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A Systematic Review

Determinants of low birth weight: a systematic review

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Abstract
More than 80% of neonatal deaths that occur in newborns are caused by Low Birth Weight (LBW). This increases the risk of several health problems, such as susceptibility to infections, chronic non-communicable developmental diseases, and growth and intellectual disability that may occur during infancy, childhood, and the later stages of life. Therefore it is necessary to reduce the prevalence of LBW to achieve Sustainable Development Goals (SDGs). The purpose of this study was to determine the determinants of LBW through a systematic review. The method used in the systematic review study was searching through the Pubmed, ProQuest, and Science Direct databases with the year of publication from January 2012 to January 2022. The results of almost all articles were obtained, which said that the mother's nutritional status, maternal age, anemia, hypertension of pregnancy, parity, ANC, and smoking affect LBW. Two factors greatly influence the seventh factor: the ANC visit factor and the mother's nutritional status. It is essential to regularly check for pregnancy as early as possible so it can be detected early. Health workers can also monitor the growth and development of the fetus, as well as the importance of fulfilling balanced nutrition during pregnancy.

Keywords: determinants; LBW; maternal factors

1. Introduction

Low Birth Weight (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 LBW rate in developing countries is more than twenty times the rate in developed countries. Around 17 million babies are born with LBW annually in developing countries (Desta et al., 2020). LBW in Indonesia is 29% (UNICEF-WHO, 2019).

LBW is associated with various factors, such as maternal nutritional status or malnutrition, maternal age during pregnancy, anemia, gestational hypertension, parity, ANC, and smoking (Melissa et al., 2016). Pregnant mothers aged less than 20 years and more than 35 give birth to LBW babies, namely 45% and 64.8%, ANC 54% or have 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 of 44.2% (Jeena et al., 2020). Poor nutritional status is 47.61%, and hypertension at 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, and the 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, and 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* includes one of its targets: 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 (Kananura et al., 2016). Routine ANC visits can also help prevent and are one care intervention that reduces maternal morbidity associated with an increased likelihood of LBW (Rornald & Muhumuza, 2021). Better quality care for pregnant women and newborns using new, more appropriate technologies developed in 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 survey 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. The researcher will use a systematic review method for updated results.

Based on the background description, 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.

2. Research Methods

2.1. Selection Strategy

It used a literature review design that summarizes relevant literature according to the topic using the Systematic Review method, namely research that outlines the preliminary research results by predetermined eligibility criteria to answer research questions. Researchers conduct systematic reviews using explicit and systematic methods chosen to minimize bias and produce more credible findings in making decisions.

The data used in this study are secondary data obtained from articles or previous research journals related to the determinants or determinants of the causes of LBW. Data were identified from January 2012 to January 2022. The search was conducted through the Pubmed, ProQuest, and Science Direct databases using the keywords Determinants AND Low Birth Weight.

2.2. Study Selection

The selection study was made by selecting relevant titles and abstracts, which were reviewed directly by the reviewers. Then the screening was carried out based on the inclusion criteria: original research journals in 2012-2022, with a population of LBW babies, journals in English, and complete articles. The study design criteria included in this article are cross-sectional and case-control. The exclusion criteria, namely: Those that are not related to the Determinants of Low Birth Weight Babies (LBW), the year of publication before 2012 and after January 2022, not full text, and other than the English language.

