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Original Research

The relationship between maternal age and low birth weight incidents at Popayato Health Center in Pohuwato Regency.

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Abstract
Low birth weight (LBW) remains a major maternal and infant health problem that significantly contributes to neonatal morbidity and mortality, particularly in developing countries including Indonesia. One key maternal factor in low birth weight (LBW) cases is the mother's age during pregnancy and delivery. Pregnancy at extreme ages, whether too young or too old, is known to carry a higher risk of poor pregnancy outcomes.This study aims to analyze the relationship between maternal age and the incidence of low birth weight at Popayato Health Center, Pohuwato Regency. This study used an analytical design with a cross-sectional approach. The study sample consisted of 30 postpartum mothers who were selected using a purposive sampling technique based on medical record data at Popayato Community Health Center for the period of January–March 2024The independent variable is the mother's age, categorized into <20 years, 20–35 years, and >35 years, while the dependent variable is the occurrence of low birth weight (LBW). Data were collected using a checklist and analyzed univariately and bivariately using the Chi-Square test with a significance level of α = 0.05. The research results show that the majority of babies born fall into the low birth weight category. Bivariate analysis showed a significant relationship between maternal age and the incidence of low birth weight (p-value = 0.038). A higher proportion of low birth weight (LBW) was found in mothers under 20 years old and over 35 years old compared to mothers aged 20–35 years. It can be concluded that maternal age is associated with the occurrence of LBW. These findings underscore the importance of age-based pregnancy risk screening as well as strengthening antenatal monitoring and reproductive health education as efforts to prevent low birth weight at the primary healthcare level.

1. Introduction

Low Birth Weight (LBW), which refers to babies born weighing less than 2,500 grams regardless of gestational age, remains a maternal and infant health issue that has not been fully resolved. This condition is not only associated with an increased risk of neonatal mortality but also has long-term implications on the quality of a child's growth and development, including cognitive development disorders, vulnerability to chronic diseases, and reduced quality of life in adulthood. Therefore, low birth weight infants (LBW) are still used as one of the main indicators of the success of maternal and perinatal health services (World Health Organization [WHO], 2014; Blencowe et al.,

2019). Globally, about 20 million infants, or 15–20% of all live births each year, are reported to be born with low birth weight. Most cases occur in low- and middle-income countries, including the Southeast Asian region. Although there has been a global commitment to reduce the incidence of low birth weight by 30% during the period 2012–2025, the rate of decrease has been uneven and tends to be slow in many developing countries (WHO, 2014; Blencowe et al., 2019). This indicates that LBW (low birth weight) is still a major challenge in efforts to improve maternal and child health. In Indonesia, LBW (low birth weight) remains one of the leading contributors to neonatal deaths. National data indicates that more than one-third of newborn deaths are related to LBW conditions. Although the national prevalence is around 6–7%, regional variations are still quite significant. The eastern regions of Indonesia, including several provinces in the Sulawesi area, still show relatively high rates of low birth weight compared to other regions. This condition is closely related to differences in access to healthcare services, education levels, socio-economic conditions, and suboptimal utilization of antenatal care services (Riskesdas, 2018; Ministry of Health of the Republic of Indonesia, 2021). One of the maternal factors that plays an important role in the occurrence of low birth weight (LBW) is the mother's age during pregnancy and childbirth. The mother's age reflects biological condition, physical readiness, and the body's ability to adapt to the pregnancy process. Clinically, pregnancies that occur at extreme ages, namely too young (<20 years) and too old (>35 years), are known to have a higher risk of various pregnancy complications, including fetal growth disorders that result in LBW. (Laopaiboon et al., 2014; Kenny et al., 2017). In teenage mothers, the reproductive organs are not fully developed and the mother is still in a growth phase. This condition can lead to competition for nutritional needs between the mother and the fetus. In addition, the immaturity of the vascular system and suboptimal placental function can interfere with the distribution of oxygen and nutrients to the fetus, thereby increasing the risk of low birth weight in babies. (Ganchimeg et al., 2014; Neal et al., 2018). On the other hand, pregnancy at an advanced maternal age is often accompanied by a decline in physiological function as well as an increase in comorbidities such as hypertension and diabetes. These changes can affect uteroplacental perfusion and reduce the efficiency of nutrient transfer to the fetus. (Fuchs et al., 2018).

