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Advanced Maternal Age and Low Birth Weight in Primigravid Births

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ABSTRACT

Background: The number of women who delay pregnancy is increasing. Advanced Maternal Age/ AMA (pregnancies in women aged 35 years or older) have increased risks of complications, such as low birth weight/LBW (up to 1.59 times). The aim of this study is to know the association between AMA with LBW in primigravid births.
Subjects and Method: This descriptive and analytical, cross sectional research consists of 169 primigravid births in Atma Jaya Hospital Jakarta, collected with a total sampling method for births between February 2016 to September 2021 meeting inclusion criteria. Independent variable included primigravid maternal age and dependent variable included birth weight. Prematurity was used as a dependent variable and an independent variable in two separate analyses. Characteristics of data are described, and analyses were done with the Fisher's exact test for the associations between primigravid AMA and LBW, , between primigravid AMA and prematurity, and between primigravid prematurity and LBW Spearman's correlation test was done for the correlation between primigravid maternal age and birth weight.
Results: The proportions of women with higher education and maternal diseases are more elevated in AMA. LBW prevalence is 14.79%. The proportion of LBW is higher in AMA (OR=2.045; CI 95% 0.513 to 8.147), with statistically insignificant association (p=0.253). The correlation between maternal age and birth weight is insignificant (p=0.113). AMA has insignificantly higher odds for prematurity (OR=1.139; CI 95% 0.234 to 5.538; p=0.567). The association between prematurity and LBW is highly significant (OR 49.224; CI 95% 15.470 to 156.621; p<0.001).
Conclusion: Primigravid women aged ≥35 years have higher proportions of maternal diseases. Despite being statistically insignificant, AMA has higher odds for LBW. Prematurity is highly associated with LBW. Further research concerning high-risk maternal age needs to be done to improve women's and children's health.

Keywords: advanced maternal age, primigravida, low birth weight.

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BACKGROUND

The number of women with higher education choosing to delay marriage and pregnancy increases with time. The National Social Economy Survey (Susesnas) states that Indonesian women's level of education is increasing from time to time (Indonesia Women's Profile 2013, 2013; Indonesia Women's Profile 2019, 2019). Indonesia Demographic and Health Survey (DHS) shows that the median age of first marriage rises with time. The DHS also states that the median age of first marriage increases with higher education and income level (Indonesia Demographic and Health Survey Report, 2017, 2018). This could mean that as women become more prosperous, they are more likely to delay pregnancy.

High-risk pregnancy increases the risk for maternal and perinatal complications. Causes of high-risk pregnancy include low socioeconomic status, drug abuse, high-risk maternal age, biological and reproductive factors, and medical conditions (Kliegman, 2020). Births from women aged below 20 years and 35 years or older are considered high-risk maternal age (Cunningham, 2018a). Advanced maternal age (AMA) is widely defined as pregnancy in women aged 35 years and above (Kahveci et al., 2018). AMA has higher risks for hypertension, diabetes, premature birth, low birth weight, placenta previa, and placental abruption. Maternal mortality increases by 2.5 times for maternal ages 35-39 years and increases by 5.3 times for 40 years or older (Cunningham, 2018a). Women in their first pregnancy, or primigravida, have a higher risk for low birth weight due to less-adapted uteroplacental vascularization than women who have had more than one pregnancy (multigravida) (Kaur et al., 2019; Lei et al., 2020). Adequate antenatal care prevents pregnancy complications in high-risk pregnancy through medical assistance, pregnancy risk-assessment, psychological support, and planning for continuous obstetric care (Cunningham, 2018b).

Low birth weight (LBW) is defined as less than 2500 grams. LBW is classified into very low birth weight/ VLBW (less than 1500 grams) and extremely low birth weight/ ELBW (less than 1000 grams). Different from LBW, small for gestational age (SGA) is defined as birth weight less than the 10th percentile for gestational age (Cutland et al., 2017). The estimated global prevalence of LBW is 15% to 20%. Regionally, the prevalence of low birth weight in East Asia and Pacific is 6%, while in South Asia is 28% (World Health Organization, 2014). Low birth weight prevalence in Indonesia is 6.2%, while Jakarta is 6.1%. However, 43.4% of births in Indonesia have no birth weight record (National Baseline Health Research "RISKESDAS" Report 2018, 2019). This supports the fact that most low- to middle-income countries have no birth weight record, thus creating a challenge in determining low birth weight's global epidemiology (Cutland et al., 2017).

