

## The Associations between Maternal Education, Chronic Energy Deficit, and Anemia in Pregnant Women: An Evidence from Lhokseumawe, Indonesia

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### ABSTRACT

**Background:** Chronic Energy Deficiency (CED) and anemia in pregnant women have a health impact on the mother and child in the womb. This condition can increase the risk of babies with low birth weight, miscarriage, premature birth, even death in mothers and newborns. This study aims to determine the relationship between CED and anemia in pregnant women at the Muara I Health Center in Lhokseumawe City in 2017.

**Subjects and Method:** This study was a cross-sectional study conducted at the Muara I Community Health Center, Lhokseumawe, in December 2017. A sample of 90 pregnant women was selected by consecutive sampling. The dependent variable was anemia of pregnant women. The independent variables were education and CED. CED was measured based on maternal mid-upper arm circumference (MUAC) during pregnancy using MUAC tape. The hemoglobin level was measured by Hb Sahli. Other data were measured using a questionnaire. The data were analyzed using multiple logistic regression tests.

**Results:** CED has a significant positive and statistically significant effect on anemia in pregnant women (OR = 64.34; 95% CI = 15.10 to 274.10;  $p < 0.001$ ). Low maternal education has a positive effect but was statistically significant towards anemia in pregnant women (OR = 3.15; 95% CI = 0.81 to 12.27;  $p = 0.099$ ).

**Conclusions:** CED and low maternal education have a positive effect on anemia in pregnant women.

**Keywords:** anemia, pregnant women, education, chronic lack of energy

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### BACKGROUND

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Anemia is a condition in which the number of red blood cells or oxygen carrying capacity is insufficient to meet physiological needs that vary according to age, gender, height, smoking habits and pregnancy status thus disrupting blood capacity to carry oxygen in the body (WHO, 2018). Anemia is an indicator of nutrition and poor health. The most common cause of anemia worldwide is ferrum substance deficiency, due to prolonged ferrum substance imbalance caused by ferrum substance intake or inadequate food intake. Ferrum

substance requirements increase during pregnancy or periods of growth and are compounded by menstrual periods and worms.

Anemia generally occurs all over the world, especially in developing countries and in low socio-economic groups. In the adult group, anemia occurs in women of reproductive age, especially pregnant women and lactating women because those who experience a lot of ferrum substance deficiency. Overall, anemia occurs in 45% of women in developing countries and 13% in developed countries (Riskesdas, 2013).

An estimated 50% of anemia in women worldwide is caused by ferrum substance deficiency (WHO, 2014). WHO (2011) states that in 2011, the prevalence of anemia in pregnant women in the world was 38.2%.

The group of pregnant women is one of the groups at high risk of anemia, although anemia experienced is generally an anemia due to physiological changes in the body during pregnancy. Ferrum substance deficiency anemia in pregnant women can affect the growth and development of the fetus or baby during pregnancy and afterwards (Indonesian Health Profile, 2016). Pregnant women are considered to have anemia if their Hb levels are below <math>11.0\text{ g/dl}</math>. Anemia occurs because of an increase in plasma volume which results in dilution of Hb levels without changes in the shape of red blood cells (Riskesdas, 2013).

In Indonesia, the proportion of anemia in pregnant women is 37.1% and the prevalence is almost the same between pregnant women in urban areas (36.4%) and rural areas (37.8%) (Riskesdas, 2013). The Provincial Health Profile of Aceh In 2012, the number of cases of anemia received inpatient care for the 2012 General Hospital was 1,301 cases. This shows that the number is close to severe public health problems with an anemia prevalence limit of more than 40% (IRB, 2014). Based on data from the Lhokseumawe City Health Office in 2017, of 4,734 pregnant women, 184 pregnant women experienced CED and 1,001 pregnant women had anemia. Muara I Health Center data for 2017 shows that out of 835 pregnant women, 48 people experienced CED and 47 people had anemia.