Several previous studies have reported a relationship between maternal age and the incidence of low birth weight. Large-scale studies in various countries have shown that the risk of low birth weight increases in mothers under 20 years old and over 35 years old compared to mothers in the optimal reproductive age range, which is 20–35 years. (Laopaiboon et al., 2014; Fuchs et al., 2018). Similar findings have also been reported in Indonesia, where the mother's age is often identified as one of the risk factors for low birth weight, although the magnitude of the effect varies across regions and study designs. (Nurhayati et al., 2020; Heriani & Camelia, 2022). However, existing research shows that the relationship between maternal age and low birth weight does not always stand alone. Some studies report that after accounting for confounding factors such as parity, maternal nutritional status, education level, occupation, and socio-economic conditions, the strength of this relationship may decrease. This indicates that the influence of maternal age on low birth weight is complex and highly affected by the local context as well as the quality of healthcare services received during pregnancy. (Isnaini et al., 2021; Wahyuli & Risnawati, 2023). Most previous studies used national or provincial-level data, so they have not fully reflected the conditions at the primary healthcare level. In fact, community health centers (Puskesmas) play a strategic role as frontline health facilities in monitoring pregnancies and preventing low birth weight risks. Data-driven scientific evidence from Puskesmas is still relatively limited, especially in areas with high incidences of low birth weight.

Pohuwato Regency in Gorontalo Province is one of the areas with a notably high number of low birth weight (LBW) cases. Regional health profile data shows that Pohuwato Regency consistently contributes a high proportion of LBW cases compared to other regencies in the province. This situation indicates the need for a more specific study to understand the factors contributing to the occurrence of LBW at the local level, particularly those related to the characteristics of pregnant women, including maternal age. (Profil Kesehatan Gorontalo, 2022).

Understanding the relationship between maternal age and the incidence of low birth weight at the community health center level is important to support evidence-based midwifery practice. This information can be utilized by midwives and healthcare workers in conducting pregnancy risk screenings, providing more targeted reproductive health education, and designing more intensive antenatal monitoring for high-risk mothers. (Rayuna et al., 2023). Based on this background, this study aims to analyze the relationship between maternal age and the incidence of low birth weight

at the Popayato Health Center, Pohuwato Regency. The results of this study are expected to provide a contextual overview of the role of maternal age in the incidence of low birth weight and serve as a basis for efforts to improve the quality of maternal and infant health services at the primary healthcare level.

2. Research Method

Research Design

This study uses an analytical design with a cross-sectional approach, which is an observational research design aimed at analyzing the relationship between independent and dependent variables measured at the same time. This design was chosen because it is suitable for identifying the relationship between maternal age and the incidence of low birth weight (LBW) based on data available during a single period of observation, without intervening in the research subjects. Research Location and Time. This research was conducted at the Popayato Health Center, Pohuwato Regency, Gorontalo Province, which is one of the primary health care facilities with a relatively high number of low birth weight cases. Data collection was carried out from January to March 2024, using maternal medical record data recorded during that period.

Research Population and Sample

The population in this study consisted of all mothers who gave birth at the Popayato Health Center during the research period. The study sample numbered 30 respondents, selected using purposive sampling, which is a sampling technique based on specific criteria established by the researchers. The inclusion criteria included mothers who gave birth to babies with complete birth weight data recorded in medical records, while the exclusion criteria were incomplete or illegible medical record data.

Research Variable

The independent variable in this study is maternal age, which is categorized into three groups: age <20 years, age 20–35 years, and age >35 years. The dependent variable is the occurrence of low birth weight (LBW), which is classified as LBW (birth weight <2,500 grams) and non-LBW (birth weight ≥2,500 grams). The grouping of these variables is adjusted according to current clinical standards and health policies.

Research Instrument

The instrument used in this study was a checklist, which was developed based on the research variables and used to record data on the mother's age and the baby's birth weight. The data was obtained from the medical records of mothers and babies at Popayato Health Center. The checklist instrument was used to ensure consistency and accuracy in recording the data needed for the research analysis.

Research Procedure

The research procedure began with obtaining research permission from the relevant institution, followed by the identification of maternal medical record data according to inclusion and exclusion criteria. The researchers then recorded the mother's age and the baby's birth weight on a checklist sheet. All collected data were then subjected to editing, coding, and data entry processes before analysis, in order to ensure the completeness and accuracy of the research data.

Data Analysis

The collected data were analyzed using statistical software. Univariate analysis was conducted to describe the frequency distribution of respondent characteristics and research variables. Furthermore, bivariate analysis was used to determine the relationship between maternal age and the incidence of low birth weight (LBW) using the Chi-Square test, at a statistical significance level of $\alpha = 0.05$. The analysis results are presented in the form of frequency distribution tables and cross-tabulation tables to facilitate the interpretation of the study findings.

3. Results and Discussion

Respondent Characteristics

This section presents an overview of the characteristics of the research respondents, including the mother's age, education level, employment status, and parity. Presenting the respondents' characteristics aims to provide an initial context regarding the profile of the mothers who are the subjects of the study before conducting an analysis of the relationships between variables.