The causes of low birth weight include premature birth, intrauterine growth restriction (IUGR), or both. Premature birth and IUGR are caused by multiple factors, including maternal, fetal, and placental factors. Low birth weight is a severe issue due to increased complications. Babies with low birth weight have 20 times higher odds of death than babies with normal birth weight. In the long run, babies with low birth weight could have neurological disabilities, language development issues, learning difficulties, and a

higher risk of chronic illnesses such as cardiovascular disease and diabetes (Cutland et al., 2017).

Numerous studies have studied the association between advanced maternal age and low birth weight. Laopaiboon et al. found that advanced maternal age increases the risk for low birth weight by 1.1 to 1.4 times (Laopaiboon et al., 2014), while Kahveci et al. found the increased risk to be 1.19 to 1.27 times (Kahveci et al., 2018). Lean et al. discovered that AMA elevates the risk for LBW by 1.37 to 1.59 times (Lean et al., 2017), while Pinheiro et al. discovered the increased risk of 1.1 to 1.4 times (Pinheiro et al., 2019). A study by Kim et al. observed a rising yearly trend of LBW and an increasing yearly trend of AMA in South Korea. Statistical analysis of the study further proved a significant correlation between birth weight and maternal age ($p<0.001$) in South Korea (Kim et al., 2019). On the other hand, research by Goisis et al. showed that AMA is not significantly associated with LBW in multigravid women (Goisis et al., 2017). Similar studies have also been done in Indonesia. Tazkiah et al. found that high-risk maternal age (<20 years or ≥35 years) increases the risk of LBW significantly by 2.8 times ($p=0.008$) (Tazkiah et al., 2013). Rahfiludin and Dharmawan proved similarly, where they found that the risk for LBW increases significantly by 5.9 times ($p= 0.025$) in high-risk maternal age (Rahfiludin and Dharmawan, 2018). However, Oktaviani discovered that high-risk maternal age is not significantly associated with LBW ($p=0.654$) (Oktaviani, 2017).

The prevention of pregnancy complications starts with the awareness of what causes them. Advanced maternal age, especially in primigravid births, is a pregnancy risk factor increasing in number as more working women are delaying pregnancy. Low birth weight is a pregnancy complication caused by premature birth or IUGR that significantly increases neonatal mortality; thus, prevention is crucial. This study aims to determine whether there is a significant association between primigravid advanced maternal age and low birth weight, a significant correlation between primigravid maternal age and birth weight, a significant association between primigravid advanced maternal age and prematurity, and a significant association between prematurity and low birth weight.

SUBJECTS AND METHOD

1. Study Design

This observational, cross sectional research applies descriptive and analytical studies including both categorical and correlational hypothesis tests. Categorical hypothesis testing applied the Fisher's exact test, analyzing the association between: (1) Primigravid AMA and LBW; (2) Primigravid AMA and prematurity; and (3) Prematurity and LBW. Correlational hypothesis testing applied the Spearman's correlation test, analyzing the correlation between primigravid maternal age and birth weight. Data of primigravid AMA women was collected through the medical records of Atma Jaya Hospital, Jakarta, Indonesia.

2. Population and Sample

The target population of this study is primigravid advanced maternal age women (≥35 years) in Jakarta. The total sampling method of primigravid births in Atma Jaya Hospital was used, from which a total data of 353 primigravid births was obtained from February 1st, 2016, to September 30th, 2021. The study's inclusion criteria consist of birth from primigravid women aged ≥35 years or 20-34 years with a complete medical record. The study's exclusion criteria included maternal age <20 years, multigravida, maternal height <150 cm, stillbirth, multiple pregnancies, drug abuse, the use of artificial reproductive technology, TORCH (toxoplasmosis,

others [syphilis, hepatitis B], rubella, cytomegalovirus, or herpes simplex) infection, maternal congenital heart disease, gestational diabetes, and tuberculosis infection.

3. Study Variables

The independent variable noted in the study is primigravid maternal age, while the dependent variable documented is birth weight. The observed variable is maternal age ≥35 years (advanced maternal age), while the control variable is maternal age 20-34 years. Prematurity was used both as an independent variable (in the analysis between prematurity and LBW) and a dependent variable (in the analysis between primigravid AMA and prematurity. Furthermore, descriptive data noted included maternal education level, employment status, gestational age at birth, previous medical history, and birth medical conditions.

