**Determinants of Low Birth Weight : *A Systematic Review***

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Submission date: xxxxxxxx, Receipt date: xxxxxxxx, Publication date: xxxxxxxx

***Abstract***

Low Birth Weight (LBW) babies can increase the risk of health problems such as retarded growth and development of babies to the next stage of life. The purpose of this study was to determine the determinants of LBW.The method used is a systematic review. The results obtained 15 articles according to the inclusion criteria. Almost all articles say that maternal nutritional status, maternal age, anemia, gestational hypertension, parity, ANC, and smoking affect LBW. There are 2 factors that greatly influence them, including 80% ANC visits and maternal nutritional status 66.7%.

***Keywords****:****Determinants, LBW***



**INTRODUCTION**

LBW is defined if the baby is born weighing less than 2500 grams (WHO, 2019). More than 80% of neonatal deaths occur in newborns with LBW where two thirds are premature and one third are infants at term for gestational age. (Blencowe *et al*., 2019). The prevalence of LBW is 15.5% or more than 20 million babies are born every year from those with low birth weight, 95.6% of whom come from developing countries. The rate of LBW in developing countries is more than twenty times the rate in developed countries. Around 17 million babies are born with LBW in developing countries every year (S. A. Desta *et al*., 2020). The incidence of LBW in Indonesia is 29% (UNICEF-WHO, 2019).

LBW is associated with various factors including factors such as maternal nutritional status or malnutrition, maternal age during pregnancy, anemia, gestational hypertension, parity, ANC, and smoking (Melissa *et al*., 2016). Mothers who are pregnant with age less than 20 years and more than 35 years give birth to LBW babies, namely 45% and 64.8%, ANC 54% or have a 6.78 times higher risk of giving birth to LBW babies (Mengesha *et al*., 2017). A total of 31.2% of pregnant women with smoking, parity 44.2% (Jeena *et al*., 2020). Poor nutritional status 47.61% and hypertension 75% (Damayanti, 2021). Mothers with anemia were also proven to give birth to LBW as much as 48.9% (Mitao *et al*., 2016).

Newborns weighing less than 2500 grams have a higher risk of neonatal morbidity and mortality, malnutrition in the first year of life, susceptibility to infection, respiratory distress and trauma during childbirth, development of chronic non-communicable diseases (Vilanova *et al*., 2019). Low birth weight babies also increase the risk of several health problems such as growth retardation, infectious diseases, developmental delays which may occur during infancy, childhood and finally later stages of life (Taha *et al*., 2020).

A significant reduction in the prevalence of LBW is needed to achieve the Sustainable Development Goals (SDGs) (Khan *et al*., 2018). The World Health Assembly (WHA) nutrition targ*et al*so includes one of its targets, namely reducing low birth weight (Wustefeld *et al*., 2015). Timely access to simple interventions such as treating maternal infections during pregnancy, ensuring clean and safe births, umbilical cord care and immediate exclusive breastfeeding can prevent most of the preventable deaths of newborns (Rornald M. Kananura *et al*., 2016). Routine ANC visits can also help prevent and one of the care interventions that reduce maternal morbidity associated with an increased likelihood of LBW (Rornald Muhumuza Kananura, 2021). Better quality care for pregnant women and newborns using new, more appropriate technologies developed in the areas of prenatal, perinatal and neonatal care (Vilanova *et al*., 2019).

Based on previous studies that discussed birth weight and neonatal survival, it can be seen from the results of the study which stated that the cumulative probability of neonatal survival for LBW infants was 94.65% (Hüseyin *et al*., 2020). Although other studies have examined the determinants of LBW, this time the researchers gave different exposure results from previous studies, namely the researcher will use a systematic review method for updated results.

Based on the description of the background, the problem indicated that the infant mortality rate is still high caused by Low Birth Weight Babies (LBW), researchers are interested in conducting a study entitled Determinants of Low Birth Weight Babies using a systematic review.

**RESEARCH METHODS**

**Selection Strategy**

The method used in this study is a Systematic Review which aims todetermine the determinants of Low Birth Weight Babies (LBW). Data identified start January 2012 to January 2022. Search is done through database *Pubmed, ProQuest, Science Direct* by using the keywords Determinants AND Low Birth Weight.

