



The Influence of Hemoglobin Levels and Nutritional Status of First-Trimester Pregnant Woman with Low Birth Weight

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Abstract

Premature birth is identified as the most significant contributor to infant mortality. The weight of a newborn baby is determined by nutritional status at the time of conception. Pregnant women who are malnourished and experience physical weakness will endanger the mother's life and threaten the safety of the fetus. LBW can be caused by anemia, in adherence to antenatal care, mothers with chronic diseases and smoking. This study aimed to determine the influence of hemoglobin levels and nutritional status of first-trimester pregnant women with low birth weight events. This type of quantitative research is a retrospective design. The population are mothers who gave birth at the Kabuh Community Health Center, Jombang Regency, in April 2019 obtained a sample of 39 respondents using a purposive sampling, with inclusion criteria birthing mothers have a KIA book. The data were analyzed using logistic regression. The results showed that almost all (79.5%) 31 pregnant women were not anaemic, almost all (84.6%) 33 pregnant women had normal nutritional status and almost all (76.9) babies were born with average weight, namely 30 respondents. There is a relationship between Hemoglobin levels in pregnant women and the incidence of LBW with a value of $p = 0.000$. There is a relationship between the nutritional status of pregnant women and the incidence of LBW with a value of $p = 0.000$. The most dominant factor is Hb levels ($p=0.001$ exp B:30) Pregnant women are anaemic, one of the factors causing poor nutritional status. Nutritional status lacks calorie energy, inhibiting the fetus's nutritional intake, resulting in premature labour or disruption of fetal growth.

Keywords: Hemoglobin levels, Low Birth Weight, Nutritional status, Lack of calorie energy

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1. BACKGROUND

The World Health Organization said Indonesia ranks fifth as the country with the most significant number of premature

babies (low birth weight) in the world, and premature births are identified as the most significant contributor to infant mortality rates. The leading causes of neonatal death

are low birth weight babies (LBW), including prematurity, followed by asphyxia and infection. The majority of all neonatal deaths (75%) in the world occurred during the first week of life, and around 1 million newborns died in the first 24 hours. Premature birth, complications related to intrapartum (asphyxia birth or failure to breathe at birth), infection, and congenital disabilities caused most neonatal deaths in 2016. From the end of the neonatal period and during the first five years of life, the main cause of death is pneumonia, diarrhea, congenital disabilities, and malaria. (WHO, 2017)

WHO said that globally, 2.5 million children died in the first month of life in 2017. There were around 7,000 newborn deaths every day, which amounted to 47% of all deaths in children under five years of age, up from 40% in 1990. Nearly the same number of stillborn babies were born in 2015. According to the East Java Central Statistics Agency, the number of babies born in East Java province in 2017 reached 578,579, and 38.9% were babies with low birth weight, namely 14,882 babies. This figure increased from 2016, when only 27.8% of 580,153 babies were born in East Java.

Kabuh Community Health Center is the community health center with the highest incidence of LBW in Jombang

Regency in 2017, 7.8% of 619 live births. This figure increased in 2018 to reach 9.17% of 533 live birth babies at the Jombang district health center (Jombang District Health Office, 2017)

Low Birth Weight can be caused by several factors, namely maternal factors, fetal factors, placental factors, and environmental factors (Proverawati, 2010). The results of Minasih's research (2021) state that the proportion of pregnant women who experience anemia has a significant relationship with indirect and direct factors that influence the incidence of anemia. Direct factors influence hemoglobin levels in pregnant women, including consumption of Fe tablets, nutritional status, and infection.

Yulianti's research (2016) shows that there is a relationship between the nutritional status of pregnant women and the incidence of LBW. Mothers with normal nutritional status will give birth to babies who are not LBW. It is because the flow of food from the mother to the fetus through the placenta runs well so that nutritional needs are met. The mother's nutritional status greatly influences the baby's health condition during pregnancy. Chronic energy deficiency (CED) in pregnant women needs to be aware of the possibility of the mother giving birth to a LBW baby, hampering the growth and

development of the fetus's brain, thereby affecting the child's intelligence in the future and the possibility of being premature (Ministry of Health, 2001).

