



## Factors affecting the occurrence of low birth weight

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### Abstract

**Introduction:** Low Birth Weight (LBW) occurs in babies born with a weight of fewer than 2.500 grams. The prevalence of low birth weight in Sidoarjo Regency tends to increase. This study aimed to provide an overview and analysis of risk factors affecting Low Birth Weight.

**Methods:** This study used literature review by collecting literature from various sources obtained from Google Search, Google Scholar, Scienndirect.com, e-books, and SAGE Journal, Scientific Caries

**Results:** The results of this study were supported the previous study stating that beside gestational age, specific factors associated with geo-demography were maternal age, kinship/incest, and citizenship. Anemia and abortion had a significant relationship to the incidence of LBW according to data taken from four hospitals in Peshawar.

**Conclusion:** Other risk factors causing LBW issues are premature birth, inbreeding, maternal age during pregnancy, and a reduction in the burden of activity during pregnancy in mothers who are at risk medically.

**Keywords:** low birth weight, Infant mortality, low birth weight prevention, low birth weight incidences

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### INTRODUCTION

Indonesia has the highest maternal mortality rate (MMR) and infant mortality rate (IMR). The number of cases of infant mortality in 2015 was 33,278 cases, then decreased in 2015 by 32.007. The incidence of low birth weight of 38.85% contributes to high infant mortality in Indonesia (Depkes 2010). Low Birth Weight (LBW) global prevalence is 15.5%, indicating that around 20.6 million of the total number of babies born each year and 96.55% of such incidents occur in developing countries, including Indonesia. In developing countries, incidence of LBW is two times higher than in developed countries (Lumbanraja 2016a). The Central and South Asia (27.1%) has the highest incidence of LBW, while European demographics (6.4%) has the lowest (Mahayana et al. 2015). Low birth weight infant will be having in the future the risk of many health problems (Muqni et al. 2017).

The cases of low birth weight are problematic in developing countries. Low birth weight risks increase mortality and morbidity rates. Low birth weight occurs in babies born with a body weight of fewer than 2.500 grams (Astuti et al. 2019). Low birth weight is the major contributor to infant morbidity and death (Lumbanraja 2016b). Low birth weight can cause early life mortality and development of chronic diseases in the elderly

(Lumbanraja 2017). Low birth weight is one of the factors influencing neonatal mortality. The prevalence of low birth weight in Sidoarjo Regency tends to increase. Preliminary studies in Sidoarjo Regency showed that low birth weight cases from 2016 to 2018 had increased from 58.56% to 66%, although LBW prevention programs had often been carried out (Verma et al. 2016).

World Health Organization (WHO) defines low birth weight as a birth weight of fewer than 2.500 grams. Low birth weight has immediate consequences for immediate health, including cognitive development and to health later in life (Amiruddin et al. 2008). Low birth weight babies are more likely that they will grow slower than normal weight babies. Babies with low birth weight have organs and immunity formation that is not perfect, thus more easily infected and suffering from several infectious diseases and other diseases, especially pneumonia (Sukmawati 2019). Low birth weight is caused by a short gestational age (Premature), IUGR (Intra-Uterine Growth Restriction) or in Indonesian it is called Inhibited Fetal Growth. Both of these causes are due to several risk factors, such as maternal, placental,

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fetal and environmental factors. These risk factors formulate the lack of fulfillment of nutrition in the fetus during pregnancy (Boulet et al. 2011).

In addition, babies with low birth weight are also 20 times more likely to pass away during their infancy than those who have normal weight at birth. The infant mortality rate increases with the rise in low birth weight incidents in a country (Organization n.d., 2012). Factors affecting low birth weight issues include socio-demographic characteristics of the mother, maternal medical risk before pregnancy, reproductive health status, and antenatal care status. Maternal socio-demographic characteristics include less than 20 years to more than 34 years of age, black ethnicity, economic condition, illegitimate marital status, and low educational levels (Iltaf et al. 2017, Karimlou et al. 2012). Reproductive health status affecting low birth weight involves maternal nutritional status, infection, pregnancy disease, and complications of pregnancy (Bener et al. 2013, Momeni et al. 2017). Antenatal service status carries the frequency and quality of antenatal care services, health workers, pregnancy check-ups and gestational age. When the women first check out their pregnancy, it is also a risk causing low birth weight (Mahayana et al. 2015, Momeni et al. 2017).