The condition of a baby in the womb of a mother is strongly influenced by the condition of maternal nutrition before and during pregnancy. Pregnant women are at

risk of experiencing CED if they have an upper arm circumference (MUAC) of less than 23.5 cm. Chronic energy deficiency is a condition caused by an imbalance in nutrient intake between energy and protein, so that the nutrients needed by the body are not fulfilled. Pregnant women are known to suffer from CED seen from measurements of MUAC, while the MUAC limit of pregnant women with CED risk is less than 23.5 cm (Saraswati and Sumarno, 1998).

CED in pregnant women can cause risks and complications in pregnant women such as maternal weight gain does not increase normally, anemia, bleeding and infectious diseases (Achadi, 2007). The results of the 2013 Riskesdas, the national CED rate was 24.2%. The lowest CED prevalence is in Bali (10.1%) and the highest in East Nusa Tenggara (45.5%).

The results of Fidyah (2014) entitled "The effect of chronic energy deficiency on pregnancy anemia in women" indicate that there is an effect of CED on anemia in pregnant women in Tanjung Pinang City Health Center with  $p= 0.002$ . A study by Zulhaida (2017) in Medan showed that there was a correlation between CED and anemia in pregnant women with  $OR= 4.08$ ;  $95\% CI= 1.60$  to  $10.39$  which means that pregnant women with CED had a 4 times higher risk of anemia compared to pregnant women who did not experience CED.

Based on a preliminary survey conducted on 10 respondents, it was found that 7 respondents turned out to have less knowledge about anemia and 6 people with poor nutritional status (MUAC less than 23.5 cm) during pregnancy, and 3 of them were pregnant with anemia. Knowledge about anemia during pregnancy is very important for those who are pregnant, because knowledge can influence people's attitudes and behavior in maintaining daily food consumption patterns so as to prevent

the occurrence of anemia during pregnancy.

were 49 people (54.4%) and normal were 41 people (45.6%).

### SUBJECTS AND METHOD

This was a analytic observational study with cross sectional approach. The population in this study was all pregnant women at Muara I Health Center, Lhokseumawe, Aceh, Indonesia, amounting to 835 pregnant women. A sample of 90 pregnant women was selected for this study with purposive sampling.

The dependent variable was anemia of pregnant women. Independent variables are education and CED. CED was measured based on MUAC during pregnancy using MUAC tape. Hemoglobin level was measured by Hb Sahli. Other data is measured by a questionnaire. The data were analyzed using multiple logistic regression tests.

### RESULTS

#### 1. Sample Characteristics

Table 1 showed sample characteristics. Table 1 showed that pregnant women aged 20-35 years old were 66 people (73.3%). Parity of  $\leq 2$  years was 79 people (87.8%). The majority of pregnant women were housewives who were 46 people (51.1%). Pregnant women were mostly graduated from high school, who were 55 people (61.1%).

Pregnant women suffering from CED were 57 people (63.3%) and those who did not experience CED were 33 people (36.7%). Pregnant women with anemia

**Table 1. Sample Characteristics**

Characteristics	n	%
<b>Age</b>		
< 20 years old	14	15.6
20-35 years old	66	73.3
>35 years old	10	11.1
<b>Parity</b>		
$\leq 2$ years	79	87.8
> 2 years	11	12.2
<b>Employment</b>		
Housewives	46	51.1
Civil Servants	13	14.4
Entrepreneur	21	23.3
Others	10	11.1
<b>Education</b>		
JHS	13	14.4
SHS	55	61.1
College	22	24.4
<b>CED</b>		
Experiencing CED	57	63.3
Not experiencing CED	33	36.7
<b>Anemia</b>		
Anemia	49	54.4
Normal	41	45.6

#### 2. Bivariate Analysis

Table 2 showed the results of bivariate analysis. Table 2 showed that low knowledge about anemia increased the risk of anemia among pregnant women (OR= 4.70; 95% CI= 1.91 to 11.58; p= 0.001).

