

# The Correlation between Birth Weight and Child Growth Aged 3-12 Months at Lekok Health Centers in Pasuruan Regency

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## Abstract

Low birth weight (LBW) continues to be a global health issue associated with neonatal mortality, prenatal morbidity, and growth disorders. RISKESDAS 2018 shows that the prevalence of LBW in East Java is 6.5% and it was a high rate (>5%). The high prevalence of LBW certainly has an impact on child growth. Therefore, this study was conducted to determine the correlation between birth weight and child growth aged 3-12 months at Lekok Health Center in Pasuruan Regency. This study used an analytic observational with a cross-sectional approach. The sample was 96 mothers who had children aged 3-12 months at Lekok Health Center in 2022. The independent variable is birth weight and the dependent variable is child growth aged 3-12 months. Data collection was obtained from primary data using a questionnaire and secondary data from the Maternal and Child Health book and it was analyzed using a Chi-Square test. Based on the study, 91.7% of infants had a normal birth weight and 8.3% had a low birth weight. Additionally, 80.2% of infants had good growth based on weight for age (WFA). This research shows that birth weight is influenced by the mother's occupation, and a child's growth is influenced by the mother's education and occupation. According to the chi-square test results regarding the correlation between birth weight and child growth, a p-value of 0.699 ( $p > 0.05$ ). Therefore, birth weight is not correlated with child growth aged 3-12 months at Lekok Health Center, Pasuruan Regency.

Keywords: Birth Weight; Child Growth; 3-12 Months; Good Health

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## 1. Introduction

Low birth weight (LBW) continues to be a global health issue associated with various consequences such as neonatal mortality, prenatal morbidity, growth disorders, and non-communicable diseases in adulthood.<sup>18</sup> A study found that children with a history of LBW had a 5.87-fold increased risk of stunting.<sup>13</sup> The prevalence of low birth weight in Indonesia is 6.2% according to data from RISKESDAS 2018. East Java has a higher rate than the prevalence of low birth weight in Indonesia.<sup>5</sup>

Pasuruan Regency is one of the regencies in East Java, with a  $\pm 48$  km coastal area along the Java Sea. Based on this geographical condition, Pasuruan Regency has the potential to have a high incidence of low birth weight. This is confirmed by previous studies that show a considerably higher prevalence of low birth weight in coastal areas. In 2018, at the Indrajaya Health Center in Aceh Jaya Regency, the incidence of LBW reached 4.2%.<sup>14</sup>

Growth is an increase in the size and number of cells as well as intercellular tissue. This means that growth involves an increase in the physical size and structure of the body, which can be measured in units of length and weight.<sup>4</sup> At the age of 3-12 months, a child's growth progresses rapidly, often referred to as the golden age. During this phase, there is a significant increase in weight and height. Therefore, a child's growth should be constantly monitored and early detection by weighing their body weight, measuring length, and then plotting the data on growth charts based on anthropometric indices: Weight for Age (WFA), Height for Age (HFA), and Weight for Height (WFH). The study aims to determine the correlation between birth weight and child growth aged 3-12 months at Lekok Health Center in Pasuruan Regency.

## 2. Method

This study is an analytic observational with a cross-sectional approach. The population is mothers who have children aged 3-12 months at Lekok Health Center, Pasuruan Regency in 2022. The sample used in this study was mothers who had children aged 3-12 months. Data collection was conducted using the Simple Random Sampling technique with a total sample of 96 mothers based on the Lemeshow formula and using an anticipated sample dropout of 10%. Inclusion criteria are infants aged 3-12 months who have an MCH book and a complete family. Exclusion criteria are infants aged 3-12 months who have physical disabilities and congenital disorders. The independent variable is birth weight and the dependent variable is child growth aged 3-12 months. This study has received ethical clearance from the Ethics Committee for Health Research, Airlangga University, Surabaya.