Babies with low birth weight generally experience unfavorable long-term life processes. If the babies do not die at the beginning of birth, LBW babies potentially grow and develop more slowly than those born with normal weight. Beside to developmental disorders, individuals with a history of low birth weight have a high-risk factor for the occurrence of hypertension, diabetes, and heart disease after reaching 40 years old (Kosim et al. 2012). There are several low birth weight risk factors, including maternal demographics, medical factors, behavior, father factors, baby factors, environmental factors, nutrition, and lack of care during pregnancy (Ohlsson et al. 2008). Socio-economic conditions, family income, education, housing, neighborhood (urban/rural) also have an important role to trigger low birth weight issues (Iltaf et al. 2017, Karimlou et al. 2012). Many factors have an association with low birth weight such as maternal age, twin pregnancy, obesity, low socioeconomic status, and preterm labor (Silva 2012).

This study systematically provided an overview of scientific findings of risk factors associated with LBW occurrences. This study aimed to providing an overview and analysis of risk factors affecting Low Birth Weight. The review used a literature study approach.

## METHODS

This study used literature review by collecting literature from various sources obtained from Google Search, Google Scholar, Scienccdirect.com, e-books, and SAGE Journal, Scientific Caries. The articles screening was based with the keyword: low birth weight,

infant mortality. Furthermore, articles investigating about Risk Factors of Low Birth Weight were also included. The first stage of screening was done in the title and abstract. Same articles were removed. The next screening was done by reviewing the full text articles. Thus, only 4 articles were selected.

## RESULTS

In the review of this journal, the authors found 4 (four) works of literature related to risk factors for low birth weight. The first literature was written with the title "Incidents and Associated Risk Factors of Low Birth Weight Babies Born in Shaikh Khalifa Bin Zayad Al-Nayan Muzaffarabad Hospital". Azad Jammu and Kashmir from January 1, 2012, until June 30, 2013 conducted interviews with mothers who gave birth to LBW babies in the delivery room and the puerperium. The results showed that low birth weight problems in Pakistan were common and a prominent of perinatal morbidity and mortality. Different risk factors included maternal age, parity, family income, gestational age, family planning, reading disability, a birth distance less than three years were important factors supporting the birth of LBW babies at Muzaffarabad Hospital, Azad Jammu, and Kashmir.

The second literature was "Risk Factors of Low Birth Weight in Mbujimayi City, Democratic Republic of Congo". This systematic review study pointed out the factors influencing babies with low birth weight in Mbujimayi City. This study was a case study with data collection of births from 1 to 30 June 2015 at the Maternity Home in three selected health zones. The problem of this study was all babies born with low birth weight and the controls were those born with a normal birth weight of 2.500 grams and more. The results of this study were the proportion of LBW of 14.5%. It could be identified that the risk factors include unmarried women [ORa = 2.92 (1.41 to 5.61)], not from the Luba tribe [ORa = 1.71 (1.02 to 2.87)], anemia during pregnancy [ORa = 2.92 (1.79 to 4.75)], absence of counseling during pregnancy (ANC) [ORa = 1.92 (1.16 to 3.17)], premature labor [ORa = 3.11 (1.79 to 5.41)], mothers with diabetes [ORa = 3.34 (1.91 to 6.21)], having malaria [ORa = 2 (1.23 to 3.26)], multiparity [ORa = 2 (1.23 to 3.26)] and once had threatening abortion [ORa = 6.17 (2.82 to 13.52)] were statistically related to LBW (Mishra et al. 2017).