4. Operational Definition of Variables

Primigravid maternal age is the age of a mother at the time she had given birth to a child from her first pregnancy.

Low birth weight is a birth weight of less than 2500 grams, measured for the first time since birth.

Prematurity is a live birth before 37 weeks of pregnancy.

5. Study Instruments

All data for this research are secondary data collected through medical records from Atma Jaya Hospital.

6. Data analysis

Statistical analyses of this study were done using IBM SPSS Statistics version 28.0.1. Analyses were done with a 95% significance level (α=0.05) and 80% power (β=0.20), by which a p-value higher than 0.05 means statistical insignificance. The odds ratio (OR) was calculated to evaluate increased or decreased odds of the outcome. Fisher's exact test was performed (as data did not meet the requirements of Chi-square test) to find significance in the association between primigravid advanced maternal age and low birth weight, between primigravid AMA and prematurity, and between prematurity and LBW. Spearman's correlation test was conducted to find a significant correlation between primigravid maternal age and birth weight. Before this correlation testing, the Shapiro-Wilk test of normality was done to determine the suitable test.

7. Research Ethics

Ethical clearance for this study (No. 04/07/-KEP-FKIKUAJ/2021) was granted by the Ethical Clearance Commission of Atma Jaya Catholic University of Indonesia, Jakarta, Indonesia on July 13th, 2021, prior to data collection. Anonymity and confidentiality of data are upheld within this study.

RESULTS

1. Sample Characteristics

Primigravid birth data from Atma Jaya Hospital was obtained from February 1st, 2016, to September 30th, 2021. The total number of births and the number of primigravid births are as stated in Table 1, of which the total number of primigravid births collected was 353. As much as 184 data were excluded for reasons indicated in Table 2. Finally, the total data included in this study is 169 primigravid births.

Maternal demographic characteristics collected in this study include maternal age, birth weight, education level, employment status, previous medical history, and birth medical conditions. Table 3 shows the distribution of primigravid maternal age and birth weight. From 169 primigravid births, 157 births (92.90%) were born to mothers aged 20-34 years, and 12 births (7.10%) were born from mothers aged 35 years or older. As many as 25 births (14.79%) were born with low birth weight, while 144 births (85.21%) were not born with LBW.

Based on Table 4 presents the distribution of education level, employment status, previous medical history, and birth medical conditions of primigravid births. Most mothers aged 20-34 years have the education level of High School (50.32%), while most mothers aged ≥35 years graduated from Academy/ University (58.33%). In both groups, most primigravid mothers have income (61.15% for 20-34 years, 75.00% for ≥35 years). Premature birth happened more frequently in maternal age ≥35 years (16.67%) compared to 20-34 years (14.65%). History of chronic hypertension, uterine myoma, and hyperemesis gravidarum are more frequent in maternal age ≥35 years (chronic hypertension 16.67%, uterine myoma 25.00%, hyperemesis gravidarum 8.33%) compared to 20-34 years (chronic hypertension 1.27%, uterine myoma 1.91%, hyperemesis gravidarum 0.00%). Oligohydramnios, placenta previa, and fetal distress happened more frequently in maternal age ≥35 years (oligohydramnios 16.67%, placenta previa 8.33%, fetal distress 8.33%) compared to 20-34 years (oligohydramnios 8.92%, placenta previa 3.18%, fetal distress 3.18%).

Table 1. The number of total births and primigravid births, and percentage of primigravid births

Year	Number of total births (multigravida and primigravida)	Number of primigravid births	Percentage of primigravid births (%)
February 1st to December 31st 2016	301	77	25.58
2017	361	92	25.48
2018	328	84	25.61
2019	122	52	42.62
2020	74	26	35.14
January 1st to September 30th 2021	53	22	41.51
Total	**1239**	**353**	**28.49**

Table 2. Data exclusion criteria

Exclusion Criteria	Number
Maternal age <20 years	56
Maternal height <143 cm	3
Stillbirth or intrauterine fetal death (IUFD)	2
Multiple pregnancies	4
Drug abuse (smoking or alcohol consumption)	2
Suspected history of TORCH infection (pneumonia, urinary tract infection)	2
History of chronic illness (tuberculosis)	3
Incomplete medical record (no data for maternal age, birth weight, maternal height, or drug abuse)	22
No medical record	90
Total number of data excluded	184