**Study Selection**

The selection of the study was done by selecting relevant titles and abstracts which were reviewed directly by the reviewers. Then the screening was carried out based on the inclusion criteria, namely: original research journals in 2012-2022, with a population ofLBW babies, journals in English, and full articles. The study design criteria included in this article are cross sectional and case control.

**IDENTIFICATION**

Identify literature by searching for data based on keywords to go through the database:

(n total = 2,575)

* Pubmed = (n= 1,213)
* Science Direct = (n= 1,003)
* ProQuest = (n= 359)

Identify literature from other sources: Google Schoolar

(n= 121)

Records after duplication removed (n= 1,579)

**SCREENING**

*Literature*excluded based on abstract

(n= 1,300)

Screening of literature sources by title and abstract (n= 1,000)

*Literature*excluded full text (n= 670)

1. Not focusing on LBW (n= 398)
2. Not full text (n=25)
3. In addition to journals that did not use Case-Control Study and Cross Sectional Study (n= 54)
4. Articles other than English (n= 0)
5. Journals over the last 10 years (n= 193)

Full text articles assessed for eligibility (n= 330)

**ELIGIBILITY**

Appropriate articles in quantitative research (n= 15)

**INCLUDED**

Articles excluded by reason (n= 315)

1. Qualitative data (n= 30)
2. Not enough information (n= 8)
3. Paid articles (n= 277)

Articles that meet the criteria

(n= 15)

**Image 1.**Prism diagram Flow chart Determinants of Low Birth Weight Babies (LBW)

**RESULTS AND DISCUSSION**

**Results**

After searching through the Pubmed, Proquest, and Scient Direct databases, it was found in total 2,575 articles that match keywords, 1,579 articles that are free of duplication and 330 full text articles. Eligibilty was carried out to determine articles that matched the inclusion criteria and obtained 15 articles that met the criteria with the number of respondents 5,948 participants. Study design using *case control* totaling 13 articles and 2 articles using cross sectional. Studies that meet the criteria discuss the determinants of LBW. Of the 15 articles, 3 studies came from Ethiopia, 3 studies from Southern Ethiopia, 2 studies from India, and the rest came from Malaysia, Ghana, West Africa, East Ethiopia, North East Ethiopia, North West Ethiopia, and Indonesia.