Data collection on children was obtained from primary data and secondary data. The Primary data was obtained from interviews with mothers who had children aged 3-12 months using a questionnaire, while secondary data was obtained from the Maternal and Child Health (MCH) book regarding birth weight and child growth charts which are measured three times in a row periodically. Growth is considered good if it has an upward growth chart marked by weight or height graphs following the growth line, or weight or height graphs intersecting above the growth line. Poor growth, on the other hand, is indicated by a downward weight or height graph, a flat weight or height graph, or weight or height graphs intersecting below the growth line. The data collected from this study was analyzed using a bivariate correlation the Chi-Square test method to examine the correlation between birth weight and child growth aged 3-12 months using IBM SPSS Statistic 23 for Windows with a 95% confidence level.

## 3. Result

This study involved 96 mothers who had children aged 3-12 months. The mother's ages were categorized into three groups: 18-19 years old, 20-35 years old, and 36-41 years old. This categorization is based on the safe age range for pregnancy and childbirth in women. The largest population falls into the 20-35-years old group, with 78 individuals, while the lowest population is in the 18-19 years old group, consisting of 8 individuals. The youngest mother is 18 years old, and the oldest is 41 years old, with an average maternal age of 28 years and a standard deviation of 5.833.

In addition, there were 96 infants as respondents consisting of 48 boys and 48 girls. The ages of the infants in this study were divided into two groups: 3-6 months and 7-12 months. This categorizing is based on the nutrition intake received by infants, where those aged 3-6 months only receive exclusive breastfeeding, and infants >6 months have started receiving complementary foods in addition to breastfeeding. The largest population falls into the 7-12-months old group, with 50 infants. The youngest infant is 3 months old, and the oldest is 12 months old. The average age of the infants is 7 months, with a standard deviation of 3.078.

Based on the research results, the birth weights of infants were divided into two groups: normal birth weight (2500 – 4000 grams) and low birth weight (<2500 grams). There were 88 infants (91.7%) with normal birth weight and 8 infants (8.3%) with low birth weight. This indicates that the frequency of infants with normal birth weight is higher than low birth weight. The lowest birth weight in this study was 1200 grams, and the highest birth weight was 3900 grams. The average birth weight of infants was 3044 grams with a standard deviation of 486.386. The mode of birth weight for infants was 2800 grams.

### 3.1. Birth Weight

Table 1. The Frequency Distribution of Mother's Occupational Status with Child's Birth Weight

Mother's Occupational	Birth Weight				Total	
	Low Birth Weight		Normal Birth Weight			
	n	%	n	%	n	%
Working	4	14,8	24	85,7	28	100
Not Working	4	5,9	64	94,1	68	100

Based on Table 1, it was found that mothers, whether working or not, mostly have infants with normal birth weights. The highest percentage is held by non-working mothers, with 64 mothers (94.1%). Meanwhile, infants with low birth weight are mostly born to working mothers, at 14.8%. This indicates that non-working mothers have a greater chance of having a child with normal birth weight.

### 3.2. Child Growth

Table 2. The Frequency Distribution of Mother's Education with Child Growth Status based on Weight-for-Age

Mother's Education	Child Growth Status				Total	
	Good		Poor			
	n	%	n	%	n	%
Unschooling	5	71,4	2	28,6	7	100
Elementary school	38	80,9	9	19,1	47	100
Middle school	19	82,6	4	17,4	23	100
High school	12	75,0	4	25,0	16	100
Bachelor	3	100	0	0	3	100

Based on Table 2, it was found that infants with a good growth status mostly come from mothers with a Bachelor's degree, at 100%. Meanwhile, infants with poor growth status were predominantly born to unschooled mothers, at 28.6%. This indicates that the higher the mother's education level, the greater chance of having a child with good growth status.

