NUTRITIONAL STATUS AND MATERNAL WEIGHT GAIN DURING PREGNANCY ARE ASSOCIATED WITH LOW BIRTH WEIGHT

Syahda Lailatul Fatimah[1], Gangsar Indah Lestari[2], Riyanto[3]

[1,2,3] Tanjungkarang Health Polytechnic Midwifery Department Study Program
Bachelor of Applied Midwifery, Metro Campus
Email correspondence: Indahcahyadi@gmail.com

ABSTRAK : STATUS GIZI DAN KENAIKAN BERAT BADAN IBU SELAMA HAMIL BERHUBUNGAN DENGAN BERAT BAYI LAHIR RENDAH

Pendahuluan Berat bayi lahir rendah merupakan salah satu masalah kesehatan yang banyak terjadi pada bayi baru lahir dan dapat meningkatkan risiko komplikasi pada bayi baru lahir. 54% penyebab kematian bayi adalah latar belakang gizi.. Bayi dengan BBLR mempunyai peluang meninggal 10-20 kali lebih besar dari pada bayi yang lahir dengan berat lahir cukup. Dampak dari BBLR antara lain peningkatan risiko hipotermia, hipoglikemia, gangguan pernapasan, hiperbilirubinemia, dan lain-lain, serta meningkatkan risiko gangguan perkembangan motorik dan kognitif, gangguan pertumbuhan, serta penyakit kronis. Prevelensi Kasus BBLR tahun 2021-2023 di Kota Metro terus mengalami kenaikan. Hasil penimbangan tahun 2021 terdapat 4,8% mengalami BBLR, pada tahun 2022 terdapat 5,1% mengalami BBLR dan pada tahun 2023 terdapat 6.0% mengalami BBLR. Rendahnya status gizi ibu hamil selama kehamilan dapat mengakibatkan berbagai dampak tidak baik bagi ibu hamil dan bayinya diantaranya adalah bayi lahir dengan BBLR. Penelitian ini bertujuan untuk mengetahui hubungan status gizi dan kenaikan berat badan ibu selama hamil terhadap BBLR.

Metode Penelitian ini merupakan penelitian *observasional* dengan desain *case control* dan dilaksanakan pada bulan Mei 2025 di RSUD Jenderal Ahmad Yani Kota Metro. Populasi penelitian ini adalah seluruh ibu dan bayi baru lahir di rumah sakit. Sampel penelitian ini berjumlah 80 responden terdiri atas 40 kelompok kasus (BBLR) dan 40 kelompok kontrol (Tidak BBLR). Sampel dipilih menggunakan alat ukur kuesioner untuk memperoleh data menggunakan analisis univariat dan bivariat menggunakan uji *Chi Square* dengan tingkat kemaknaan ( ) 0,05%.

Hasil penelitian dari 80 responden menunjukkan ibu dengan status gizi dalam kategori beresiko BBLR (25,0%) dan ibu dengan status gizi dalam kategori tidak beresiko BBLR (75,0%), sedangkan ibu dengan kenaikan berat badan selama hamil dalam kategori tidak sesuai IMT (77,5%) dan kategori sesuai IMT (22,2%). Hasil uji statistik diperoleh hasil adanya hubungan antara status gizi *p-value* = 0,003; OR = 13,000 dan kenaikan berat badan ibu selama hamil *p-value* = 0,001 ; OR = 4,660 dengan berat bayi lahir rendah.

Kesimpulan penelitian adanya hubungan status gizi dan kenaikan berat badan ibu selama hamil dengan kejadian BBLR. Saran Perlu edukasi untuk upaya menurunkan dan mencegah kejadian BBLR dengan melakukan pemeriksaan rutin agar dapat membantu dalam mendeteksi dini status gizi ibu hamil serta melakukan pemantauan selama kehamilan.

Kata kunci : IMT, status gizi, kenakan berat badan, BBLR

ABSTRACT

Introduction Low birth weight is a common health problem in newborns and can increase the risk of complications in newborns. 54% of infant deaths are caused by nutritional background. Babies with low birth weight have a 10-20 times greater chance of dying than babies born with adequate birth weight. The impacts of low birth weight include an increased risk of hypothermia, hypoglycemia, respiratory disorders, hyperbilirubinemia, and others, as well as an increased risk of impaired motor and cognitive development, growth disorders, and chronic diseases. The prevalence of low birth weight cases in Metro City from 2021-2023 continues to increase. The results of weighing in 2021 showed 4.8% experiencing low birth weight, in 2022 there were 5.1% experiencing low birth weight and in 2023 there were 6.0% experiencing low birth weight. The low nutritional status of pregnant women during pregnancy can result in various adverse effects for pregnant women and their babies, including babies born with low birth weight. This study aims to determine the relationship between nutritional status and maternal weight gain during pregnancy with low birth weight.