Pregnant women who are at risk of CED are pregnant women who have an Upper Arm Circumference (LILA) measurement of less than 23.5. Efforts to reduce neonatal mortality rates begin with promotive and preventive efforts before, during, and after childbirth. It provides health information, especially the fulfillment of nutrition for pregnant women from the start of pregnancy by health workers, prenatal examinations that meet the standards of prenatal examination services, delivery in health services, and handling of LBW babies by appropriate management. The background description above illustrates that the

mother's nutritional status before and during pregnancy will influence the weight of the baby she will give birth to.

2. METHODS

This type of quantitative research is a retrospective design. The study's independent variables were Hb levels and the nutritional status of pregnant women, and the dependent variable was the incidence of low birth weight. The population of mothers who gave birth at the Kabuh Community Health Center, Jombang Regency, in April 2019 obtained a sample of 39 respondents using a purposive sampling technique. Inclusion criteria: birthing mothers have a KIA book. Results were analyzed using logistic regression.

3. RESULTS

Characteristic of respondents

Table 1. Frequency distribution of respondents' general data includes age, education, occupation, parity, ANC visits, and pregnancy complications (N=39). (Continue to page 343)

Characteristics	Frequency	Percentage (%)
Age		
<20 years	3	7,7
20 – 35 years	34	87,2
>35 years	2	5,1
Education levels		
Basic Education	2	5,2
Secondary Education	30	76,9
Higher Education	7	17,9

Characteristics	Frequency	Percentage (%)
Occupation		
Housewife	32	82,1
Entrepreneur	4	10,3
Factory employee	2	5,1
Civil servant	1	2,5
Parity		
Primipara	18	46,2
Multipara	21	53,8
ANC visits		
Reguler ANC	39	100
Pregnancy complications		
With complications	8	20,5
No complications	31	79,5

Based on table 1 shows that almost all (87.2%) respondents aged 20 - 35 years, namely 39 respondents; almost all (76.9%) respondents had secondary education (SMA), namely 30 respondents; the majority (53.8%) were multigravida mothers, namely 21 respondents, almost all

(82.1%) of the respondents are housewives, namely 32 respondents, all (100%) of the respondents carry out regular ANC visits, namely 39 respondents, almost all (79.5%) of the respondents go through the process birth without complications, 32 respondents.

Table 2. Frequency distribution of Hemoglobin levels, Nutritional status and Low Birth Weight events (N=39)

Variables	Frequency	Percentage (%)
Hemoglobin levels		
Anemia	8	20,5
Normal	31	79,5
Nutritional status		
KEK	6	15,4
Normal	33	84,6
Low Birth Weight events		
Low Birth Weight	9	23,1
Normal	30	76,9

Based on table 2, in Hemoglobin levels shows that almost all (79.5%) 31 of

the respondents were normal Hemoglobin levels. Then, based on nutritional status

that almost all (84.6%) 33 respondents had normal nutritional status. The last, based on Low Birth Weight events showed that

almost all (76.9%) 30 babies were born with normal birth weight.

Table 3. Relationship between Hemoglobin levels in pregnant women and the incidence of LBW (N=39)

Hemoglobin levels	LBW Events				Σ		p value
	LBW		Normal		f	%	
	f	%	f	%			
Anemia	8	88,9	0	0	8	20,5	0.000
Normal	1	11,1	30	100	31	79,5	

Table 3 shows that more than half (66.7%) of babies born LBW were born to mothers with KEK nutritional status, namely six respondents. The Chi-Square statistical test results show that the p-value is 0.000, so H₁ is accepted, meaning there is a relationship between the nutritional status of pregnant women and the incidence of LBW.