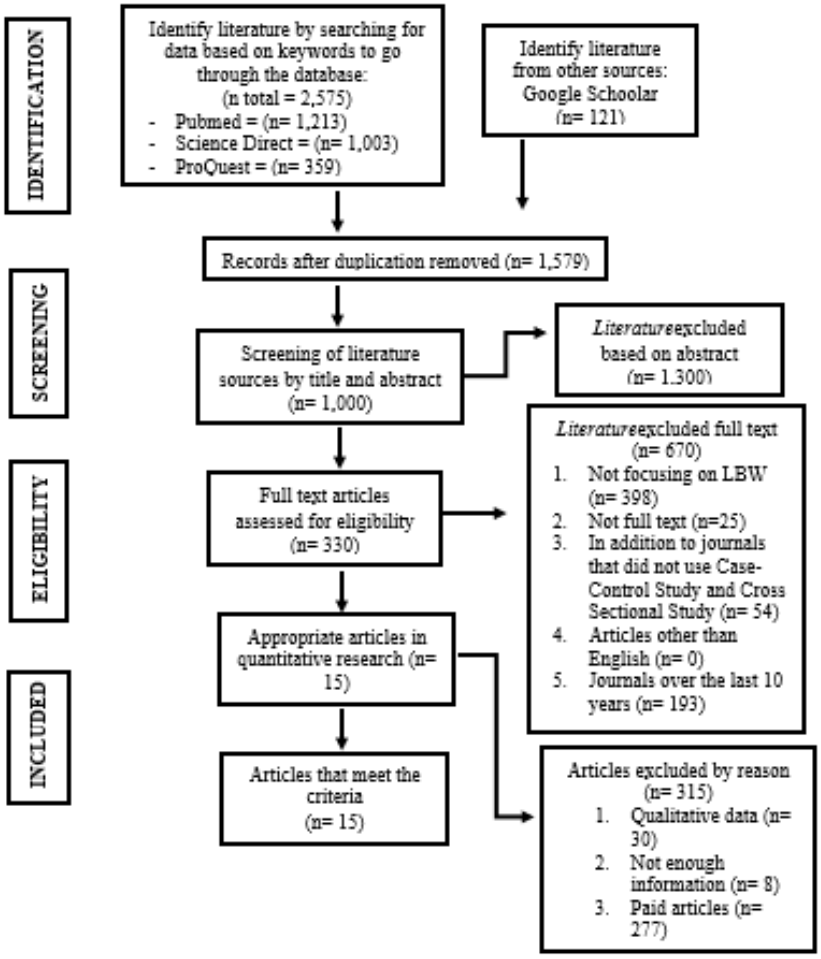

Figure 1. Prism diagram flow chart determinants of Low Birth Weight babies (LBW)

3. Results and Discussion

3.1. Results

After searching through the Pubmed, Proquest, and Scient Direct databases, I found 2,575 articles that match keywords, 1,579 articles that are free of duplication, and 330 full-text articles. Eligibility was conducted to determine articles that fit the inclusion criteria, and obtained 15 articles that met the criteria with several respondents of 5,948 participants. Study design using case-control totaling 13 articles and two articles using cross-sectional. Studies that meet the criteria discuss the determinants of LBW**.** Of the 15 articles, three came from Ethiopia, three from Southern Ethiopia, two from India, and the rest 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	Berhanu Senbeta Deriba et	Case-Control	a. Questionnaire.	N = 49,667 pregnant women who	5 General Hospitals and 14 Health	PubMed	Significantly associated with LBW: a. The nutritional status of the mother was known

No	Title	Author (year) Country	Design	Instrument	Population (N) or sample (n)	Place, Research Time	Data based	Results
	Gave Birth at Public Health Facilities in North Shewa Zone: Unmatched Case-Control Study	al. (2021) Ethiopia		b. Face-to-Face Interview c. Patient Records.	are expected to give birth n=570 participants (190 cases and 380 controls). Response rate=97.37%.	Centers in North Shewa, Ethiopia, conducted from February to June 2020	https://pubmed.ncbi.nlm.nih.gov/34619995/	by the maternal upper arm circumference (LiLA) < 23 cm (AOR = 2.85; 95% CI = [1.68, 4.85]). b. Anemia (AOR = 2.34; 95% CI = [1.21, 4.53]). There is no relationship with LBW: a. 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 shows 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	a. Questionnaire. b. Face-to-Face Interview c. Medical records. d. 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 and Southern Ethiopia, carried out from February 25 to April 25, 2018.	PubMed https://pubmed.ncbi.nlm.nih.gov/32782793/	Significantly associated with LBW: a. Non-routine ANC care (adjusted odds ratio = 1.87, confidence interval = [1.32-2.6]) b. Parity (primiparous) (adjusted odds ratio = 0.385, confidence interval = [0.176-0.83]) c. Anemia (adjusted odds ratio = 4.4, confidence interval = [1.84–10.5]) d. 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,	Getaneh Baye Mulu et al. (2020) Ethiopia	Case-Control	a. Interviews using a structured questionnaire. b. Medical records.	N = 279 (93 cases and 186 controls) newborns. n = 270 (90 cases and 180	At Addis Ababa General Hospital, Ethiopia, conducted from 15 March to	PubMed https://pubmed.ncbi.nlm.nih.g	Significantly associated with LBW: a. Gestational hypertension with [AOR 3.7 (95% CI = 1.6-8.7)]. b. Incomplete ANC visits [AOR 6.7 (95% CI = 3.2-15.3)]