Table 1. Frequency Distribution of Respondent Characteristics at Popayato Health Center

Characteristics	f	%
Mother's Age		
< 20 years	10	33,3
20–35 years	17	56,7
> 35 years	3	10,0
Education		
Elementary School	9	30,0
Junior High School	10	33,3
High School	8	26,7
Higher Education Institution	3	10,0
Work		
Work	17	56,7
Not working	13	43,3
Parity		
< 3	27	90,0
≥ 3	3	10,0

Based on Table 1, the majority of respondents are in the 20–35 age group, totaling 17 people (56.7%), followed by respondents under 20 years old totaling 10 people (33.3%) and respondents over 35 years old totaling 3 people (10.0%). In terms of education, the largest groups of respondents have an education level of junior high school (33.3%) and elementary school (30.0%), while respondents with higher education make up the smallest proportion (10.0%). Based on employment status, more than half of the respondents are employed (56.7%), while 43.3% are not employed. Regarding parity, the majority of respondents have a parity of less than 3, totaling 27 people (90.0%), while respondents with a parity of 3 or more number only 3 people (10.0%).

Distribution of Low Birth Weight (LBW) Incidents

This section presents the distribution of low birth weight (LBW) incidents among the research respondents. The presentation aims to provide an overview of the proportion of babies born with and without LBW at Popayato Health Center as a basis for analyzing the relationship with maternal age.

Tabel 2. Distribution of Severe Low Birth Weight (LBW) Incidents at Popayato Health Center

Incidence of Low Birth Weight	f	%
LBW (Low Birth Weight)	19	63,3
Not LBW	11	36,7
Total	**30**	**100,0**

Based on Table 2, out of a total of 30 respondents, most of the babies born fell into the low birth weight (LBW) category, totaling 19 babies (63.3%). Meanwhile, babies born with normal weight (not LBW) numbered 11 babies (36.7%). These results indicate that the proportion of low birth weight incidents at Popayato Health Center was higher compared to babies born with normal birth weight during the study period.

Distribution of Low Birth Weight (LBW) Incidents Based on Mother's Age

This section presents the distribution of low birth weight (LBW) occurrences based on maternal age groups. The presentation of this cross-tabulation table aims to illustrate the pattern of LBW occurrences in each maternal age category before conducting a statistical relationship analysis.

Tabel 3. Distribution of Low Birth Weight Incidents Based on Maternal Age at Popayato Health Center

Mother's Age	LBW (Low Birth Weight)		Not LBW		Total	
	f	%	f	%	f	%
< 20 years	8	80,0	2	20,0	10	100
20–35 years	8	47,1	9	52,9	17	100
> 35 years	3	100,0	0	0,0	3	100
Total	**19**	**63,3**	**11**	**36,7**	**30**	**100**

Based on Table 3, in the group of mothers aged <20 years, most of the babies born were categorized as low birth weight (LBW), totaling 8 babies (80.0%), while 2 babies (20.0%) were born with normal birth weight. In the 20–35 years age group, the proportion of babies born with LBW was 8 babies (47.1%), while 9 babies (52.9%) were not LBW. All mothers in the >35 years age group gave birth to LBW babies, totaling 3 babies (100.0%). Descriptively, it can be seen that the proportion of LBW occurrences is higher in the extreme maternal age groups, namely <20 years and >35 years, compared to the optimal reproductive age group of 20–35 years.

Analysis of the Relationship Between Maternal Age and the Incidence of Low Birth Weight (LBW)

This section presents the results of bivariate analysis to determine the relationship between maternal age and the incidence of low birth weight (LBW). The analysis was conducted using statistical tests to assess the significance of the relationship between the two variables based on data obtained from the research respondents.

Tabel 4. Analysis of the Relationship Between Maternal Age and the Incidence of Low Birth Weight at Popayato Health Center (n = 30)

Mother's Age	LBW (Low Birth Weight)	Not LBW	Total	p-value
< 20 year	8	2	10	
20–35 year	8	9	17	0,038
> 35 year	3	0	3	
Total	**19**	**11**	**30**	

Based on the results of bivariate analysis using the Chi-Square test, a p-value of 0.038 ($p < 0.05$) was obtained. These results indicate that there is a statistically significant relationship between maternal age and the occurrence of low birth weight (LBW) at Popayato Health Center. Therefore, it can be statistically stated that differences in maternal age groups are associated with variations in the incidence of LBW in newborns.