**Table 1. Presentation of Systematic Review Results**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No** | **Title** | **Author (year) Country** | **Design** | **Instrument** | **Population (N)**  **or Sample (n)** | **Place, Research Time** | **Data**  **based** | **Results** |
| 1. | Determinants of Low Birth Weight Among Women Who Gave Birth at Public Health Facilities in North Shewa Zone: Unmatched Case-Control Study | Berhanu Senbeta Deriba *et al* (2021) Ethiopia | Case Control | 1. Questionnaire. 2. Face to Face Interview. 3. Patient Records. | N = 49,667 pregnant women who are expected to give birth  n = 570 participants (190 cases and 380 controls).  Response rate = 97.37%. | 5 General Hospitals and 14 Health Centers in North Shewa, Ethiopia conducted from February to June 2020 | PubMed  <https://pubmed.ncbi.nlm.nih.gov/34619995/> | Significantly associated with LBW:   1. The nutritional status of the mother was known by the maternal upper arm circumference (LiLA) < 23 cm (AOR = 2.85; 95% CI = [ 1.68, 4.85]). 2. Anemia (AOR = 2.34; 95% CI = [1.21, 4.53]).   There is no relationship with LBW:   1. ANC visits were not routine (AOR = 1.03; 95% CI = [0.47, 2.26]).   This article states that the factors that affect LBW include maternal nutritional status and anemia. However, this article also describes the results that non-routine ANC visits do not affect LBW. |
| 2. | Determinants of Low Birth Weight Among Live Birth Newborns Delivered at Public Hospitals in Gamo Gofa Zone, South Ethiopia: Unmatched Case Control Study | Alemu Basazin Mingude *et al* (2020)  Southern Ethiopia | Case Control | 1. Questionnaire. 2. Face to Face Interview. 3. Medical records. 4. Scales | N = 300 (60 cases and 240 controls) newborns  n = 100 (20 cases and 80 controls) participants.  Response rate = 100%. | This research was conducted at the selected Hospital Gamo Gofa Zone, Southern Ethiopia carried out from February 25 to April 25 2018. | PubMed    <https://pubmed.ncbi.nlm.nih.gov/32782793/> | Significantly associated with LBW:   1. Non-routine ANC care   (adjusted odds ratio = 1.87, confidence interval = [1.32-2.6])   1. Parity (primiparous)   (adjusted odds ratio = 0.385, confidence interval = [0.176-0.83])   1. Anemia   (adjusted odds ratio = 4.4, confidence interval = [1.84–10.5])   1. The nutritional status of the mother is known by the circumference of the mother's upper arm (LiLA) < 23 cm   (adjusted odds ratio = 7.99, confidence interval = [3.5–20.3])  This article states that the factors that affect LBW include non-routine ANC visits, parity, anemia, and nutritional status. |
| 3. | Determinants of Low Birth Weight Among Newborns Delivered in Public Hospitals in Addis Ababa, Ethiopia: Case-Control Study | Getaneh Baye Mulu *et al* (2020) Ethiopia | Case Control | 1. Interviews using a structured questionnaire. 2. Medical records. 3. Anthropometry :  * Scale scale: * height meter * LiLA Ribbon | N = 279 (93 cases and 186 controls) newborns.  n = 270 (90 cases and 180 controls) newborns  Response rate = 96.8%. | At Addis Ababa General Hospital, Ethiopia conducted from 15 March to 30 April 2019 | PubMed  <https://pubmed.ncbi.nlm.nih.gov/32273790/> | Significantly associated with LBW:   1. Gestational hypertension with [AOR 3.7 (95% CI = 1.6-8.7)]. 2. Incomplete ANC visits [AOR 6.7 (95% CI = 3.2-15.3)]   There is no relationship with LBW:   1. Maternal age < 20 years [AOR 0.5 (95% CI = 0.9-2.6)] 2. Anemia [AOR 1.8 (95% CI = 0.65-5.1)] 3. Maternal nutritional status was known by LiLA [AOR 1.4 (95% CI = 0.6-2.9)] and BMI [AOR 0.9 (95% CI = 0.2-3.8)]   This article states that the factors that affect LBW include gestational hypertension and incomplete ANC visits. However, this article also describes the results that maternal age, anemia, and nutritional status do not affect LBW. |