The results of the logistic regression test show that the most influential influence on the incidence of LBW is Hemoglobin levels with p-value = 0.000 exp (B) 30.00

4. DISCUSSION

Hemoglobin levels of TM I pregnant women

The study results showed that almost all (79.5%) 31 respondents were not anaemic. Anemia is a condition where the body has too few red blood cells (erythrocytes), where the red blood cells

contain Hemoglobin, which functions to carry oxygen to all body tissues (Proverawati, 2013)

Basic Health Research (Riskesdas) results in 2013 showed that the prevalence of anemia in pregnant women in Indonesia was 37.1%. The government has carried out a program to control anemia in pregnant women, namely by giving 90 Fe tablets to pregnant women during the pregnancy period to reduce the rate of maternal anemia. Pregnant, but the incidence of anemia is still high (Indonesian Ministry of Health, 2013).

The impact of anemia in pregnancy will affect the fetus and mother in the third trimester. It can cause premature labour, antepartum bleeding such as placental abruption, placenta previa, impaired fetal growth in the uterus (PJT), intrauterine asphyxia and even death.

The results of Rahadinda's 2022 research at Abdul Wahab Sjahranie

Hospital, Samarinda, showed that the distribution of pregnant women experiencing anemia was 64 people (4.1%) out of 1,547 pregnant women. Pregnant women in the first-trimester experience nausea and vomiting, which is one of the causes of anemia in pregnant women and will be made worse by hemodilution in the second trimester. The risk of anemia will be reduced if the mother's nutritional status before pregnancy is in good condition.

Nutritional status of TM I pregnant women.

The research results showed that almost all (84.6%) respondents had normal nutritional status (namely 33%). One of the objectives of measuring LILA is to determine the risk of CED in women of childbearing age (WUS), both pregnant women and prospective mothers, to screen women who are at risk of giving birth to low birth weight (LBW) babies.

According to research by Indrawati (2015), which used secondary data on low birth weight babies in the Minggir Community Health Center area, Sleman district, pregnant women are declared CED if they have a LILA measurement threshold < 23.5 cm. It means that pregnant women with a risk of CED are expected to

give birth to LBW babies. CED is caused by an imbalance in nutritional intake so that the nutrients the body needs are insufficient.

The instrument in this study used LILA to determine the nutritional status of pregnant women because the LILA measurement was recorded in the MCH book, and the measurement was easy so that all pregnant women had their LILA measured. Respondents who gave birth at the Kabuh community health centre in Jombang district had complete ANC visit records in the maternal cohort. Hence, the required data was sufficient to obtain research results.

The research results showed that almost all (79.5%) of the respondents experienced pregnancy without pregnancy complications 32 respondents, and a small portion (20.5%) of respondents experienced pregnancy complications.

Malnutrition can make it easier for the body to suffer from infectious diseases, and infections will also make nutritional status easier and accelerate malnutrition. The mechanism is a decrease in nutritional intake due to lack of appetite, decreased absorption and the habit of reducing food when sick. Increased loss of fluids or nutrients due to diarrhea, nausea, vomiting

and continuous bleeding. Moreover, increasing needs, either from increased needs due to illness or parasites in the body. (Manuaba, 2015)

Pregnancy complications experienced by respondents were hyperemesis gravidarum, anemia and multiple pregnancies. In the first trimester of pregnancy, hyperemesis gravidarum causes pregnant women to experience excessive nausea and vomiting, resulting in poor nutritional intake. The mother's appetite also decreases, resulting in malnutrition, which affects pregnant women.

Low Birth Weight babies (LBW)

The research results showed that almost all (76.9%) babies were born with average birth weight or not LBW, namely 30 respondents. LBW is a baby with a birth weight of less than 2500 grams, regardless of gestational age. Weight at birth is the weight of the baby weighed within 1 hour after birth (Manuaba et al., 2010)

The research results showed that almost all babies born with normal nutritional status were also born to mothers with normal nutritional status. The condition of the fetus during pregnancy is determined by the condition

of the mother during pregnancy. Mothers whose nutritional needs are met during pregnancy can meet the fetus's needs for growth and development so that when the baby is born, it has a normal nutritional status. The causes of LBW are influenced by several factors, including maternal factors, nutritional status of pregnant women, ANC visit status and complications during pregnancy.