The third literature was "Prevalence and Risk Factors of Low Birth Weight in the Southeast of Iran". This systematic review study found out the prevalence and factors associated with LBW in Southeast Iran with a cross-sectional design in Kerman Province. The study collected the data from Iranian mothers and babies in special private hospitals. The population was all live births from March 2014 to March 2015. It was found that risk factors in this study included maternal age, abortion,

pregnancy risk factors, maternal citizenship, parity, gravida, education of pregnant women, maternity insurance, residence, kinship, baby sex, premature labor, place of birth, birth attendants, and types of labor compared between LBW and a group of babies with normal birth weight (Iltaf et al. 2017). The prevalence of LBW in this study was 9.4%. Preterm labor (odds ratio [OR]: 22.06;  $P < 0.001$ ). Female baby (OR: 1.41;  $P < 0.001$ ), low parity (OR: 0.85;  $P < 0.001$ ), maternal age during pregnancy  $< 18$  years (OR: 1.17;  $P = 0.002$ ), maternal age during pregnancy  $> 35$  years (OR: 1.21;  $P < 0.001$ ), low maternal education (OR: 1.19;  $P < 0.001$ ), living in rural areas (OR: 1.19;  $P < 0.001$ ), kinship (OR: 1.08;  $P = 0.025$ ) and the labor process was helped by a gynecologist (OR: 1.12;  $P = 0.029$ ) were the factors related to the incidence of LBW in this study. Prevention of LBW incidents was to anticipate the occurrence of premature labor, marriages in kinship, and maternal at the age of  $< 18$  years and  $> 35$  years. Maternal medical risk-factors were part of important interventions to reduce risk. An effective strategy for LBW prevention is to increase the attainment of quality of health services in rural areas (Iltaf et al. 2017).

The fourth literature has the title of "Low Birth Weight Babies-Risk Factors and Complications a Clinical Study". This research study with a systematic review aimed to evaluate the factors causing LBW and its complications. This study was implemented in the obstetrics and gynecology section which observed 250 babies born with the body weight of  $< 2.500$  grams in 2011 as cases and 100 pregnant women as randomized controls. The data were then analyzed by using Chi-Square test with a p-value of  $< 0.05$  as a significant level. The data included name, age, parity, weight before pregnancy, hemoglobin levels, poor pre-eclamptic history (SGA), fetal distress, and type of labor. The results showed that respondents with low economic status were more vulnerable to having LBW infants. The most common complications were due to poor obstetric history, anemia, pre-eclampsia, premature labor, Premature Rupture of Membrane (PROM) and malpresentation (Mishra et al. 2017, Verma et al. 2016).

## DISCUSSION

The results of the study are the same as the previous study stating that food and maternal health status during pregnancy affected infant weight (15,16). The previous study explained that LBW incidence of 10.04% had a smaller value compared to other studies. The previous study also showed low birth weight incidence of 25.5% from Punjab. In Pakistan, anemia during pregnancy occurs because of iron deficiency. The risk of anemia is expected to decrease during pregnancy by iron supplements and prevents babies with low birth weight.

The other study presented the prevalence of LBW in anemic mothers of 78.8%. The results of this study were

supported the previous study stated that beside gestational age, specific factors associated with geodemography were maternal age, kinship/incest, and citizenship. Maternal health (anemia) and pregnancy history (abortion) have a significant relationship to the incidence of LBW according to data taken from four hospitals in Peshawar. This data presented cultural factors might influence the incidence of Small Gestational Age (SGA) in Pakistan (Iltaf et al. 2017, Pardede et al. 2015).

Anemia is a preventable disease. The prevention of anemia occurrence is expected to reduce the incidence of low birth weight and tends to diminish infant mortality. Low hemoglobin levels during pregnancy can inhibit the process of growth and development of the fetus, even interfere with the baby's survival. This is following the theory that anemia during pregnancy can cause adverse effects on both the mother and fetus to be born. Anemia can hinder the supply of oxygen to the mother's metabolism because hemoglobin works to increase oxygen which can cause indirect effects on the mother and baby, including infant mortality, increased susceptibility of the mother to infection, and the possibility of the baby being born prematurely (Khan et al. 2016).