| 4. | Determinants of Low Birth Weight: A Case Control Study in Pravara Rural Hospital in Western Maharashtra, India. | Reecha Ghimire *et al* (2014) India | Case Control | Documents from the Hospital. | n = 763, 277 were cases (mothers who gave birth to babies weighing less than 2.5kg) and 486 were controls (mothers who gave birth to babies weighing more than 2.5kg).  . | At Pravara Rural Hospital in Western Maharashtra, India it was conducted from September 2013 to April 2014 | Science Direct  <https://www.researchgate.net/publication/279336932_Determinants_of_Low_Birth_Weight_A_Case_Control_Study_in_Pravara_Rural_Hospital_in_Western_Maharashtra_India> | Significantly associated with LBW:   1. In this study, univariate regression analysis showed that the risk factor associated with low birth weight was maternal age less than 19 years with p value = 0.042 which was considered significant if p value < 0.05. 2. In this study, multivariate regression analysis showed that the risk factor associated with low birth weight was hypertension in pregnancy with p value < 0.001 which was considered significant if p value < 0.05.   This article states that the factors that affect LBW include maternal age and hypertension in pregnancy. |
| 5. | Determinant of Low Birth Weight Infants: A Matched Case Control Study | Rosnah Sutan *et al* (2014) Malaysia | Case Control | 1. Medical records. 2. Questionnaire.   Contains socio-demographic characteristics. | N = 3214 babies.  n = 360 LBW infants (180 infants as cases and 180 infants as controls). | Universiti Kebangsaan At Hospital Malaysia Medical Center (UKMMC) in Kuala Lumpur, Malaysia conducted from January to June 2012 | ProQuest  <https://www.scirp.org/html/1-1340268_43684.htm> | Significantly associated with LBW:   1. Young mother's age (OR 2.89, 95% CI 1.86 - 4.51, p < 0.001). 2. Mother with gestational hypertension (OR 4.52, 95% CI 1.06 - 19.22, p = 0.041) 3. Mother's nutritional status is known by underweight BMI (OR 1.56, 95% CI 0.56 - 2.57, p = 0.02)   There is no relationship with LBW:   1. Anemic mother (OR 0.05, 95% CI 0.18 - 0.28, P = 0.661)   This article states that the factors that affect LBW include maternal age status, gestational hypertension, and maternal nutritional status. However, this article also describes the results that anemia does not affect LBW. |
| 6. | Determinants of Low Birth Weight in Neonates Born in Three Hospitals in Brong Ahafo Region, Ghana, 2016- An Unmatched Case-Control Study | Zakariah Adam *et al* (2019) Ghana | Case Control | 1. Questionnaire. 2. Maternal antenatal and postnatal health records. | n = 360 mothers who gave birth to babies weighing < 2500 grams.  120 cases and 240 controls | At three major hospitals in the Brong Ahafo Region, Ghana (Brong Ahafo Hospital, Sunyani Hospital and Holy Family Hospital) from 1 December 2015 to 30 April 2016. | PubMed  <https://pubmed.ncbi.nlm.nih.gov/31096938/> | Significantly associated with LBW:   1. Maternal anemia (OR 3.14, 95% CI 1.50–6.58) 2. ANC visits less than 3 times (OR; 4.94, 95% CI 2.12-11.12) 3. Primiparity (OR: 2.66, 95% CI: 1.09–6.48)   This article states that the factors that affect LBW include anemia, ANC visits less than 3 times, and parity. |
| 7. | Determinants of Low Birth Weight Among Newborns Delivered at Tirunesh Beijing General Hospital, Addis Ababa, Ethiopia: A Case-Control Study | Mesfin Tadese *et al* (2021)  Ethiopia | Case Control | 1. Questionnaire   To obtain primary data.   1. Maternal antenatal and postnatal health records. | N = 3798 mothers who gave birth in the hospital  n = 482 (161 cases and 321 controls) | at Beijing Tirunesh General Hospital, Addis Ababa, Ethiopia from March 1 to April 30, 2019. | PubMed  <https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-021-04275-6> | Significantly associated with LBW:   1. Mother's nutritional status is known by underweight BMI (AOR (CI) = 4.94 (3.26-7.52) 2. Maternal age > 36 years (AOR (CI) = 2.45 (0.38-15.8) 3. Pregnancy hypertension (AOR (CI)=1.88 (0.60–5.86) 4. No ANC visit (AOR (CI) = 0.41 (0.12–1.45) 5. Multipara (AOR (CI) = 2.20 (0.68–7.15)   This article states that those that affect LBW include maternal nutritional status, maternal age, gestational hypertension, not having ANC visits, and parity. |
