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Relationship of sociodemographic factors and low birth weight in toddlers

Original article

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Abstract: **Objective:** This study analyzes the relationship between sociodemographic factors and low birth weight (LBW) in toddlers.
Methods: The research design uses a correlational method. The population is 303 mothers with toddlers aged 12–60 months in Lojejer Wuluhan Jember Village, East Java, Indonesia. The cluster sampling took 172 samples in total. The sociodemographic variables measured included the father's and the mother's age, the father's and mother's education, family income, the father's occupation, the mother's occupation, and the child's gender. Data collection techniques used questionnaires and document studies in the Maternal Child Health (MCH) handbook. Data were analyzed using logistic regression.
Results: The results showed that the variable age of the father and mother ≥20 years was a protective factor for the incidence of LBW. Family income <IDR 3,000,000 per month, fathers with farm workers and fishermen as occupation, male sex, and low father's education were predictor factors for LBW.
Conclusions: This study concluded that the variable sociodemographic factors related to LBW in toddlers in Lojejer Wuluhan Village, Jember district, East Java Province, Indonesia. Therefore, the government needs to establish stricter policies in terms of maturing the age of marriage to reduce the incidence of LBW.

Keywords: *early marriage • low birth weight • sociodemography • toddler • family income*

1. Introduction

Birth weight is a predictor of mortality and morbidity in infants. One of the main health problems associated with birth weight is low birth weight (LBW). LBW is a condition with a birth weight of <2500 g regardless of gestational age with a high risk of death. LBW is associated with various short-term and long-term adverse consequences. LBW babies are facing an increased risk of death and frequency of morbidity compared to full-term babies. In addition to survival implications, LBW has been associated with an increased risk of malnutrition and lifelong complications such as neurodevelopmental disorders, noncommunicable diseases, and metabolic disorders.[1]

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The estimation of the global prevalence of LBW is at 15%–20% in >20 million births in a year.[2] Regional estimates of LBW are 28% in South Asia, 6% in East Asia and the Pacific, 13% in Sub-Saharan Africa, and 9% in Latin America.[3] The proportion of LBW in the Southeast Asian Region reached 12.3% with the 6 highest prevalence countries. These are 20.1% in the Philippines, 17.3% in Laos, 12.3% in Myanmar, 12.1% in Cambodia, 10% in Indonesia, and 8.2% in Vietnam.[4]

Every year, 1.1 million babies are estimated to die due to LBW, and in Indonesia, the neonatal mortality rate (NMR) reached 60,000 cases in 2019. Indonesia is in the top 10 countries with the highest NMR, equivalent to 12.1 per 1000 live births.[5,6] The national prevalence shows that the incidence of LBW in 34 provinces in Indonesia reaches 111,719 babies with a mortality rate due to LBW reaching 34.5%.[7] There are 5 provinces in Indonesia with the highest prevalence of LBW. These are West Java with 22,574 babies, East Java with 18,739 babies, East Nusa Tenggara with 7784 babies, South Sulawesi with 6254 babies, and Lampung with 4812 babies. This previous report shows that East Java is the province with the second-highest incidence of LBW in Indonesia.[8]

The prevalence of LBW in East Java reached 3.8% of live births with a mortality rate due to LBW reaching 987 babies.[9] The highest incidence of LBW in East Java was in Malang Regency, which reached 1382 babies. Second was Probolinggo, which reached 989 babies. The prevalence of LBW babies in Jember is 356 babies (10.1%), with a proportion of 172 baby boys and 184 baby girls out of 3536 babies weighed.[10] The prevalence of LBW in Jember Regency in the last 5 years shows increased cases. In 2016, it was 0.9%; in 2018, it was 3.32%, and it will be 5.51% in 2020.[11] The prevalence of LBW in Jember Regency was 101 infants in Sumberjambe District, 91 infants in Kalisat District, 73 infants in Ledokombo District, 71 infants in Sukowono District, and 56 infants in Bangsalsari District.[12]