Table 3. Primigravid maternal age and birth weight distribution

Characteristics	Category	Frequency (N)	Percentage (%)
Maternal Age	≥35 years (AMA)	12	7.10
	20-34 years	157	92.90
Birth Weight	<2500 g (LBW)	25	14.79
	≥2500 g (normal weight)	144	85.21

Table 4. Distribution of education level, employment status, previous medical history, and birth medical conditions in primigravid births

Characteristics	Category	Age 20-34 years (n=157)		Age ≥35 years (n=12)		Total (n=169)	
		N	%	N	%	N	%
Education Level	Elementary school	3	1.91	1	8.33	4	2.37
	Middle school	6	3.82	1	8.33	7	4.14
	High school	79	50.32	3	25.00	82	48.52
	Academy/University	68	43.31	7	58.33	75	44.38
	No data	1	0.64	-	-	1	0.59
Employment Status	Has Income	96	61.15	9	75.00	105	62.13
	Housewife	47	29.94	3	25.00	50	29.59
	No data	14	8.92	-	-	14	8.28
Gestational Age	Full term	131	83.44	10	83.33	141	83.43
	Premature	23	14.65	2	16.67	25	14.79
	No data	3	1.91	-	-	3	1.78
Previous Medical History	Chronic hypertension	2	1.27	2	16.67	4	2.37
	Uterine myoma	3	1.91	3	25.00	6	3.55
	Ovarian cancer	1	0.64	-	-	1	0.59
	Prediabetes	1	0.64	-	-	1	0.59
	Anemia	1	0.64	-	-	1	0.59
	Hyperemesis gravidarum	0	0.00	1	8.33	1	0.59
	Tuberculosis	2	1.27	-	-	2	1.18
	COVID-19	3	1.91	-	-	3	1.78
	Asthma	3	1.91	1	8.33	4	2.37
	Dyspepsia	3	1.91	-	-	3	1.78
Birth Medical Conditions	Oligohydramnios	14	8.92	2	16.67	16	9.47
	Anhydramnios	1	0.64	-	-	1	0.59
	Polyhydramnios	1	0.64	-	-	1	0.59
	Premature rupture of membranes	15	9.55	1	8.33	16	9.47
	Gestational hypertension	3	1.91	-	-	3	1.78
	Chronic hypertension with superimposed preeclampsia	2	1.27	-	-	2	1.18
	Preeclampsia	10	6.37	-	-	10	5.92
	Eclampsia	2	1.27	-	-	2	1.18
	Impending eclampsia	1	0.64	-	-	1	0.59
	Placenta previa	5	3.18	1	8.33	6	3.55
	Placental abruption	1	0.64	-	-	1	0.59
	Anemia	2	1.27	-	-	2	1.18
	Fetal distress, impending fetal distress	5	3.18	1	8.33	6	3.55
	IUGR (intrauterine growth	2	1.27	-	-	2	1.27

Characteristics	Category	Age 20-34 years (n=157)		Age ≥35 years (n=12)		Total (n=169)	
		N	%	N	%	N	%
	restriction)						
	Multiple congenital anomaly	1	0.64	-	-	1	0.59

Based on Table 5 shows the characteristics of primigravid births with low birth weight in maternal ages 20-34 years and ≥35 years. Most mothers with LBW babies graduated from High School (60.00%) and have income (48.00%). Most LBW babies were born with premature gestational age (72.00%). Previous medical histories in LBW births include chronic hypertension, uterine myoma, hyperemesis gravidarum, asthma, dan dyspepsia (each 4.00%). Birth medical conditions that happened the most in LBW include oligohydramnios (12.00%), premature rupture of membranes (12.00%), dan placenta previa (8.00%).

Table 5. Characteristics of Primigravid Births with Low Birth Weight

Characteristics	Category	Frequency (N)	Percentage (%)
Education Level	Elementary school	2	8.00
	Middle school	1	4.00
	High school	15	60.00
	Academy/ University	6	24.00
	No data	1	4.00
Employment Status	Has income	12	48.00
	Housewife	9	36.00
	No data	4	16.00
Gestational Age	Full term	7	28.00
	Premature	18	72.00
Previous Medical History	Chronic hypertension	1	4.00
	Uterine myoma	1	4.00
	Hyperemesis gravidarum	1	4.00
	Asthma	1	4.00
	Dyspepsia	1	4.00
Birth Medical Conditions	Oligohydramnios	3	12.00
	Anhydramnios	1	4.00
	Premature rupture of membranes	3	12.00
	Gestational hypertension	1	4.00
	Chronic hypertension with superimposed preeclampsia	1	4.00
	Preeclampsia	1	4.00
	Impending eclampsia	1	4.00
	Placenta previa	2	8.00
	Placental abruption	1	4.00
	IUGR	1	4.00
	Multiple congenital anomaly	1	4.00

2. Bivariate Analysis

Table 6 shows the association between primigravid advanced maternal age and low birth weight. Overall, 25 out of 169 (14.8%) primigravid births were born with LBW. In mothers aged 20-34 years, 22 out of 157 (14.0%) births had low birth weight. In mothers aged ≥35 years, 3 out of 12 (25.0%) births had low birth weight.