No	Title	Author (year) Country	Design	Instrument	Population (N) or sample (n)	Place, Research Time	Data based	Results
	Ethiopia: Case-Control Study			c. Anthropometry : - Scale scale: - height meter - LiLA Ribbon	controls) newborns Response rate = 96.8%.	30 April 2019	ov/32273790/	There is no relationship with LBW: a. Maternal age < 20 years [AOR 0.5 (95% CI = 0.9-2.6)] b. Anemia [AOR 1.8 (95% CI = 0.65-5.1)] c. 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 shows 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: a. In this study, univariate regression analysis showed that the risk factor associated with low birth weight was maternal age less than 19 years with a p-value = 0.042, which was considered significant if the p-value < 0.05. b. In this study, multivariate regression analysis showed that the risk factor associated with low birth weight was hypertension in pregnancy with a p-value < 0.001, which was considered significant if the 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	Rosnah Sutan et al. (2014) Malaysia	Case-Control	a. Medical records. b. Questionnaire.	N = 3214 babies. n = 360 LBW infants (180 infants	Universiti Kebangsaan At Hospital Malaysia	ProQuest https://www.sc	Significantly associated with LBW: a. Young mother's age (OR 2.89, 95% CI 1.86 - 4.51, p < 0.001).

No	Title	Author (year) Country	Design	Instrument	Population (N) or sample (n)	Place, Research Time	Data based	Results
	Case-Control Study			Contains sociodemographic characteristics.	as cases and 180 infants as controls).	Medical Center (UKMMC) in Kuala Lumpur, Malaysia, conducted from January to June 2012	irp.org/html/1-1340268_43684.htm	b. Mother with gestational hypertension (OR 4.52, 95% CI 1.06 - 19.22, p = 0.041) c. Underweight BMI knows the Mother's nutritional status (OR 1.56, 95% CI 0.56 - 2.57, p = 0.02) There is no relationship with LBW: a. Anemic mother (OR 0.05, 95% CI 0.18 - 0.28, P = 0.661) This article states that the factors affecting LBW include maternal age, 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	a. Questionnaire. b. 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: a. Maternal anemia (OR 3.14, 95% CI 1.50–6.58) b. ANC visits less than three times (OR; 4.94, 95% CI 2.12-11.12) c. 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 three 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	a. Questionnaire To obtain primary data. b. 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-	Significantly associated with LBW: a. Mother's nutritional status is known by underweight BMI (AOR (CI) = 4.94 (3.26-7.52) b. Maternal age > 36 years (AOR (CI) = 2.45 (0.38-15.8) c. Pregnancy hypertension (AOR (CI)=1.88 (0.60–5.86)