The results of another study in Pakistan showed an increase in low birth weight incidence. That was probably due to sex with different ethnic groups. The results of this study were different from previous study. Inbreeding/kinship or not remains a risk factor for low birth weight issue. The results of other study support this opinion, that incest/kinship marriages, especially those married to cousins or first siblings have a 1.9 times greater risk of having a baby with low birth weight compared to non-blood-related marriage (17).

Low birth weight with the parity factor is caused by the reproductive system of the mother experienced depletion due to frequent childbirth (Bwana et al. 2014). This is because the higher the parity of the mother; the quality of the endometrium will decrease. Repeated pregnancy will affect the circulation of nutrients to the fetus which the amount of nutrition will be reduced compared to previous pregnancies (Mahayana et al. 2015, Prawirohardjo 2008). The previous research illustrates multiparous women had a higher risk of delivery with low birth weight (8). The results of this study contradict the other study which explained that women who first gave birth had a 2.48 times greater risk of giving birth with LBW than multiparous women (19). Women in Sub-Saharan Africa spend 35% or 50% of their lifetime pregnant, giving birth, and breastfeeding stated as the risk of multipara which in turn causes maternal depletion syndrome. The close intervals, negative energy balance, and nutritional deficiencies may cause the above conditions. The greatest nutritional stress (degradation of nutritional status) experienced in women, pregnancy,

and lactation can trigger low birth weight (Karimlou et al. 2012, Kusparlina 2016).

Mothers giving birth with age of <18 and >35 years have a major role in the incidence of LBW. Most epidemiological research shows low birth weight occurs in young and old mothers. There are several causes such as social conditions found in mothers during childbirth at a young age, for example, socioeconomic status, low maternal education, poor nutrition, and low body mass index. Furthermore, those associations with maternal age are relevant with biological factors such as chromosomal anomalies, preeclampsia, and diabetes mellitus (Momeni et al. 2017).

The risk of pregnancy for mothers who are too young is because they are not ready psychologically or physically. Psychologically, teenagers are generally not ready to be mothers. Apart from no preparation, her pregnancy was not maintained properly. The physical risk is a big problem since some adolescent female reproductive organs like the uterus are not mature enough to bear the burden of pregnancy (Kusparlina 2016).

According to Moise, monitoring of prenatal counseling during pregnancy of mothers who have not performed ANC has a risk of 1.9 times giving birth with LBW. It was explained that insufficient monitoring of pregnancy allowed the mother to be unable to take precautionary measures for LBW, malaria, anemia, and nutrient deficiencies. History of malaria and anemia in the city of Mbuji Mayi explained pregnant women were

at twice the risk of developing malaria or 2 times more likely attacked during 2 times of pregnancy (Karimlou et al. 2012).

According to previous research, 16.77% of pregnant women experienced illiteracy. Maternal education and LBW incidences have a significant relationship. Family income also influenced the LBW issue. The highest percentage, 54.3%, LBW occurred in families with low incomes and the lowest was 3.1% in families with low incomes (7). The research supporting this result was written by other researcher. National and international research revealed low levels of maternal education increased the risk of LBW (3,20). The previous study also described the termination of pregnancy at 8 months of age increased the incidence of LBW by 43.47% compared to 9 months of pregnancy (21.73%). The increased incidence of LBW in homemakers (mothers not working) and working mothers, showed work stress during pregnancy could influence the condition of pregnancy, which affected the birth of LBW babies. The findings were supported by the previous study (21).

## CONCLUSION

Other risk factors causing LBW issues are premature birth, inbreeding, maternal age during pregnancy of <18 and >35 years old, and a reduction in the burden of activity during pregnancy in mothers who are at risk medically.

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