 DOI 10.33024, http://ejurnalmalahayati.ac.id/index.php/kebidanan

Method This research is an *observational study* with a *case control design* and was conducted in May 2025 at General Ahmad Yani Regional General Hospital, Metro City . The population of this study was all mothers and newborns at the hospital. The sample of this study amounted to 80 respondents consisting of 40 case groups (LBW) and 40 control groups (Not LBW). The sample was selected using a questionnaire measuring tool to obtain data using univariate and bivariate analysis using the *Chi Square test* with a significance level ( ) of 0.05%.

The results of the study from 80 respondents showed that mothers with nutritional status in the category at risk of LBW (25.0%) and mothers with nutritional status in the category not at risk of LBW (75.0%), while mothers with weight gain during pregnancy in the category not according to BMI (77.5%) and the category according to BMI (22.2%). The results of the statistical test obtained the results of a relationship between nutritional status *p-value* = 0.003; OR = 13,000 and maternal weight gain during pregnancy *p-value* = 0.001; OR = 4,660 with low birth weight.

The conclusion of the study is that there is a relationship between nutritional status and maternal weight gain during pregnancy with the incidence of LBW. Suggestion : Education is needed to reduce and prevent the incidence of LBW by conducting routine check-ups to help in early detection of the nutritional status of pregnant women and conducting monitoring during pregnancy.

Keywords : BMI, nutritional status, weight gain, LBW

INTRODUCTION

Low birth weight is one of the health problems that often occurs in newborns and can increase the risk of complications in newborns. The low nutritional status of pregnant women during pregnancy can result in various adverse effects for pregnant women and their babies, including babies born with Low Birth Weight (LBW) (Iriani *et al* ., 2022) . WHO reports the prevalence of LBW globally is 14.7% of live newborns experiencing LBW. The prevalence of LBW in Africa is 13.7%, America 9.2%, Europe 7.6%, and Southeast Asia has the highest prevalence of LBW at 23.5% (WHO, 2020) . The trend of LBW cases in Indonesia in 2021-2023 has increased with the results of weighing carried out in 2021 there were 81.8% of newborns weighed with around 2.5% experiencing LBW. The 2022 birth weight results showed neither an increase nor a decrease, with 82% of newborns weighed, with approximately 2.5% being low birth weight (LBW). This figure increased in 2023, with 84.3% of newborns weighed, with 3.9% being low birth weight (Ministry of Health of the Republic of Indonesia, 2023) .

Based on the graph of the trend of LBW cases in 2023 in Lampung Province below, it can be seen that the number of live births was 139,713 people and of that number, 133,878 (95.8%) newborns were weighed with around 3,380 (2.5%) experiencing LBW (Lampung Provincial Health Office, 2023) . This is an increase from 2022 with the number of live births of 141,337 people and of that number, 134,824 (95.4%) newborns were weighed and around 2,627 (1.9%) experienced LBW (Lampung Provincial Health Office, 2022) . And in 2021 there were 144,195 live births, of which 128,782 (89.3%) newborns were weighed, and around 4,812 (3.7) had LBW (Lampung Provincial Health Office, 2021) .

The trend of LBW cases in Metro City from 2021 to 2023 continues to increase. The results of the 2021 weighing showed a number of live births of 2,409 people (100%) babies were weighed, and approximately 4.8% had LBW (Metro City Health Office, 2022) . The results of the 2022 weighing showed a number of live births of 2,538 people, there were 100% babies weighed and approximately 5.1% had LBW (Metro City Health Office, 2023) . The results of the 2023 weighing showed a number of live births of 2,543 people, there were 100% babies weighed with approximately 6.0% having LBW (Metro City Health Office, 2024) .

Previous research has demonstrated a correlation between maternal nutritional status and weight gain during pregnancy and infant birth weight. Research conducted by (Puspita, 2019) Previously, results showed that pre-pregnancy maternal BMI and weight gain during pregnancy had a significant relationship with the baby's birth weight. Research found that pre-pregnancy maternal BMI and weight gain during pregnancy affect the baby's birth weight. Research conducted by (Aldina *et al.,* 2022) found a relationship between maternal nutritional status and cases of low birth weight. Research conducted by (Iriani *et al.,* 2022) The results showed a relationship between nutritional status and estimated fetal weight in pregnant women in the third trimester. Research conducted by (Bariyyah & Srimiati, 2021) found a significant relationship between maternal nutritional status before pregnancy and the incidence of low birth weight (LBW). Pre-pregnancy

nutritional status increases the risk of giving birth to a low birth weight baby.