Fisher's exact test was used to test the hypothesis where the p-value found was 0.253. The OR calculated was 2.05 (95% CI= 0.51 to 8.15). These findings show advanced maternal age (AMA) has a 2.05 risk of experiencing LBW events compared to those aged 20-34 years, and this result was not statistically significant (OR= 2.05; 95% CI= 0.51 to 8.15; p = 0.253).

Table 6. The association between advanced maternal age (AMA) and low birth weight (LBW)

Independent variable	LBW (<2500 g)		Normal birth weight (≥2500 g)		OR	95% CI		p
	N	%	N	%		Lower Limit	Upper Limit	
≥35 years (AMA)	3	25.0	9	75.0	2.05	0.51	8.15	0.253
20-34 years	22	14.0	135	86.0				

The correlation between primigravid maternal age and birth weight was also analyzed. The Shapiro-Wilk test for normality showed that the data distribution was not normal. Hence, the Spearman test for correlation was done. The p-value calculated was 0.113, indicating that the correlation between primigravid maternal age and birth weight is statistically insignificant (p>0.05).

Since prematurity is one of the causes of low birth weight, the association between advanced maternal age and prematurity was also analyzed in Table 7. The Fisher's exact showed that advanced maternal age (AMA) has a 1.14 risk of prematury events compared to those aged 20-34 years, and this result was not statistically significant (OR= 1.14; 95% CI= 0.23 to 5.54; p = 0.567).

The association between prematurity and LBW was also analyzed in Table 8 using Fisher's exact test. Based on Table 8 show that premature has a 49.22 risk of LBW events compared to term, and this result was statistically significant (OR= 49.22; 95% CI= 15.47 to 156.62; p <0.001).

Table 7. The association between advanced maternal age (AMA) and prematurity

Independent Variable	Premature		Full Term		OR	95% CI		p
	N	%	N	%		Lower Limit	Upper Limit	
≥35 years (AMA)	2	16.7	10	83.3	1.14	0.23	5.54	0.567
20-34 years	23	14.9	131	85.1				

Table 8. The Association between prematurity and low birth weight (LBW)

Independent Variable	LBW		Normal birthweight		OR	95% CI		p
	N	%	N	%		Lower Limit	Upper Limit	
Premature	18	72.0	7	28.0	49.22	15.47	156.62	<0.001
Full Term	7	5.0	134	95.0				

DISCUSSION

1. Data characteristics

There has been a yearly decline in the number of births in Atma Jaya Hospital, especially during the COVID-19 pandemic (Table 1). Indonesia Demographic and Health Survey (DHS) states that there is an increase in women's age at first marriage (Indonesia Demographic and Health Survey Report, 2017, 2018). This shows that more women are delaying marriage and are likely to delay childbearing, hence may explain the birth decline. Another factor that could contribute to this decline is the modification of the national health insurance system, namely the Jaminan Kesehatan Nasional (JKN). Another study is in accordance with the birth rate decline found in this research, where it was discovered that there is a significant birth rate decline in 7 out of 22 middle- to high-income countries observed (Aassve et al., 2021).

The prevalence of primigravid births found in this study is 28.49%. Deliveries from 2019-2021 have higher percentages of primigravid births compared to births from 2016-2018 (Table 1). Aside from showing that more women have first pregnancies, this data could also indicate fewer women have more than one pregnancy. Because many factors could influence the risk of pregnancy complications, comprehensive exclusion criteria are required for a more valid association study (Table 2). Some researchers have found that short maternal stature (less than 150 cm) has a higher risk of having low birth weight babies (Inoue et al., 2016; Zhang et al., 2015). The acceptance threshold for maternal height in this study was adapted to the data collected, where low birth weight only happened in mothers standing less than 143 cm tall.