The research results showed that all (100%) respondents carried out ANC visits regularly, namely 39 respondents. An ANC visit is a visit by a pregnant woman to a health service to check the condition of her pregnancy. ANC examinations influence the level of compliance of pregnant women in consuming Fe tablets because by carrying out pregnancy examinations, pregnant women will receive information about the importance of Fe tablets for their pregnancy (Hidayah, 2012).

Pregnant women who routinely have their pregnancy checked by a health worker will have their condition monitored so that the nutritional status of the pregnant woman is maintained, and the condition of the fetus will also be well monitored.

The research results showed that almost all (79.5%) 31 of the respondents

were not anaemic. Anemia in pregnancy harms the mother during pregnancy, childbirth, postpartum and the following period. Complications that can arise due to anemia are miscarriage (abortion), premature birth, low birth weight, prolonged labour due to fatigue of the uterine muscles contracting (uterine inertia), postpartum bleeding due to the absence of uterine muscle contractions (uterine atony), shock, infections both during labour and postpartum and severe anemia (<4 gr%) can cause cord decompensation. Hypoxia due to anemia can cause shock and maternal death during labour (Manuaba, 2010).

The study results showed that most respondents were not anaemic; pregnant women who had regular ANC and always received Fe tablets would prevent anemia in pregnant women. Mothers who are not anaemic can meet the needs of their fetuses so that fetal growth can be maximized.

Aprilisa's (2017) research on pregnant women with anemia at BPS Kertosuko, Krucil District, Probolinggo Regency, showed a value = 0.001, meaning p-value < 0.05. It means there is a relationship between anemia in pregnant women and the weight of newborn babies

at BPS Kertosuko, Krucil District, Probolinggo Regency.

It is also in line with Andria's (2017) research conducted on all postpartum mothers at Rokan Hulu District Hospital, which showed that the results of Chi-Square analysis showed that there was a relationship between anemia in pregnant women and the incidence of LBW with a P-value = 0.000 or < 0.05. It means that there is a relationship between anemia in pregnant women and the incidence of LBW at Rokan Hulu District Hospital in 2016.

Researchers assume that the incidence of anemia in pregnant women can affect LBW because anemia in pregnant women occurs due to a decrease in Hemoglobin, which can cause disturbances or obstacles to the growth and development of the fetus.

The relationship between hemoglobin levels of TM I pregnant women and the incidence of low birth weight.

The research results showed that almost all (88.9%) LBW babies were born to mothers with anemia, namely 8 respondents. The results of the Chi Square statistical test show that the p value is 0.000, there is a relationship between the

hemoglobin levels of pregnant women and the incidence of LBW.

Rahadinda's research results (2022) show that there is a significant relationship between hemoglobin levels in pregnant women and the incidence of LBW. Results of Labir's research (2013) Pregnant women who experience anemia in the first trimester are 10 times more likely to give birth to LBW babies than pregnant women who are not anemic (RR=10.29; 95%CI: 2.21-47.90), while pregnant women who experience anemia in the second trimester have a 16 times greater risk of giving birth to LBW babies compared to pregnant women who are not anemic (RR=16; 95%CI: 3.49-73.41). There was no difference in the incidence of LBW between anemia in the first trimester and anemia in the second trimester ($p=0.297$). From the results of this study, it can be concluded that anemia in pregnant women in the first and second trimesters increases the risk of LBW.

Lestari Research, Endah (2021) The p value is 0.025, meaning $p<0.05$, so it is concluded that "There is a relationship between anemia and the incidence of low birth weight (LBW) at Dustira Hospital, Cimahi City. The results of an article review carried out by Farhan, 2021, show that the effects that can occur in babies

due to mothers suffering from anemia during pregnancy include LBW (low birth weight), IUGR (Intrauterine Growth Restriction), abortion, low birth age. or premature and postnatal infant deaths.

During pregnancy the body's need for iron increases by around 800-1000 mg to meet needs, such as an increase in red blood cells requiring 300-400 mg of iron and reaching a peak at 32 weeks-34 weeks of gestation, the fetus needs iron around 100-200 mg and about 190 mg is wasted during delivery. If iron reserves before pregnancy are reduced, during pregnancy the mother will easily experience iron deficiency. If the needs of pregnant women are not met, it will have an impact on the growth and development of the fetus.