Based on the results of a pre-survey conducted at General Ahmad Yani Regional Hospital, Metro City, in 2023, there were 314 mothers giving birth. Of these, 119 (37.89%) had babies born with low birth weight (LBW) and 195 (62.10%) had babies born without low birth weight (LBW). Therefore, this study was conducted to re-analyze the relationship between nutritional status and maternal weight gain during pregnancy and low birth weight.

RESEARCH METHODS

The type of research used is quantitative . Research *Case control* is an analytical study that studies the causes of events or incidents retrospectively . The case group is newborns with low birth weight or LBW recorded in medical records in 2024 at RSUD. Ahmad Yani Metro City. While the control group is babies with normal weight or not LBW recorded in medical records in 2024 at RSUD. Ahmad Yani Metro City. Data collection by looking at medical records . The case population in this study is all mothers and newborns diagnosed with LBW at RSUD Jenderal Ahmad Yani, Metro City with a total of 14 7 respondents. The sample required by the researcher is 80 newborns, namely 40 case groups are newborns with low birth weight and 40 control groups are newborns with normal weight. Case criteria : All mothers of babies diagnosed with LBW in the Perinatology room who were medically recorded in 2024 at General Ahmad Yani Metro Hospital who met the research requirements. Control criteria: All mothers of babies with normal weight in the Perinatology room who were medically recorded in 2024 at General Ahmad Yani Metro Hospital who met the research requirements. Exclusion criteria Data on mothers and babies with twin pregnancies. This research instrument uses a questionnaire consisting of 4 parts : Respondent Identity includes the respondent's initial name, respondent's age, occupation, education, marital status and how many times they have given birth. The screening questionnaire for respondents who meet the research requirements can continue or not in filling out the questionnaire that has been provided and are grouped into case groups or control groups. The respondent's diagnosis questionnaire contains the diagnosis experienced by the respondent to determine the case group or control group based on the doctor's diagnosis seen from the medical record and since when the patient received the diagnosis of the disease. Risk Factor Questionnaire : Maternal nutritional status , Maternal weight gain during pregnancy .

RESEARCH RESULTS

This table provides an overview of the distribution of respondent characteristics in this study. The characteristics of respondents in this study were mostly aged 20-35 years (78.8 %), the majority of respondents had a high school education (40.0 %), and the majority of respondents were employed (52.5 %), and the number of ANC visits for mothers was mostly ≥ 8 times (compliant) (65.0%).

Table 1
Frequency Distribution of Respondent Characteristics

Category	Low Birth Weight Incident					
	Case		Control		Total	
	n	%	n	%	n	%
Age						
20-35 Years	31	77.5	32	80.0	63	78.8
<20 or >35 Years	9	22.5	8	20.0	17	21.3
Education						
Elementary School	1	2.5	1	2.5	2	2.5
JUNIOR HIGH SCHOOL	8	20.0	9	22.5	17	21.3
SENIOR HIGH SCHOOL	17	42.5	15	37.5	32	40.5
College	14	35.0	15	37.5	29	36.3
Work						
Doesn't work	17	42.5	21	52.5	38	47.5
Work	23	57.5	19	47.5	42	52.5
Parity						

 DOI 10.33024, http://ejurnalmalahayati.ac.id/index.php/kebidanan

1-3	36	90.0	38	95.0	74	92.5
>3	4	10.0	2	5.0	6	7.5
ANC						
Not obey	20	50.0	8	20.0	38	35.0
Obedient	20	50.0	32	80.0	52	65.0

Table 2
Distribution of Nutritional Status of Pregnant Women at General Ahmad Yani Regional Hospital Metro City

Nutritional status (BMI)	Low Birth Weight Incident				Total	
	Case		Control			
	n	%	n	%	n	%
Not enough	10	25.0	1	2.5	11	13.8
Normal	23	57.5	20	50.0	43	53.8
Excessive	4	10.0	15	37.5	19	23.8
Obesity	3	7.5	4	10.0	7	8.8

The table shows the proportion of nutritional status of a total of 80 pregnant women respondents. The majority of respondents' nutritional status was in the normal category, as many as 23 (57.5%) respondents in the case group. In the control group, the majority of respondents' nutritional status was in the normal category, as many as 20 (50.0%) respondents.