There is no single factor; several factors cause the incidence of LBW.[13] Risk factors include socioeconomic characteristics and maternal characteristics.[14] Socioeconomic factors include type of residence, type of work, parents' educational status, and wealth level.[15] Meanwhile, maternal factors include premature delivery, history of LBW, mother's age, height, hemoglobin level, lack of iron supplementation, and frequency of antenatal care (ANC) visits.[16] Other risk factors, namely, the education level of the partner, the father's employment status and status of residence in the village, and delays in using health facilities during the antenatal period are also associated with the incidence of LBW.[17]

LBW will have an impact on increasing comorbidities in infants, which cause energy expenditure and abnormalities in endocrine function, central nervous system disorders, sucking reflexes, and swallowing reflexes. Respiratory disorders can also occur in LBW babies, such as a high risk of asphyxia with low APGAR values. LBW also has an impact on increasing long-term morbidity in infants, especially neurodevelopmental disorders such as mental retardation, learning disabilities, poor language development, and intellectual disorders.[18]

LBW babies require different and intense care, so nurses need to consider the needs of babies and parents during discharge planning by increasing the mother's readiness and facilitating the baby's transition from hospital to home. Nurses play a role in developing the ability to cope with the role of baby parents, parent–infant relationships, changing emotions, and managing personal needs in caring for LBW babies. Proper discharge planning by nurses taking into account the needs of parents also increases self-confidence in caring for their babies.[19] Based on this description, this study aims to determine the relationship between the sociodemographic factors and the incidence of LBW in toddlers. The novelty of this research is identifying the incidence of LBW in rural communities, primarily coastal areas.

2. Research methods and materials

2.1. Study design

Correlational research design.

2.2. Population and sampling

The population in this study were mothers with toddlers aged 13–60 months in the working area of the Lojejer Health Center. From the population size of 303, the Slovin formula was determined to obtain 172 samples. The sampling technique is the cluster sampling method. The randomly selected location is Lojejer Village. Sampling was carried out proportionally at 6 Posyandu in Lojejer Village.

2.3. Variables and variable operational definitions

The sociodemographic variables measured included the father's age, the mother's age, the father's education, the mother's education, the family income, the father's occupation, the mother's occupation, the under-5 gender, and the birth weight. The age of the father/mother is measured by calculating the date of birth until the time of data collection in a yearly unit. The age measured is divided into 3 categorical data: age <20 years, between 20 years and 35 years of age, and >35 years of age.

The father's and mother's education is the history of education that the father/mother has passed until graduation. Education is measured and divided into 3 categorical data. These are elementary (sekolah dasar), junior high school (sekolah menengah pertama), and high school (sekolah menengah atas). Family income is calculated by adding up the monthly income of the father and the mother. Income is grouped into 3 categories: >IDR 3,000,000; between IDR 1,000,000 and IDR 3,000,000; and <IDR 1,000,000. The father's/mother's occupation is the job owned by the father and the mother at the time of data collection. The father's/mother's occupation is measured in a categorical form, which is divided according to the study's results. Fathers' occupations are divided into 4 categories: entrepreneur, farmer, farm laborer, and fisherman. Mothers' occupations are divided into 3 categories: housewives, self-employed, and civil servants. The sex of the child is measured on a nominal scale, namely, boys and girls. Birth weight is the history of a toddler's weight at birth in grams. Birth weight was measured in categorical data provided that <2500 g was included in LBW and ≥2500 g was not included as LBW.

2.4. Data collection and analysis techniques

Data collection techniques for sociodemographic variables used questionnaires and LBW variables used document studies from Maternal Child Health (MCH) books. Data analysis in this study used logistic regression.

2.5. Ethical principles

This study has been approved by the Health Research Ethics Committee of the Faculty of Health Sciences, University of Muhammadiyah Jember (IRB approval number: 0060/KEPK/FIKES/2022). The application of ethical principles in this research includes respecting human dignity (respect for persons), doing good (beneficence) and not harming (non-maleficence), and justice, i.e., treating everyone (as an autonomous person) the same as moral right and worthy of their rights. The respondent's willingness to voluntarily sign an informed consent sheet after receiving an explanation indicates the participation approval.