No	Title	Author (year) Country	Design	Instrument	Population (N) or sample (n)	Place, Research Time	Data based	Results
							021-04275-6	d. No ANC visit (AOR (CI) = 0.41 (0.12–1.45) e. 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	a. Questionnaire b. Mother's ANC card c. Face-to-face interview d. 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: a. Anemia during pregnancy (AoR = 3.88, 95% CI 1.90-7.90, p < 0.001) b. Smoking during pregnancy (AoR = 4.36, 95% CI 1.94-9.80, p < 0.001) c. ANC visits less than 4x (AoR = 2.69, 95% CI 1.70–4.26, p < 0.001) There is no relationship with LBW: a. 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 shows that maternal age < 20 years does not affect LBW.
9.	Associated Factors with Low Birth Weight in Dire Dawa City, Eastern Ethiopia: A	Alekaw Sema et al. (2019) Eastern Ethiopia	Cross-Sectional	a. Questionnaire b. Interview c. Anthropometry	n = is 431 mothers Response rate = 97.40% Social Demographi	Dilchora Referral Hospital and Sabina Primary Hospital, in Dire Dawa Municipal	PubMed https://pubmed.ncbi.nlm.nih.g	Significantly associated with LBW: a. Mother smoker (AOR 3.97, 95% CI: 1.59, 9.88) There is no relationship with LBW:

No	Title	Author (year) Country	Design	Instrument	Population (N) or sample (n)	Place, Research Time	Data based	Results
	Cross-Sectional Study				c Characteristics: $\bar{x}$ mother's age27.4 (±4.98) years.	Government, East Ethiopia, from July to August 2018	ov/31886197/	a. No ANC visit (AOR 0.97, 95% CI: 0.39, 2.38) b. Anemic mother (AOR 1.25, 95% CI: 0.67, 2.36) c. Maternal nutritional status is known from LiLA < 23 cm (AOR 1.61, 95% CI: 0.86, 3.03) This article states that those who affect by LBW are mothers who smoke. However, this article also says that not having ANC visits, maternal anemia, and nutritional status does 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	a. Face-to-Face Interview b. Structured Questionnaire and Pre-Test c. Anthropometry	n = 286 mothers exposed to anemia (95 cases and 191 controls) Response rate = 97.6%.	Ten 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: a. Mother's nutritional status is known to be LiLA < 23 cm [AOR = 7.17: CI (3.99,12.88)] b. Maternal anemia [AOR = 3.54: CI (1.46, 8.61)] There is no relationship with LBW: a. Maternal age < 20 years 0.54 (0.25,1.19) and maternal age > 35 years 2.24 (0.73,6,91) b. 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 shows 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	Getnet Asmare et al. (2018) Northwest Ethiopia	Case-Control	a. Questionnaire b. Interview c. Anthropometry	n = 453 mothers (151 cases and 302 controls). Mothers who gave birth to live babies weighing < 2500 grams	Women are giving birth at 3 Referral Hospitals in the Amhara region, Northwest Ethiopia.	PubMed https://pubmed.ncbi.nlm.nih.gov/29986740/	Significantly associated with LBW: a. No ANC visit (AOR: 2.3, 95% CI 1.32-4.04) b. 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:

No	Title	Author (year) Country	Design	Instrument	Population (N) or sample (n)	Place, Research Time	Data based	Results
	Case-Control Study				were considered cases, and mothers who gave birth to live babies weighing > 2500 grams and above were considered controls. Response rate = 94.7%.	Conducted from March 20 to April 30, 2017.		a. 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 shows 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	a. Structured interview b. 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. They are 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: a. Not attending ANC care [AOR=2.3; 95% CI: 1.3-2.7] b. 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	a. Interview b. Questionnaire c. 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	It was conducted at the Zona Sidama public hospital in Southern Ethiopia from March 1 to May 5, 2019.	PubMed https://pubmed.ncbi.nlm.nih.gov/32351737/	Significantly associated with LBW: a. ANC delay (AOR = 3:22, 95% CI (1.47-7.14) b. Hypertension of pregnancy (AOR = 4:49, 95% CI (1.94-10.38) c. Mother's nutritional status is known to be LiLA < 23 cm (AOR = 4: 27, 95% CI (2.24-8.12)