Table 3. The Frequency Distribution of Mother's Occupational with Child Growth Status based on Weight-for-Age

Mother's Occupational	Child Growth Status				Total	
	Good		Poor		n	%
	n	%	n	%		
Working	23	82,1	5	17,9	28	100
Not Working	54	79,4	14	20,6	68	100

Based on Table 3, it was found that the highest population of infants with a good growth status comes from working mothers, at 82.1%. Meanwhile, non-working mothers have more infants with a poor growth status, totaling 14 mothers (20.6%). This indicates that working mothers have a greater chance of having children with good growth status compared to mothers who do not work. Because by having a working mother, the family's economic status can also improve.

### 3.3. Correlation between Birth Weight and Child Growth

Table 4. The Frequency Distribution of Birth Weight and Child Growth Status based on Weight-for-Age

Birth Weight	Child Growth Status				Total	
	Good		Poor		n	%
	n	%	n	%		
Low Birth Weight	6	75,0	2	25,0	8	100
Normal Birth Weight	71	80,7	17	19,3	88	100

From the analysis results in Table 4, it is known that infants with normal birth weight mostly have a good growth status, totaling 71 infants (80.7%). Meanwhile, infants with poor growth status mostly have a history of low birth weight (LBW) at 25%. This indicates that infants with normal birth weight have a greater likelihood of having a good growth status. However, it does not rule out the possibility that infants with low birth weight may also have good growth. According to the chi-square test results regarding the correlation between birth weight and child growth, a p-value of 0.699 was obtained, which means p-value >0.05. Therefore, it can be stated that there is no significant correlation between birth weight and child growth based on weight for age.

## 4. Discussion

Based on the research findings, the prevalence of low birth weight at Lekok Health Center in Pasuruan Regency was 8.3% (>5%). This statistic falls into the high category and poses a crucial problem. According to the RISKESDAS 2018 data, the proportion of low birth weight in Indonesia was 6.2%. Meanwhile, in East Java Province, it is 6.5%.<sup>5</sup> This indicates that the prevalence of low birth weight at Lekok Health Center in Pasuruan Regency is higher than the incidence rates of low birth weight in Indonesia and East Java.

### 4.1. Birth Weight

Based on the study results in Table 1 show that a majority of non-working mothers have children with normal birth weight. On the other hand, working mothers have a higher proportion of low birth weight. This aligns with the previous study, where 25 out of 46 infants with normal birth weight were born to non-working mothers.<sup>19</sup> Meanwhile, LBW is more common among working mothers. Other research also indicates that maternal employment status has a crucial role in the occurrence of low birth weight. In contrast, the previous study states that the risk of low birth weight decreases with the increasing employment status of mothers.<sup>9</sup> Maternal employment is indirectly related to household income and can improve the family's economic status, thereby reducing the risk of low birth weight. Based on epidemiological evidence, five occupational factors contribute to low birth weight and premature delivery, including heavy physical work, standing positions, lifting heavy loads, long working hours, and shift work, all of which negatively impact the mother's pregnancy.<sup>1</sup> Therefore, it can be stated that the occurrence of low birth weight is lower among non-working mothers. However, it is essential to note that for working mothers, it is important that their jobs do not involve these five factors that trigger low birth weight.

### 4.2. Child Growth

Based on the study results presented in Table 2, it was found that children with good growth status are predominantly from mothers with bachelor's degrees. Meanwhile, those with poor growth are mostly associated with unschooled mothers. Descriptively, a child's growth based on the weight-for-age index is influenced by maternal education. Higher maternal education has an impact on increasing the likelihood of a child having good growth. Previous studies revealed a significant correlation between maternal education and child growth through maternal parenting practices.<sup>16</sup> The prevalence of malnutrition or a combination of malnutrition and undernutrition is higher among mothers with basic education (elementary and junior high school) compared with advanced education (high school and university). This differs from a study conducted in the Balen, Bojonegoro Regency, where maternal education did not contribute to child growth and growth disorders such as wasting and stunting.<sup>7</sup> Based on theory, maternal education is directly related to parenting practices, including nutrition provision, care, treatment when sick, and personal hygiene. Furthermore, a mother's empowerment also enhances her sensitivity in monitoring child growth.<sup>17</sup> Mothers with higher education are more likely to receive and apply information regarding good nutrition and child care. This eventually will affect the child's growth.<sup>3</sup>