3. Results

Table 1 describes that the age of the father and the mother are related to the incidence of LBW. Almost all LBW are born to mothers who are <20 years old. Father's education is also related to the incidence of LBW. Fathers with elementary school education tend to have babies born with LBW. Likewise, Table 1 describes that parents' income is related to the incidence of LBW. Parents who have an income >Rp. 3,000,000 have more babies born with a birth weight ≥2500 g. Father's occupation is also associated with the incidence of LBW. The proportion of LBW is more significant for fathers who work as farm laborers and fishermen. Ultimately, Table 1 also shows that gender is related to the incidence of LBW, and that boys under 5 years old have a more significant proportion of LBW babies than girls.

Table 2 presents that the father's age ≥20 years protects the family from LBW. These results mean that an increase in age is associated with a decrease in a father's chances of having a baby born with a history of LBW. The OR value of 0.027 shows changes in the chance of reducing LBW in the father's age group between 20 years and 35 years. This result means that the father's age group between 20 years and 35 years is associated with a 99.97% decrease in the likelihood of having a toddler born with a history of LBW. The OR value of 0.017 shows the change in the chance of reducing LBW at the father's age >35 years. This result means that the father's age group >35 years is associated with a 99.98% decrease in the likelihood of having a toddler born with a history of LBW.

Table 2 describes the maternal age ≥20 years as a protective factor for LBW. These results mean that an increase in age is associated with a decrease in a mother's chances of having a toddler born with a history of LBW. The OR value of 0.031 shows changes in the chance of reducing LBW among mothers aged between 20 years and 35 years. This result means that mothers in the age group between 20 years and 35 years are associated with a 99.96% decrease in the likelihood of having babies born with a history of LBW. The OR value of 0.019 shows changes in the chance of reducing LBW in the group of mothers aged >35 years. This result means that the group of mothers aged >35 years is associated with a 99.98% decrease in the likelihood of having a toddler born with a history of LBW.

Table 2 illustrates that family income is related to the incidence of LBW. Families whose income is between IDR 1.000.000 and IDR 3,000,000, has the possibility of 3.742 times more likely to have a toddler born with LBW compared to families who earn >IDR 3,000,000. The lowest estimate is 1.745 times and the highest is 8.028 times more likely to have a toddler born with LBW. Families with an income of <IDR 1,000,000 are 5.981 times more likely to have a toddler born with LBW compared to families with an income of >IDR 3.000.000. The lowest estimate is 2.122 times and the highest is 16.861 times more likely to have a toddler born with LBW.

Variable	LBW			*P*-value
	No (n = 91)	Yes (n = 81)	Total	
Father's age (years old)				<0.001
<20	19 (20.9%)	74 (91.4%)	93 (54.1%)	
20–35	57 (62.6%)	6 (7.4%)	63 (36.6%)	
>35	15 (16.5%)	1 (1.2%)	16 (9.3%)	
Mother's age (years old)				<0.001
<20	20 (22.0%)	74 (91.4%)	94 (54.7%)	
20–35	56 (61.5%)	6 (7.4%)	62 (36.0%)	
>35	15 (16.5%)	1 (1.2%)	16 (9.3%)	
Father's education				0.013
Primary Education	30 (33.0%)	36 (44.4%)	66 (38.4%)	
Junior High School	19 (20.9%)	25 (30.9%)	44 (25.6%)	
Senior High School	42 (46.2%)	20 (24.7%)	62 (36.0%)	
Mother's education				0.549
Primary Education	33 (36.3%)	36 (44.4%)	69 (40.1%)	
Junior High School	39 (42.9%)	30 (37.0%)	69 (40.1%)	
Senior High School	19 (20.9%)	15 (18.5%)	34 (19.8%)	
Family income (IDR)				<0.001
>3,000,000	38 (41.8%)	12 (14.8%)	50 (29.1%)	
1,000,000–3,000,000	44 (48.4%)	52 (64.2%)	96 (55.8%)	
<1,000,000	9 (9.9%)	17 (21.0%)	26 (15.1%)	
Father's occupation				<0.001
Self-employed	38 (41.8%)	12 (14.8%)	50 (29.1%)	
Farmer	30 (33.0%)	12 (14.8%)	42 (24.4%)	
Farm workers	15 (16.5%)	39 (48.1%)	54 (31.4%)	
Fisherman	8 (8.8%)	18 (22.2%)	26 (15.1%)	
Mother's job				0.417
Housewife	60 (65.9%)	59 (72.8%)	119 (69.2%)	
Self-employed	28 (30.8%)	18 (22.2%)	46 (26.7%)	
Civil servant	3 (3.3%)	4 (4.9%)	7 (4.1%)	
Gender toddler				0.010
Male	36 (39.6%)	48 (59.3%)	84 (48.8%)	
Female	55 (60.4%)	33 (40.7%)	88 (51.2%)	