| 8. | Determinants of Low Birth Weight Deliveries at Five Referral Hospitals in Western Area Urban District, Sierra Leone | David Kabba Kargbo *et al* (2021) West Africa | Case Control | 1. Questionnaire 2. Mother's ANC card 3. Face to face interview 4. Anthropometry Seca . Scales | n = 438 mothers (146 cases and 292 controls) | In 5 District referral hospitals West Sierra Leone West Africa, West Africa (Princess Christian Maternity Hospital (PCMH), Lumley Government Hospital, King Harman Road Government Hospital, 34 Military Hospital, and Aberdeen Women's Center (NGO) Hospital ) held from November 2019 to February 2020 | ProQuest  <https://www.proquest.com/docview/2598872605/E0B601EAB5F04882PQ/1> | Significantly associated with LBW:   1. Anemia during pregnancy (AoR = 3.88, 95% CI 1.90-7.90, p < 0.001) 2. Smoking during pregnancy (AoR = 4.36, 95% CI 1.94-9.80, p < 0.001) 3. ANC visits less than 4x (AoR = 2.69, 95% CI 1.70–4.26, p < 0.001)   There is no relationship with LBW:   1. Maternal age < 20 years (AoR = 1.75, 95% CI 0.33–9.25, P = 0.059)   This article states that the factors that affect LBW include anemia, smoking during pregnancy, and <4x ANC visits. However, this article also describes the results that maternal age < 20 years does not affect LBW. |
| 9. | Associated Factors with Low Birth Weight in Dire Dawa City, Eastern Ethiopia: A Cross-Sectional Study | Alekaw Sema *et al* (2019) Eastern Ethiopia | Cross Sectional | 1. Questionnaire 2. Interview 3. Anthropometry | n = is 431 mothers  Response rate = 97.40%  Social Demographic Characteristics:  x̅ mother's age27.4 (±4.98) years. | Dilchora Referral Hospital and Sabina Primary Hospital, in Dire Dawa Municipal Government, East Ethiopia from July to August 2018 | PubMed  <https://pubmed.ncbi.nlm.nih.gov/31886197/> | Significantly associated with LBW:   1. Mother smoker (AOR 3.97, 95% CI: 1.59, 9.88)   There is no relationship with LBW:   1. No ANC visit (AOR 0.97, 95% CI: 0.39, 2.38) 2. Anemic mother (AOR 1.25, 95% CI: 0.67, 2.36) 3. Maternal nutritional status known from LiLA < 23 cm (AOR 1.61, 95% CI: 0.86, 3.03)   This article states that those who affect LBW are mothers who smoke. However, this article also describes the results that not having ANC visits, maternal anemia, and nutritional status do not affect LBW. |
| 10. | A Health Facility Based Case-Control Study on Determinants of Low Birth Weight in Dassie Town, Northeast Ethiopia: The Role of Nutritional Factors | Semira Ahmed *et al* (2018) Northeast Ethiopia | Case Control | 1. Face to Face Interview 2. Structured Questionnaire and Pre-Test 3. Anthropometry | n = 286 mothers exposed to anemia, (95 cases and 191 controls) Response rate = 97.6%. | 10 public health facilities in Dessie City, Northeast Ethiopia, conducted from 3 February to 29 April 2017 | PubMed  <https://pubmed.ncbi.nlm.nih.gov/30400909/> | Significantly associated with LBW:   1. Mother's nutritional status is known to be LiLA < 23 cm [AOR = 7.17: CI (3.99,12.88)] 2. Maternal anemia [AOR = 3.54: CI (1.46, 8.61)]   There is no relationship with LBW:   1. Maternal age < 20 years 0.54 (0.25,1.19) and maternal age > 35 years 2.24 (0.73,6,91) 2. No ANC visit [AOR = 3.61: CI (1.27, 10.28)]   This article states that the factors that affect LBW include maternal nutritional status and anemia. However, this article also describes the results that maternal age < 20 years and not having ANC visits did not affect LBW. |
| 11. | Determinants of Low Birth Weight Among Neonates Born in Amhara Regional State Referral Hospitals of Ethiopia: Unmatched Case Control Study | Getnet Asmare *et al* (2018) Northwest Ethiopia | Case Control | 1. Questionnaire 2. Interview 3. Anthropometry | n = 453 mothers (151 cases and 302 controls).  Mothers who gave birth to live babies weighing < 2500 grams were considered as cases and mothers who gave birth to live babies weighing > 2500 grams and above were considered as controls. Response rate = 94.7%. | Women giving birth at 3 Referral Hospitals in Amhara region, Northwest Ethiopia.  Conducted from March 20 to April 30 2017. | PubMed  <https://pubmed.ncbi.nlm.nih.gov/29986740/> | Significantly associated with LBW:   1. No ANC visit (AOR: 2.3, 95% CI 1.32-4.04) 2. Mother's nutritional status is known to be LiLA < 23 cm (AOR: 1.7, 95% CI 1.02-2.70)   There is no relationship with LBW:   1. Parity (primiparous) (AOR: 1.45, 95% CI 0.92–2.31)   This article states that the factors that affect LBW include not carrying out ANC visits and maternal nutritional status. However, this article also describes the results that parity does not affect LBW. |