Table 3
Distribution of Nutritional Status at General Ahmad Yani Regional Hospital Metro City

Nutritional status (BMI)	Case (LBW)				Total	
	Case		Control			
	n	%	n	%	n	%
At risk of low birth weight	10	25.0	1	2.5	11	13.8
No Risk of Low Birth Weight	30	75.0	39	97.5	69	86.3

The results of the study in the table show the proportion of maternal nutritional status with the incidence of LBW. It is known that of the total respondents in the case group, 10 (25.0%) respondents had a nutritional status at risk of LBW (BMI <18.5). Meanwhile, 30 (2.5%) respondents had a nutritional status not at risk of LBW (BMI <18.5).

The results of the study in the table show the proportion of maternal weight gain during pregnancy with the incidence of LBW. It is known that of the total respondents in the case group, 31 (77.5%) respondents had weight gain that did not match BMI. Meanwhile, 9 (22.5%) respondents had weight gain that matched BMI.

Table 4
Distribution of Maternal Weight Gain During Pregnancy at General Ahmad Yani Regional Hospital Metro City

Weight Gain	Low Birth Weight Incident				Total	
	Case		Control			
	n	%	n	%	n	%
Not according to BMI	31	77.5	17	42.5	48	60.0
According to BMI	9	22.5	23	57.5	32	40.0

Table 5
Frequency Distribution of the Relationship between Maternal Nutritional Status and Low Birth Weight at General Ahmad Yani Regional Hospital, Metro City

Nutritional status	Case (LBW)		Control (Not LBW)		Total		P-Value	OR (95% CI)
	n	%	n	%	n	%		
At risk	10	25.0	1	2.5	11	13.8		13,000
No Risk	30	75.0	39	97.5	69	86.3	0.003	1,576 - 107,228

The results of the bivariate analysis from the table show that there is a relationship between maternal nutritional status and low birth weight. The results of the statistical test using *chi-square analysis* obtained *a p value of* 0.003, Ha was accepted, which means there is a significant relationship between the variable of maternal nutritional status during pregnancy and low birth weight. The Odds Ratio (OR) value = 13,000 from these results shows that respondents with nutritional status (BMI) in the less category are at 13,000 times risk of experiencing LBW in their babies compared to respondents with nutritional status in the category of not less during pregnancy.

Table 6
Frequency Distribution of the Relationship between Maternal Weight Gain During Pregnancy and Low Birth Weight at General Ahmad Yani Regional Hospital, Metro City

Weight Gain	Low Birth Weight Incident						P-Value	OR (95% CI)
	Case (LBW)		Control (Not LBW)		Total			
	n	%	n	%	n	%		
Not according to BMI	31	77.5	17	42.5	48	60.0		4,660
According to BMI	9	22.5	23	57.5	32	40.0	0.001	1,764 - 12,311

The results of the bivariate analysis from the table show that there is a relationship between maternal weight gain during pregnancy and low birth weight. The results of the statistical test using *chi-square analysis* obtained *a p-value of* 0.001, Ha was accepted, which means there is a significant relationship between the variable of maternal weight gain during pregnancy and low birth weight. The Odd ratio (OR) value = 4.660 from these results shows that respondents with weight gain during pregnancy not according to BMI have a 4.660 times risk of experiencing LBW in their babies compared to respondents with weight gain according to BMI during their pregnancy.

DISCUSSION

This study shows that a quarter (25.0%) of the respondents in the case group had a nutritional status at risk of LBW (BMI <18.5). Meanwhile, 2.5% of the respondents had a nutritional status not at risk of LBW (BMI <18.5). This finding indicates a significant proportion of those at risk of LBW in the case group, thus indicating a potential relationship between maternal nutritional status and the incidence of low birth weight.

These results are comparable to a study conducted by Puspanagara & Khayati (2021) at Dr. Djoko Pramono Women's and Children's Hospital (RSIA), where less than a quarter (22.5%) of mothers had poor nutritional status. Furthermore, more than a quarter (77.4%) of mothers had good nutritional status. A study by Bariyyah (2021) at Harapan Children's and Mothers' Hospital (RSAB) also showed that more than a quarter (92.6%) of babies were born with low birth weight (LBW) to mothers with poor nutritional status before pregnancy. This indicates that babies with low birth weight (LBW) are more likely to be born to mothers with a history of poor nutritional status before pregnancy.