Note: LBW, low birth weight.

Table 1. Respondent variable descriptive statistics (n = 172).

Table 2 also explains that the father's occupation is related to the incidence of LBW. Fathers who work as farm laborers are 8.233 times more likely to have babies born with LBW compared to fathers who work as entrepreneurs. The lowest estimate is 3.233 times and the highest is 19.866 times more likely to have a toddler born with LBW. Fathers who work as fishermen are 7.125 times more likely to have babies born with LBW compared to fathers who work as entrepreneurs. The lowest estimate is 2.479 times and the highest is 20.480 times more likely to have a toddler born with LBW.

Table 2 explains that male toddlers are associated with LBW events. Boys are 2.222 times more likely to be born with LBW than girls. The lowest estimate is 1.207 times and the highest is 4.093 times more likely that male toddlers are born with a history of LBW.

Table 2 also describes that the father's education is related to the incidence of LBW. Fathers with an elementary school education are 2.520 times more likely to have babies born with a history of LBW compared to fathers with a high school education. The lowest estimate is 1.227 times and the highest is 5.177 times more likely to have a toddler born with a history of LBW. Fathers who have a junior high school education are 2.763 times more likely to have babies born with a history of LBW compared to fathers who have a high school

Variables	*P*-value	LBW		
		OR	Lower bound (95% CI)	Upper bound (95% CI)
Father's age (years old)				
<20*	–	–	–	–
20–35	<0.001	0.027	0.010	0.072
>35	<0.001	0.017	0.002	0.138
Mother's age (years old)				
<20*	–	–	–	–
20–35	<0.001	0.031	0.012	0.082
>35	<0.001	0.019	0.002	0.152
Family income (IDR)				
>3,000,000*				
1,000,000–3,000,000	0.001	3.742	1.745	8.028
<1,000,000	0.001	5.981	2.122	16.861
Father's occupation				
Self-employed*	–	–	–	–
Farmer	0.619	1.267	0.499	3.218
Farm workers	<0.001	8.233	3.233	19.866
Fisherman	<0.001	7.125	2.479	20.480
Gender toddler				
Man	0.010	2.222	1.207	4.093
Woman*	–	–	–	–
Father's education				
Primary Education	0.012	2.520	1.227	5.177
Junior High School	0.013	2.763	1.242	6.147
Senior High School*	–	–	–	–

Note: CI, confidence interval; LBW, low birth weight; *Reference; CI of 95%; *P*-value ≤0.05.

Table 2. Results of logistic regression analysis of the relationship between the sociodemographic factors and the LBW babies (n = 172).

education. The lowest estimate is 1.442 times and the highest is 6.147 times more likely to have a toddler born with a history of LBW.