| 12. | Low Birth Weight: Prevalence and Associated Factors Among Newborns at Hospitals in Kambata-Tembaro Zone, Southern Ethiopia 2018 | Abebe Alemu *et al* (2019) Southern Ethiopia | Cross Sectional | 1. Structured interview 2. Questionnaire | N = all selected newborns at a government hospital in the Kembata-Tembaro Zone, Southern Ethiopia  n = 341 babies  Response rate = 97.9%. | At the government Hospital in the Kembata-Tembaro Zone, Southern Ethiopia. Held from 1-30 May 2018. | PubMed  <https://pubmed.ncbi.nlm.nih.gov/31819784/#:~:text=Results%3A%20The%20prevalence%20of%20low,2.7%5D%2C%20mothers%20with%20greater%20than> | Significantly associated with LBW:   1. Not attending ANC care [AOR=2.3; 95% CI: 1.3-2.7] 2. Mothers with more than three births [AOR=1.5; 95% CI: 1.8- 2.6]   This article states that the factors that affect LBW include not doing ANC and parity. |
| 13. | Determinants Of Low Birth Weight Among Newborns Delivered At Public Hospitals In Sidama Zone, South Ethiopia: Unmatched Case-Control Study | Muse Bututa Bekela *et al* (2020) Southern Ethiopia | Case Control | 1. Interview 2. Questionnaire 3. Medical records | N = All mothers who gave birth to their babies in public hospitals in the Sidama Zone, both cases and controls. Case: newborn with birth weight <2500 grams  Control: newborns with birth weight 2500 grams.  n = 354 (118 cases and 236 controls)  Response rate = 90% | It was conducted at the Zona Sidama public hospital, Southern Ethiopia from March 1 to May 5, 2019. | PubMed  <https://pubmed.ncbi.nlm.nih.gov/32351737/> | Significantly associated with LBW:   1. ANC delay (AOR = 3:22, 95% CI (1.47-7.14) 2. Hypertension of pregnancy (AOR = 4:49, 95% CI (1.94-10.38) 3. Mother's nutritional status is known to be LiLA < 23 cm (AOR = 4: 27, 95% CI (2.24-8.12)   This article states that the factors that affect LBW include not doing ANC, gestational hypertension, and maternal nutritional status. |
| 14. | Risk Factors of Low Birth Weight in Prof. Dr. HM Anwar Makkatutu Bantaeng General Hospital in 2019 | Nur Aryani Rifai *et al* (2020) Indonesia | Case Control | 1. Secondary Data Obtained from RSUD Prof. Dr. HM Anwar Makkatutu Bantaeng. 2. Primary Data Obtained by conducting guided and directed interviews from house to house using a questionnaire. | N = all mothers gave birth at Prof. Hospital. Dr. HM Anwar Makkatutu Bantaeng during 2018.  n = 126 (63 cases and 63 controls) mothers  Case: mothers who gave birth to LBW Control: mothers who gave birth to babies who were not LBW. | At Prof. Hospital. Dr. HM Anwar Makkatutu Bantaeng, South Sulawesi Province, Indonesia. Conducted in 2018 to 2019 | Science Direct  <https://www.sciencedirect.com/science/article/abs/pii/S1130862120302515> | Significantly associated with LBW:   1. Mother smokes with OR = 3.441 2. Poor nutritional status (KEK) OR = 3,224 3. Not doing ANC OR = 3.185   With a significance level of each P < 0.05.  There is no relationship with LBW:   1. Maternal age at risk with P value = 0.202, which means P > 0.05   This article states that the factors that affect LBW include smoking mothers, poor nutritional status, and not carrying out ANC visits. However, this article also describes the results that maternal age does not affect LBW. |
| 15. | Study of Sociodemographic Determinants of Low Birth Weight in Wardha District, India | ML Taywade *et al* (2017) India | Case Control | 1. Questionnaire 2. Interview | n = 614 infants (307 cases and 307 controls).  Case: single live birth with term pregnancy, with birth weight < 2500 grams in the hospital  Controls: single live births with birth weight equal to or > 2500 grams born at term | In the Obstetrics ward of Wardha District Hospital, India. Conducted from January 2013 to December 2013 | Science Direct  <https://www.sciencedirect.com/science/article/abs/pii/S2213398416300306> | Significantly associated with LBW:   1. Maternal age less than 20 years [AOR=1.90; 95% CI: 1.20–3.01] or over 30 years [AOR=2.12; 95% CI: 1.01–4.67] 2. Tobacco use [AOR=1.42; 95% CI: 1.01–1.99]   This article states that the factors that affect LBW include maternal age and smoking mothers. |