2. Characteristics of demographics and primigravid births

The LBW prevalence in primigravid births found in this study is 14.79% (Table 3). This percentage is higher than Indonesia's LBW prevalence, according to Indonesia Demographic and Health Survey (DHS), which is 7.1% (Indonesia Demographic and Health Survey Report, 2017, 2018). This could mean a higher risk for LBW in Pluit Region, Jakarta. However, the LBW prevalence noted on the DHS is not specific for primigravid births. Primigravid births are known to have a higher risk for LBW compared to multigravida births (Kaur et al., 2019; Lei et al., 2020). Another reason behind this is the national health insurance's referral system. Babies needing comprehensive NICU facilities will be referred to type B hospitals (including Atma Jaya Hospital), causing LBW prevalence in the hospital to be higher than the general population.

Table 4 shows that the proportion of mothers who graduated from higher education (Academy/ University) is higher in maternal ages ≥35 years (58.33%) than in maternal ages 20-34 years (43.31%). This finding is in accordance with the Indonesia Demographic and Health Survey that discovered an increase in maternal age at first birth as a woman's education and income level increases (Indonesia Demographic and Health Survey Report, 2017, 2018). Women with higher education levels are also likely to prioritize their careers, thus explaining their delay in primigravid pregnancy. This study further supports this finding, in which the percentage of women having an income is higher in maternal ages ≥35 years (75.00%) than in maternal ages 20-34 years (61.15%).

In advanced maternal age (≥35 years), there are increases in the percentages of chronic hypertension, uterine myoma, hyperemesis gravidarum, oligohydramnios, placenta previa, fetal distress, etc. These findings correspond to the available data that

state AMA increases pregnancy risks, leading to various complications (including low birth weight) (Cunningham, 2018a). Most primigravid LBW babies were born with premature gestational age (72.00%), as shown in Table 5. This finding is due to prematurity and intrauterine growth restriction (IUGR) being the etiologies of LBW (Cutland et al., 2017).

3. Advanced maternal age and low birth weight

Numerous studies have analyzed the association between advanced maternal age and pregnancy complications, including low birth weight. Many studies found a significant association between AMA and LBW (Kahveci et al., 2018; Kim et al., 2019; Laopaiboon et al., 2014; Lean et al., 2017; Pinheiro et al., 2019), but some studies do not (Goisis et al., 2017; Oktaviani, 2017). This study discovered that despite statistical insignificance (p=0.253), there is an increase in the odds for low birth weight in advanced maternal age (OR=2.045). This study also discovered a statistically insignificant correlation between primigravid maternal age and low birth weight (p=0.113). With a larger sample size, statistical significance could have likely to be found.

This study found a significant correlation between prematurity and low birth weight (p<0.001, OR=49.2), supporting the fact that prematurity is one of the etiologies of LBW (Cutland et al., 2017). Furthermore, this study discovered a slight increase in the odds for prematurity in AMA (OR=1.14), though statistically insignificant (p=0.567). Another study also found increased odds for prematurity in AMA (Fuchs et al., 2018).

There is still a limited number of studies analyzing advanced maternal age, low birth weight, and prematurity, specifically on primigravid births. Although further decreasing an already limited sample size, this study has a comprehensive list of exclusion criteria since many factors could influence the risk for low birth weight. Descriptive findings from this study could be further analytically studied by analyzing the association between AMA and chronic hypertension, uterine myoma, hyperemesis gravidarum, oligohydramnios, placenta previa, or fetal distress. This study's limitation is its sample size, by which a larger sample size would be much preferable. Further studies could be done where inadequate antenatal care and maternal malnutrition are excluded as they may affect LBW. Primigravid advanced maternal age has larger proportions of higher education level and maternal diseases, which include chronic hypertension, uterine myoma, hyperemesis gravidarum, oligohydramnios, placenta previa, and fetal distress. Despite being statistically insignificant, AMA has higher odds for LBW. Prematurity was found to be significantly associated with LBW. With new findings and limitations discovered in this research, further studies concerning high-risk maternal age need to be done to improve women's and children's health.

AUTHOR CONTRIBUTION

Kezia Adelize Aurelia Junus, Ana Lucia Ekowati, Bertha Soegiarto, and Andy Setiawan collaborated to create the research concept and design, article drafting and critical revision, as well as proofreading. Kezia Adelize Aurelia Junus collected and analyzed data.

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None.

CONFLICT OF INTERESTS

There are no conflict(s) of interest in this study.

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