4. Discussion

The study results show that a father's age ≥20 years is a protective factor for LBW. Fathers aged ≥20 years are associated with a decreased chance of a father having a toddler born with LBW. Empirically, the father's age of >20 years is proven to have a lower probability of having a baby with LBW. A retrospective study has associated paternal age with birth weight in infants. Fathers who are under 25 years old and over 44 years old have a higher probability of having LBW babies. Other studies have consistently shown that, in Finland, babies born to young fathers (<25 years) have an increased risk of LBW.[20]

The study results show that maternal age ≥20 years is a protective factor for LBW. Mothers aged ≥20 years are associated with a decreased chance of a mother having a toddler born with a history of LBW. Empirically, it can be proven that mothers over 20 years of age have a lower probability of having babies with LBW. This finding is in line with a cross-sectional study in China that mothers aged 24–34 years have the lowest likelihood of having a child with LBW.[21] A case-control study revealed a significant effect between the maternal age and the incidence of LBW. Mothers aged <20 years have a uterus and pelvis that have not grown optimal until they reach adult size. As a result, disruption of the safety and health of the fetus in the womb could occur, and the mother can suffer from anemia because it has to share red blood cells with the fetus.[22]

The study results show that family income is related to the incidence of LBW. Families with income <IDR 3,000,000 are associated with an increased chance of having a toddler born with a history of LBW. Based on these results, low-income families are proven to have

a greater risk of having babies born with LBW. Consistent with complex surveys with linear model-based research in Afghanistan, Bangladesh, Nepal, and Pakistan, it shows that LBW babies are generally born to underprivileged or low-income families.[23] This study provides empirical evidence that families with an income of <IDR 1,000,000 have the potential to have children with LBW 5.9 times. Families with a monthly income of <IDR 1,500,000 are included in the low-income or underprivileged families category.[24] Consistent with these findings, a study in Israel revealed that lower income is associated with higher odds of LBW.[25]

The study results show that the father's occupation is related to the incidence of LBW. Fathers who work as farm laborers and fishermen are more likely to have babies born with a history of LBW compared to fathers who work as entrepreneurs. This study proves empirically that more LBW babies are born to fathers who work as farm laborers and fishermen. These findings are consistent with previous studies that show that work characteristics are associated with birth weight in infants, especially in agricultural sector workers.[17] A retrospective study in Morocco showed similar results for LBW babies in rural areas with fathers working as laborers or non-formal jobs.[26]

This study found that male toddlers were associated with the incidence of LBW. Boys are more likely to be born with LBW than girls. These findings show that, empirically, male babies are at risk of 2.2 times experiencing LBW. These results are consistent with a systematic review, which revealed that the highest percentage of LBW events was in male babies.[27]

Father's education is related to the incidence of LBW. Fathers who have elementary and junior high school education are more likely to have babies born with a history of LBW compared to fathers who have high school education. These findings show that the lower the education level of the father, the higher the potential for having a child with LBW. This finding is consistent with a cohort study in Tanzania, which revealed that fathers with low levels of education are at potential risk for having LBW babies.[3,9,28] Other studies also show similar results that a low father's education level has an impact on the incidence of LBW, which is an indirect effect (direct effect), meaning that fathers with a low education level may have less access to healthcare resources.[29]

5. Conclusions

This study concluded that the variable family income <IDR 3,000,000, the father's work as a farm laborer and fisherman, male gender, and the father's education in elementary and junior high school is a predictor factor in the incidence of LBW in toddlers in Lojejer Village, Jember district. Meanwhile, the age of the father and the mother ≥20 years is a protective factor for the incidence of LBW in toddlers in Lojejer Village, Jember Regency, East Java Province, Indonesia.

Limitations

This study uses a cross-sectional design, so the results cannot identify variable changes over time.

Suggestion

In future research, researchers can conduct longitudinal studies to test variable changes over time.

Ethical approval

We have added in the manuscript that this study has been approved by the Health Research Ethics Committee of the Faculty of Health Sciences, University of Muhammadiyah Jember (IRB approval number: 0060/KEPK/FIKES/2022).

Conflicts of interest

All contributing authors declare no conflicts of interest.

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