**Discussion**

Maternal age during pregnancy affects LBW births, because when the mother is still young (< 20 years) the mother's reproductive organs are still immature and adolescent mothers have low incomes so that prenatal care is not carried out optimally and cannot be detected early, causing LBW. While the age of the mother who is too old (> 35 years) the function of the reproductive organs has decreased and the hormones in the mother's body are reduced during pregnancy. The ideal female reproductive age is 20-35 years. Maternal mortality that occurs at the age of < 20 or > 35 years is 2-5 times higher than women of childbearing age. A study describes the results of research that maternal age 2.24 to 4.51 times can increase the risk factors for LBW (Ghimire *et al*., 2014; Sutan *et al*., 2014; Taywade and Pisudde, 2017; Tadese *et al*., 2021). Older mothers have been shown to be at higher risk of low birth weight, premature birth, perinatal death, and more likely to use specialized care or respiratory care (Barbuscia *et al*., 2020; Carolan & Frankowska, 2011; Klemetti *et al*., 2014). There is a study which states that maternal age is not a factor in the occurrence of LBW, but there are factors that influence it more, for example, the mother's gestational age (Jacobsson *et al*., 2004). Therefore, that maternal age is one of the causative factors of LBW, although some of the results of the article are controversial, the researchers suggest that the risk is related not to age itself, but to complications from other processes such as a large number of chronic diseases (hypertension, diabetes, increased blood pressure). vascular arteriosclerotic disorders at the myometrial level, which are more common in older people.

The maternal anemia factor affects the birth of LBW, because one of the causes of anemia is the lack of Fe intake, which affects the intake of oxygen and blood carried by the placenta to the fetus (Valero De Bernabé *et al*., 2014). Anemia also causes disruption of oxygen intake in the body due to a lack of hemoglobin. This can cause the fetus to be malnourished, causing low birth weight (Allen, 2001). A study describes the results of research that mothers who suffer from anemia 2.34 to 6.58 times can increase the risk factors for low birth weight (Adam *et al*., 2019; Ahmed *et al*., 2018; Deriba & Jemal, 2021; Kargbo *et al*., 2021; Mingude *et al*., 2020). Hb <11 g/dl during pregnancy can increase the risk of low birth weight and prematurity. The incidence of LBW is seen in Hb values ​​between 9.5 and 10.5 g/dl, this is classified as mild to moderate anemia. There is a study which states that there is no significant relationship between the anemia factor and the occurrence of LBW (Steer, 2018). The researcher suggests that these results should be interpreted with caution, because there are a variety of characteristics possessed by a group that can be considered as indicators of inconsistency or inconsistency.

Poor maternal nutritional status can affect LBW births, because to provide an adequate amount and variety of substances for the fetus, a woman must get good nutrition during pregnancy. If the mother's nutrition is not fulfilled, then malnutrition will occur which will disrupt the growth of the fetus, and this will cause the mother to give birth to babies with low body weight. Supplementary food intake in the second and third trimesters is very influential on fetal weight gain compared to mothers who do not get supplementary food. A study describes the results of research that mothers who suffer from anemia 2.85 to 7.99 times can increase the risk factors for low birth weight (Ahmed *et al*., 2018; Asmare *et al*., 2018; Bekela *et al*., 2020; Deriba & Jemal, 2021; Mingude *et al*., 2020; Rifai *et al*., 2020; Sutan *et al*., 2014; Tadese *et al*., 2021). The importance of proper maternal nutrition and proper weight gain during pregnancy can minimize the risk of adverse birth outcomes (Jeena *et al*., 2020).

First parity can affect LBW births, because the first pregnancy is all for the true maturation of the uterine structure (Paramitasari *et al*., 2018). High parity affects the development of various health problems for mothers who give birth to babies. The higher the frequency of pregnancy and childbirth, the elasticity of the uterus is increasingly disturbed before pregnancy and delivery, resulting in incomplete uterine contractions, resulting in postoperative bleeding and premature birth resulting in low birth weight (Noli *et al*., 2019). A study describes the results of his research that primily mothers and mothers who have given birth to children > 3 times cause 2.20 to 2.66 times increased risk factors for LBW (Adam *et al*., 2019; Alemu *et al*., 2019; Mingude *et al*., 2020; Tadese *et al*., 2021). Parity 2-3 is the safest condition for pregnancy and childbirth during the reproductive period, because in that condition the uterine wall does not change much.