Based on the study results in Table 3, it was shown that children with good growth status are more commonly found among working mothers. Meanwhile, children with poor growth are predominantly from non-working mothers. Descriptively, maternal employment status influences a child's growth based on the weight-for-age index. This aligns with a previous study which stated that there was a correlation between maternal employment and child growth. Working mothers tend to have higher incomes, ensuring their purchasing power for nutritious food for their children.<sup>20</sup> This differs from other research findings which

revealed that housewives have a higher potential to have children with good growth compared to working mothers.<sup>12</sup> According to the theory explains that three factors are directly related to child growth: sufficient nutritional needs, balanced nutritional needs, and the occurrence of infectious diseases.<sup>20</sup> Working mothers may find it easier to obtain information and afford a balanced nutritious diet that is essential for their child's growth process.

#### 4.3. Correlation between Birth Weight and Child Growth

Based on study results indicate that the number of infants with normal birth weight is higher than those with low birth weight. 67 out of 83 infants with normal birth weight have a good growth status. Additionally, 6 out of 8 infants with low birth weight also have a good growth status. This indicates that infants with normal birth weight are more likely to have good growth, and there is a possibility that infants with low birth weight may also have good growth based on the weight-for-age index. Descriptively, a child's growth is influenced by birth weight, as previous studies revealed that birth weight is related to child growth. Birth weight is a strong predictor for early childhood weight and height, not only for children with normal birth weight but also for those with low birth weight.<sup>6</sup>

However, based on the results of the Chi-Square test, there is no significant correlation between birth weight and child growth based on the weight-for-age index. This may occur due to the limited variability in the obtained data and the relatively small sample size. The findings align with research conducted at Jagir Surabaya Health Center, indicating that no relationship between birth weight and child growth. Nevertheless, fulfilled nutrition is identified as one of the factors influencing postnatal child growth.<sup>15</sup> In contrast, other studies suggest a significant relationship between birth weight and child growth. Children with normal birth weight have a higher growth index compared to those born with low birth weight. This implies that birth weight is significantly associated with stunting and underweight.<sup>8</sup>

Based on theory, child growth is the result of the interaction of several factors, including genetic, nutritional, metabolic, and endocrine factors. Additionally, nutritional factors, infections, socioeconomic status, parenting, environment, and medications also influence child growth.<sup>4</sup> A study found that 32 out of 51 children with low birth weight have normal growth.<sup>6</sup> Adequate nutrition is a key element in managing LBW. In low birth weight infants, there is nutrition deficiency in the early stages of life. If not promptly addressed, it can lead to continuing growth and developmental delays, posing a risk of stunting.<sup>10</sup> Therefore, providing nutrition such as Breast Milk, LBW formula milk, and other parenteral nutrition early can improve growth and prevent complications due to low birth weight.<sup>2</sup> This emphasizes that not all infants with low birth weight will experience growth disorders and infants with normal birth weight can have good growth. Fulfilling the basic needs of a child's growth, such as nutrition and basic health care in health services, including immunization, socialization of breastfeeding and complementary feeding (MPASI), regular baby weighing, treatment when sick, personal hygiene, and environmental sanitation, is crucial factors for their growth.<sup>11</sup> Therefore, birth weight cannot determine a child's growth in the future.

#### 5. Conclusion

This study found that the number of infants with normal birth weight is higher compared to those with low birth weight and infants with good growth status outnumber those with poor growth status. Infants with normal birth weight have a greater chance of having good growth status, and it is not ruled out that infants with low birth weight can also have good growth. This is based on the influencing factors, where birth weight is influenced by the mother's occupation, and a child's growth is influenced by the mother's education and occupation. Birth weight is not correlated with child growth aged 3-12 months at Lekok Health Center,

Pasuruan Regency. This is due to the limited variability and insufficient sample size of the research data obtained. Further research is expected to increase the sample size and incorporate more varied data.

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