The relationship nutritional status of TM-I pregnant women with low birth weight incidence.

The research results showed that more than half (66.7%) of babies born LBW were born to mothers with KEK nutritional status, namely six respondents. The results of the Chi-Square statistical test show that the p-value is 0.000. There is a relationship between the nutritional status of pregnant women and the incidence of LBW.

Nutritional status before and during pregnancy can affect the growth of the fetus being conceived. If the mother's nutritional status is expected before and during pregnancy, she will likely give birth to a healthy, full-term baby with an average weight. In other words, the quality of the baby is very dependent on the mother's nutritional status before and during pregnancy (Ministry of Health, 2014).

The results of the study showed that almost all of the respondents who did not have CED gave birth to normal babies because the nutritional status of the respondents was good so that they could meet the nutritional needs of the fetus during pregnancy. The respondents also regularly had ANC, so the mother's condition was monitored by weighing the body weight, checking Hb levels regularly and routinely, and administering Fe tablets according to the needs of pregnant women. Respondents who gave birth to LBW babies all had CED nutritional status, where the respondents lacked caloric energy and experienced anemia . The condition of CED causes mothers to suffer from anemia , so LBW cannot be avoided.

Puspitaningrum research (2018) conducted on all babies born at RSIA

Annisa, Jambi City, showed that 47.6% of respondents experienced KEK at RSIA Annisa, Jambi City, which would harm the babies to be born. Pregnant women who are at risk of developing CED will be expected to give birth to babies with LBW. Astuti's research (2012) shows that 19.2% of pregnant women at RB Karya Rini Magelang have KEK nutritional status. This situation will affect the fetus's condition in the mother's womb. The results of Puspitaningrum's research (2018), the research results showed that the majority of respondents who experienced CED had LBW babies, namely 26 respondents (65.0%) and respondents who did not experience primarily CED did not give birth to LBW babies, 28 respondents (63.6%). There is a relationship between the nutritional status of pregnant women and the incidence of Low Birth Weight (LBW) at RSIA Annisa Jambi City in 2018 with a p-value = 0.016.

The results of Kusparlina's research (2016) on babies with a birth weight of less than 2500 grams at the Tawangrejo Community Health Center, Madiun City, showed that the majority (65.1%) of mothers gave birth in the KEK category, causing premature LBW (38.5%) and dysmature LBW (38.5%) 61.5%). From the

Fisher Exact test results, the value of $p = 0.011$ for age and $p = 0.024$ for the LILA measure with a significance level of $\alpha = 0.05$. Because $p < \alpha$, this research shows a relationship between age and maternal nutritional status based on arm circumference with LBW type. Mothers who are pregnant and give birth at unsafe ages and with CED tend to give birth to babies with LBW.

Pregnant women who experience CED will give birth to LBW babies, so it is necessary to monitor the mother's health during pregnancy so that the baby born has a normal birth weight. Malnutrition in pregnant women can affect fetal growth. It can cause miscarriage, abortion, stillbirth, neonatal death, congenital defects, anemia in babies, intrapartum asphyxia (death in the womb) and birth with Low Birth Weight (LBW).

5. CONCLUSION

The results of this research indicate that there was a relationship between Hemoglobin levels in pregnant women and the incidence of LBW with a value of $p=0.000$. There was a relationship between the nutritional status of pregnant women and the incidence of LBW with a p -value = 0.000 . The most dominant factor influencing the incidence of LBW is the Hb

level in pregnant women ($p=0.001$ exp B:30).

Health workers can provide counselling and education to pregnant women about the importance of regular ANC visits to monitor fetal growth and development and the health of pregnant women.

AUTHOR CONTRIBUTIONS

Substantial contributions to conceptualization, data curation, analysis and manuscript revisions: Kolifah, Dwi Srirahandayani. Supervision, review and editing: Kolifah, Mudhawaroh, Niken Grah Prihartanti.

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CONFLICT OF INTEREST

The authors declare no conflict of interest for this publication.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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