773	0.621	0.963	
Richer	0.461	0.913	0.717	1.163	
Richest	0.061	0.737	0.536	1.014	

Table 2. The results of binary logistic regression of the LBW in Eastern Indonesia ((n=6,636)	
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Note: *p < 0.05; **p < 0.01; ***p < 0.001.

DISCUSSION

The results of the analysis found that age is one of the predictors for the possibility of women in Eastern Indonesia giving birth to LBW babies. The results of previous studies that took research areas in Indonesia also provide similar results^{21–23}. A study in India informed that age, together with maternal BMI and consumption of IFA tablets were also found to be predictors of LBW²⁴. Meanwhile, a study in Brazil reported that maternal age, education level, parity, and a number of prenatal visits, multivariate roles as predictors of LBW baby²⁵.

The results showed that higher education is a protective factor for women in Eastern Indonesia from giving birth to LBW babies. The results of this analysis confirm the results of previous studies which found that poor education is a risk factor for LBW babies^{26–28}. A better level of education can provide a better understanding of prevention and risk factors^{29–31}. Better education levels are often found to be a positive determinant of performance output in health^{32,33}. On the other hand, poor education is informed as a barrier to achieving better performance output in the health sector^{34,35}.

Wealth status was also found as a predictor for women giving birth to LBW babies in Eastern Indonesia. This finding is in line with the results of research in Sub-Saharan Africa and Ethiopia^{36,37}. A study in Sub-Saharan Africa, which found wealth status as a predictor of a woman giving birth to LBW babies, informed that the incidence of LBW was high in the poor women³⁶. Meanwhile, a study in Ethiopia informs maternal age, welfare index, marital status, and education level are predictors of LBW babies. The predictor has been shown to affect infant size and newborn weight³⁷. This information strengthens some of the results of previous studies which inform that wealth status is a determinant of output or performance in the health sector. The better the wealth status, the better the output that can be generated^{38,39}.

Study Limitation

This study has limited variables involved in the analysis. Several variables have been known from previous research as predictors of LBW, but due to limited data received from the 2017 IDHS, they are not analyzed. Among them are maternal BMI and consumption of IFA tablets²⁴, maternal weight gain and co-morbidity during pregnancy⁴⁰, number of antenatal care⁴¹, quality of antenatal care⁴², and level of hemoglobin⁴³.

CONCLUSIONS

Based on the research results, it could be concluded 3 variables were proven as predictors of LBW in Eastern Indonesia. The three variables were age group, education level, and wealth status.

ACKNOWLEDGEMENT

The author would like to thank the ICF for allowing the use of the 2017 IDHS.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

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