The variation in results between studies is likely due to differences in service conditions and respondent characteristics. In this study, the majority of respondents had dual roles, such as being a housewife and a breadwinner, diverting their time and energy. This is due to decreased uterine-placental blood flow, as it is channeled to the muscles (Mendri *et al.,* 2021). Furthermore, there were also mothers at high-risk ages (<20 or >35 years). At age 20 or younger, reproductive organs are immature and not ready to receive a

 DOI 10.33024, http://ejurnalmalahayati.ac.id/index.php/kebidanan

pregnancy, and at age 35 or older, reproductive organ function begins to decline, making pregnancy less favorable (Noor *et al.,* 2020). These factors also influence respondents' perceptions of health worker involvement. The frequency of antenatal care can also affect maternal outcomes. Therefore, it is crucial for expectant mothers to maintain good nutritional status before pregnancy (e.g., not underweight, anemic, or obese) to ensure adequate nutrient reserves to meet the needs of their fetus (Ministry of Health, 2021).

This research is important in pregnancy and childbirth, as maternal age <20 and >35 is a risk factor for low birth weight (LBW). This study contributes by presenting local data that considers biological and behavioral factors, and suggests the need for further analysis of antenatal care visits to monitor maternal nutritional status during the reproductive period and early pregnancy.

This research is important in pregnancy and childbirth because maternal age <20 and >35 is a risk factor for LBW. This study contributes by presenting local data that considers biological and behavioral factors, and suggests the need for further analysis of antenatal care visits to monitor maternal nutritional status during the reproductive period and early pregnancy. The frequency of antenatal care visits can also influence mothers' delivery (Mendri *et al.,* 2021). These factors also influence respondents' perceptions of health worker involvement. Therefore, during pregnancy, pregnant women are required to make a minimum of 6 ANC visits with a time distribution: one visit in the first trimester (gestational age 0-12 weeks), one visit in the second trimester (gestational age >12 weeks-24 weeks), and three visits in the third trimester (gestational age >24 weeks until delivery) (Rohmawati *et al.* , 2020) .

Efforts are needed to optimize the role of health workers in monitoring pregnancy through antenatal care. Maternal weight gain during pregnancy that is not in line with BMI can increase the risk of LBW. Furthermore, low parity (1–3) can contribute to LBW, especially when accompanied by inadequate weight gain during pregnancy. This highlights the importance of monitoring maternal weight gain in preventing LBW.

Nutritional status is a condition that arises, whether sufficient or insufficient, resulting from the balance between consumed intake and the body's metabolic needs. Nutrient intake for the fetus in the womb comes from the mother's nutrient reserves. Therefore, it is crucial for expectant mothers to have good nutritional status before pregnancy (e.g., not underweight, anemic, or obese) to ensure adequate nutrient reserves to meet the needs of the fetus (Ministry of Health of the Republic of Indonesia, 2021). A mother's nutritional status before and during pregnancy serves as a benchmark for monitoring fetal growth and development to avoid potential risks, including low birth weight (LBW) (Aldina *et al.,* 2022).

The implications of this study's findings emphasize the importance of meeting pre-pregnancy nutritional needs for women during their reproductive years. Health workers should involve families in education, supervision, and psychosocial support. This approach not only supports long-term therapy success but also maintains health and other important aspects of pregnancy, as well as preventing pregnancy complications and the risk of low birth weight (LBW) (Ministry of Health, 2021).

Collaborative efforts between health workers and families are crucial to improving pregnant women's and their families' understanding and knowledge regarding a balanced, nutritious diet. These interventions should focus on mothers, who have multiple roles, to prevent immune system disorders, impaired brain and nervous system development, anemia, preeclampsia, low birth weight (LBW), and prematurity. Broadly, these efforts also contribute to improving maternal reproductive health and preventing low birth weight (LBW) by improving maternal nutritional status in preparation for pregnancy (Ministry of Health, 2021).

Weight gain during pregnancy and fetal development vary significantly depending on pre-pregnancy weight and height. A good method for assessing normal weight gain during pregnancy is to use the relationship between the woman's weight and height before pregnancy, or the BMI (Ministry of Health, 2021). Underweight or overweight weight gain during pregnancy can put the pregnancy at risk. Maternal malnutrition can affect fetal growth and can lead to miscarriage, abortion, stillbirth, neonatal death, congenital defects, anemia in infants, intrapartum asphyxia, and low birth weight (LBW) (Proverawati & Ismawati, 2021).