No	Title	Author (year) Country	Design	Instrument	Population (N) or sample (n)	Place, Research Time	Data based	Results
					weight <2500 grams Control: newborns with a birth weight of 2500 grams. n = 354 (118 cases and 236 controls) Response rate = 90%			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	a. Secondary Data Obtained from RSUD Prof. Dr. HM Anwar Makkatutu Bantaeng. b. Primary Data was 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 from 2018 to 2019	Science Direct https://www.sciencedirect.com/science/article/abs/pii/S1130862120302515	Significantly associated with LBW: a. Mother smokes with OR = 3.441 b. Poor nutritional status (KEK) OR = 3,224 c. Not doing ANC OR = 3.185 With a significance level of each P < 0.05. There is no relationship with LBW: a. 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 shows 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	a. Questionnaire b. Interview	n = 614 infants (307 cases and 307 controls). Case: single live birth with term pregnancy, with birth weight < 2500 grams in the hospital	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: a. 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] b. 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.

No	Title	Author (year) Country	Design	Instrument	Population (N) or sample (n)	Place, Research Time	Data based	Results
					Controls: single live births with birth weight equal to or > 2500 grams born at term			

3.2. 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 prenatal care is not carried out optimally and cannot be detected early, causing LBW (Banerjee et al., 2020). When the mother's age is too old (>35 years), the function of the reproductive organs decreases, and the hormones in the mother's body are reduced during pregnancy. The ideal female reproductive age is 20-35 years. Maternal mortality at <20 or >35 years is 2-5 times higher than women of childbearing age. A study describes the research results 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 & Pisudde, 2017; Tadese et al., 2021). Older mothers are at higher risk of low birth weight, premature birth, and perinatal death and are more likely to use specialized care or respiratory care (Barbuscia et al., 2020; Carolan & Frankowska, 2011; Klemetti et al., 2014). A study states that maternal age is not a factor in the occurrence of LBW, but some factors 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 article's results are controversial, the researchers suggest that the risk is related to age and complications from other processes, such as many chronic diseases (hypertension, diabetes, and increased blood pressure). Vascular arteriosclerotic disorders at the myometrial level 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, classified as mild to moderate anemia. A study 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 cautiously because a group possesses various characteristics that can indicate inconsistency or inconsistency.

Poor maternal nutritional status can affect LBW births because to provide an adequate amount and variety of substances for the fetus, and a woman must get good nutrition during pregnancy. If the mother's nutrition is not fulfilled, 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 influences 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 maternal nutrition and 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 essential benefits. For example, mothers 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 the lousy family economy. Pregnant women with old age usually tend to be embarrassed to have their pregnancy checked due to old age, which generally happens in rural environments. A study describes the results of its research that mothers who do not make ANC visits cause a 4.94 to 6.7 times increase in 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). Two references are planned in the 2nd trimester (at 20 and 26 weeks of gestation) and five in the 3rd trimester (at gestational age). 30, 34, 36, 38, and 40 weeks) (WHO, 2018).

Hypertension during 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, leading 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 research results 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. Mothers' active or passive exposure to cigarette smoke during pregnancy hurts 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, contributing to the cause of LBW babies. The habit of mothers who smoke is usually caused by social and 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, and smoking, all of which are natural. A study describes the research results 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 and carbon dioxide are 2 to 10 times higher in

sidestream smoke than in 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 there are several articles that still do not include the total population. It is feared that the sample is not representative of the people. The paper uses a case-control research method. The weakness of this method is the retrospective measurement of variables, objectivity, and lack of reliability because the research subject must recall the risk factors.

4. Conclusion

Based on the results of identification and analysis, as well as the discussion that has been explained in 15 articles, it can be concluded that factors such as the 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 15 articles, it was stated that the factor of ANC visits and the mother's nutritional status greatly influenced LBW. It is essential to have regular pregnancy check-ups to detect abnormalities early and to fulfill balanced nutrition during pregnancy. It is hoped that health workers can also unite growth and the fetus and provide developmental information through counseling or during health facilities visits and educate patients.

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