ANC visits can affect LBW births, because ANC visits have important benefits, for example, mothers who are diagnosed with LBW risk factors can be detected early and get better and maximum care immediately. It is also necessary to know that pregnant women at a young age usually have less knowledge and experience in prenatal care or it could be due to other factors such as inadequate family economy. Pregnant women with old age usually tend to be embarrassed to have their pregnancy checked due to old age, this usually happens in rural environments. A study describes the results of its research that mothers who do not make ANC visits cause 4.94 to 6.7 times to increase the risk factors for LBW (Adam *et al*., 2019; Alemu *et al*., 2019; Asmare *et al*., 2018; Bekela *et al*., 2020; Kargbo *et al*., 2021; Mingude *et al*., 2020; Mulu *et al*., 2020; Rifai *et al*., 2020; Tadese *et al*., 2021). WHO recommends a minimum of 8 contacts where the first ANC contact is scheduled in the 1st trimester (from the beginning of pregnancy to 12 weeks of gestation), then there are 2 contacts scheduled in the 2nd trimester (at 20 and 26 weeks of gestation) and 5 contacts in the 3rd trimester (at gestational age). 30, 34, 36, 38 and 40 weeks) (WHO, 2018).

Hypertension of pregnancy can affect LBW births, because hypertension in pregnancy is associated with decreased uteroplacental flow or causes insufficient blood flow to the placenta and limits fetal development, and this leads to an increased risk of LBW births (M. Desta *et al*., 2019). Hypertension associated with symptoms of proteinuria, edema, or both will show signs of preeclampsia. If the disease progresses further, or if fetal distress occurs, the pregnancy must end early, and preterm delivery may occur, thereby increasing the incidence of LBW. A study describes the results of research that pregnancy hypertension 1.88 to 3.7 times can increase the risk factors for LBW (Ghimire *et al*., 2014; Sutan *et al*., 2014; Bekela *et al*., 2020; Mulu *et al*., 2020; Tadese *et al*., 2021). Therefore, pregnancy hypertension is one of the causative factors of LBW. For all the previous reasons, the investigators emphasized the importance of prompt intervention to control hypertension in pregnancy, thereby avoiding subsequent complications.

Mothers who smoke can affect the birth of LBW. Mother's active or passive exposure to cigarette smoke during pregnancy has a negative effect on the newborn (Atessahin & Pirincci, 2015). This is because the substances contained in cigarettes are very dangerous, one of the effects is to weaken the release of blood oxygen to the fetal tissue and reduce the mother's blood supply to the placenta which is a contributor to the cause of LBW babies. The habit of mothers who smoke is usually caused by social environmental factors such as daily association and place of residence. Mothers who live in urban areas tend to have a free and modern lifestyle such as drinking alcohol, smoking, all of which are natural. A study describes the results of research that mothers who smoke 3.97 to 4.36 times can increase the risk factors for low birth weight (Kargbo *et al*., 2021; Rifai *et al*., 2020; Sema *et al*., 2019; Taywade & Pisudde, 2017). Concentrations of tar, nicotine, carbon monoxide, carbon dioxide are 2 to 10 times higher in side stream smoke than mainstream smoke (Deshmukh *et al*., 2018; Hüseyin *et al*., 2020). Research shows that smoking mothers can increase the risk of LBW regardless of other confounding factors.

The limitations of the articles that have been reviewed are:

1. There are several articles that still do not include the total population, it is feared that the sample is not representative of the population.
2. The article uses a case-control research method where the weakness in this method is the retrospective measurement of variables, objectivity, and lack of reliability because the research subject must recall the risk factors.

Follow-up needed in future research can develop research on other factors that can affect LBW.

# CONCLUSION

Based on the results of identification and analysis, as well as the discussion that has been explained from 15 articles, it can be concluded thatfactors such as age of pregnant women, maternal anemia, maternal nutritional status, parity, ANC visits, gestational hypertension, and maternal smoking are the determining factors that cause low birth weight babies. Of the many articles stated that 80% ANC visit factors and maternal nutritional status 66.7% greatly affect LBW.

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