The results of this study indicate that maternal age is significantly associated with the incidence of low birth weight (LBW) at Popayato Community Health Center. A p-value of 0.038 indicates that differences in maternal age groups are related to variations in the proportion of LBW. Descriptively, the occurrence of low birth weight (LBW) is more commonly found in mothers under 20 years old and over 35 years old compared to the 20–35 years age group. These findings provide an overview that pregnancy at extreme ages remains a real challenge in efforts to improve maternal and child health at the primary healthcare level. The high proportion of LBW in mothers under 20 years can be understood through a combination of biological and social factors. In adolescents, the mother's body is still in a growth phase, so nutritional needs must be divided between the mother and the fetus. This condition can lead to suboptimal nutrient supply to the fetus. In addition, physical and psychological unpreparedness, as well as limited knowledge about healthy pregnancy, are often found in this age group and may affect the quality of care during pregnancy. (Yakubu & Salisu, 2018; Ayele et al., 2019). Several studies in developing countries also report that teenage pregnancy is often associated with delayed antenatal visits and poor maternal nutritional status, which indirectly increases the risk of low birth weight. (Fall et al., 2015).

In the age group of mothers over 35 years, all respondents in this study gave birth to babies with low birth weight. Although the number of respondents in this group was relatively small, this pattern indicates a risk trend that cannot be ignored. Clinically, pregnancy at an advanced age is often associated with a decline in physiological function and an increase in comorbidities, such as hypertension and diabetes, which can affect placental function. A decrease in the efficiency of oxygen and nutrient transfer from mother to fetus has the potential to cause intrauterine growth restriction and ultimately result in low birth weight. (Carolan, 2013; Lean et al., 2017). Cohort studies in several countries also show that the risk of low birth weight increases with maternal age, especially when accompanied by certain medical conditions. (Pinheiro et al., 2019). Conversely, in the 20–35 year age group, the proportion of babies born with normal birth weight is higher compared to low birth weight. This indicates that within this age range, the mother's biological condition generally better supports the pregnancy process. Placental function tends to be optimal, the mother's physiological reserves are still good, and the risk of comorbidities is relatively lower. In addition, at this age, mothers are usually more psychologically and socially prepared for pregnancy, resulting in better utilization of antenatal care services. (Lisonkova et al., 2017; Goisis et al., 2017).

The findings of this study are in line with various previous studies that reported a relationship between maternal age and the incidence of low birth weight (LBW). Studies in Asia and Africa have shown that mothers who are too young or too old have a higher risk of giving birth to LBW babies compared to mothers of optimal reproductive age. (Kassa et al., 2020; Wado et al., 2019). In Indonesia, several studies have also reported similar patterns, although the magnitude of the risk may vary between regions, depending on socioeconomic conditions and access to healthcare services (Sari et al., 2021; Putri & Wibowo, 2020). However, it is important to note that the mother's age is not the only factor affecting the incidence of low birth weight (LBW). Other factors such as parity, education level, employment status, and maternal nutritional status also play an important role. In this study, most respondents had a parity of less than 3, which is theoretically considered a relatively safe condition. This indicates that even though the respondents' parity is relatively low, maternal age still shows a pattern of association with the occurrence of LBW. Several studies state that when these factors are analyzed together, the influence of maternal age on LBW may be reduced, suggesting a complex interaction among maternal variables. (Gebremedhin et al., 2015; He et al., 2018).

From the perspective of midwifery practice, the results of this study have fairly clear implications. Maternal age can be used as an early indicator in pregnancy risk screening at health centers. Pregnant women under 20 years old or over 35 years old need extra attention through more intensive antenatal monitoring, nutritional counseling, and continuous reproductive health education. This approach aligns with the principles of promotive and preventive midwifery services aimed at reducing the risk of pregnancy complications, including low birth weight. (World Health Organization, 2016). In addition, these findings emphasize the important role of midwives in pre-marital and preconception education, especially regarding pregnancy planning at a safe age. Efforts to prevent risky pregnancies from adolescence, as well as increasing awareness among women of reproductive age about the importance of pregnancy planning, can be a long-term strategy to reduce the incidence of low birth weight (Bhutta et al., 2017). Overall, this study indicates that maternal age is associated with the incidence of low birth weight at Popayato Health Center. Nevertheless, the results of this study should be interpreted with caution considering the limitations in sample size and the study design used. Further research with a larger sample size and multivariate analysis is highly needed to gain a more comprehensive understanding of the factors influencing the incidence of low birth weight.

4. Conclusion

This study aims to analyze the relationship between maternal age and the incidence of low birth weight (LBW) at the Popayato Community Health Center, Pohuwato Regency. The results of the study indicate that maternal age is significantly associated with the occurrence of LBW, where mothers at extreme ages, namely <20 years and >35 years, tend to have a higher risk of giving birth to LBW babies compared to mothers in the optimal reproductive age range. These findings strengthen the evidence that maternal age is an important determinant of pregnancy outcomes, particularly at the primary healthcare level. Clinically, the results of this study emphasize the importance of age-based pregnancy risk screening, more intensive antenatal monitoring, and ongoing reproductive health education as efforts to prevent LBW and improve maternal and infant health quality.

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