CONCLUSION

There is a relationship between maternal nutritional status and low birth weight (p-value = 0.003) and mothers who experience nutritional status at risk of LBW (BMI <18.5) have a 13,000 times greater risk of experiencing LBW in their babies compared to respondents with nutritional status (BMI) in the non-risk category (BMI ≥18.5) during their pregnancy.

There is a relationship between maternal weight gain during pregnancy and low birth weight

(p-value = 0.001) and mothers with weight gain during pregnancy that does not match their BMI have a 4.660 times greater risk of experiencing LBW in their babies compared to respondents with weight gain that matches their BMI during pregnancy.

SUGGESTION

It is hoped that General Ahmad Yani Regional General Hospital, Metro City, will conduct routine checks to help in early detection of maternal nutritional status during pregnancy, as well as provide information in educational efforts for pregnant women so as to minimize the occurrence of low birth weight babies.

REFERENCES

Aldina, M., Utami, K. D., Reski, S., & Saraheni. (2022). Hubungan Status Gizi Ibu dan Jarak Kelahiran dengan Kasus Berat Badan Lahir Rendah di RSUD Abdoel Wahab Sjahranie Samarinda. *Formosa Journal of Science and Technology*, *1*(5), 411–420. https://doi.org/10.55927/fjst.v1i5.1199

Bariyyah, K., & Srimiati, M. (2021). Status Gizi Ibu Sebelum Hamil Dan Status Anemia Ibu Hamil Meningkatkan Resiko Melahirkan Bayi Berat Lahir Rendah. *Jurnal Gizi Dan Kuliner (Journal of Nutrition and Culinary)*, *1*(1),

Dinkes Kota Metro. (2023). *Profil Kesehatan Kota Metro 2022*. Kota Metro.

Dinkes Kota Metro. (2024). *Profil Kesehatan Kota Metro Tahun 2023*. 1–205. Kota Metro.

Dinkes Provinsi Lampung. (2022). Profil Dinas Kesehatan Provinsi Lampung. *Angewandte Chemie International Edition, 6(11), 951–952.*, *Mi*, 5–24.

Dinkes Provinsi Lampung. (2023). *Profil Keseehatan Provinsi Lampung*. *44*. Bandar Lampung.

Iriani, O. S., Triwidiyantari, D., & Pitrianti, D. (2022). Hubungan Status Gizi dengan Tafsiran Berat Janin Ibu Hamil Trimester III di PMB Bidan I Kabupaten Bandung. *Journal of Midwifery Information (JoMI)*, *2*(2), 200–206. http://https//jurnal.ibikotatasikmalaya.or.id/index.php/jomi%0AHUBUNGAN

Kemenkes RI. (2021). *Pedoman Gizi Seimbang Ibu Hamil Dan Ibu Menyusui*. Kementerian Kesehatan RI. https://drive.google.com/file/d/1f0GKY_M3DOX5ENJ2cZG7XRzZ4cFAfvyI/view

Kemenkes RI. (2023a). Buku KIA Kesehatan Ibu dan Anak. In *Kementrian kesehatan RI*. https://kesmas.kemkes.go.id/konten/133/0/061918-sosialisasi-buku-kia-edisi-revisi-tahun-2020

Mendri, N. K., Badi'ah, A., & Subargus, A. (2021). Model Momming Guide Kangoroe Mother Care Skin To Skin Contact Terhadap Kestabilan Suhu Tubuh Dan Berat Badan Pada Bblr Di Puskesmas. In *Angewandte Chemie International Edition, 6(11), 951–952.* (Vol. 3).

Proverawati, A., & Ismawati, C. (2021). *Berat Badan Lahir Rendah (BBLR)*. nuha Medika.

Puspita, I. M. (2019). Hubungan Antara Indeks Massa Tubuh (IMT) Ibu Prahamil dan Kenaikan Berat Badan selama Kehamilan dengan Berat Badan Lahir Bayi di RSUD DR.M, Soewandhie Surabaya. *Midwifery Journal | Kebidanan. 4*(2), 32–37.

Rohmawati, N., Agusfar, A. Z., Amelia, D., & Setianingrum, M. (2020). *Pedoman pelayanan antenatal terpadu*.

WHO. (2020). *Prevelensi Berat Badan Rendah*. WHO. https://www.who.int/data/gho/data/indicators/indicator-details/GHO/low-birth-weight-prevalence-(-)