CED increased the risk of anemia among pregnant women and it was statistically significant (OR= 13.82; 95% CI= 4.74 to 40.32; p<0.001).

**Table 2. The relationship between knowledge and CED on anemia among pregnant women**

	Anemia		Normal		OR	95% CI	p
	n	%	n	%			
<b>Education</b>							
Low	31	73.8	11	26.2	4.70	1.91 to 11.58	0.001
High	18	37.5	30	62.5			
<b>CED</b>							
Yes	43	75.4	14	24.6	13.82	4.74 to 40.32	<0.001
No	6	18.2	27	81.8			

**3. Multivariate Analysis**

Table 3 showed the results of multiple logistic regression analysis. Table 3 showed that CED have a positive and statistically significant effect on anemia in pregnant

women (OR = 64.34; 95% CI = 15.10 to 274.10; p <0.001). Low maternal education has a positive and statistically significant effect on anemia in pregnant women (OR= 3.15; 95% CI= 0.81 to 12.27; p= 0.099).

**Table 3. The results of multiple logistic regression analysis**

Independent Variables	OR	95% CI		p
		Lower Limit	Upper Limit	
CED	64.34	15.10	274.10	<0.001
Education	3.15	0.81	12.27	0.099

**DISCUSSION**

**1. The relationship between education and anemia**

This study showed that the proportion of low education who suffer from anemia of pregnancy compared to higher education was experiencing anemia of pregnancy. It showed that education has an effect on the incidence of anemia in pregnancy. Education that can affect pregnancy was due to low knowledge about iron requirements of pregnant women. This was in accordance with the theory of Notoatmodjo (2007), low maternal education would have an impact on the low level of knowledge. Knowledge was an acceptance of someone before adopting a behavior, and wanted to know the meaning and benefits of the behavior for herself or her family. The education level of pregnant women was related to the level of knowledge. The low level of maternal education influenced the acceptance of information so that knowledge about iron (Fe) was limited. According to researchers, the higher the level of education of a person, the easier it was to receive information so that more knowledge would be possessed both in the prevention of anemia in pregnancy, fulfilling the nutritional needs of pregnant women, and the utilization of existing health services.

**2. The relationship between CED and anemia**

The results showed that there was a relationship between CED and the incidence of

anemia in pregnant women at the Muara I Health Center in Lhokseumawe City. The study also conducted by Aminin et al. (2014) who stated that there was a relationship between CED and anemia in pregnant women. Lubis et al. (2016) also showed a significant relationship between SEZ and anemia in pregnant women in Medan.

As many as 63.3% of pregnant women experienced anemia in this study. The same results were found by Mahirawati (2014), who stated that 70.6% of pregnant women with CED were anemic. Tanziha et al. (2016) stated that CED was a major risk factor in the incidence of anemia in pregnant women.

Maternal Mortality Rate (MMR) was one indicator of the success of health services in a country. WHO explained that the causes of maternal death were bleeding and infections that could be caused by anemia and chronic energy deficiency (CED). These incidents range from less than 10% to almost 60% in various countries (Prawirohardjo, 2006).

According to WHO (2014), about 40% of maternal deaths in developing countries were associated with anemia in pregnancy and most anemia in pregnancy was caused by acute bleeding and poor nutritional status. Pregnant women with poor nutritional status can cause chronic energy deficiency (CED).

Pregnancy caused an increase in energy metabolism. This lead to the enhancement of energy needs and other nutrients during pregnancy. Increased energy and nutrients were needed for fetal growth and development, increase in the content of the uterus, and changes in the composition and metabolism of the maternal body. Therefore, the lack of certain nutrients needed during pregnancy can inhibit the growth of the fetus.

The needs of pregnant women would increase from the usual where the exchange of almost all the ingredients that occur was very active, especially in the third trimester. Because of the increase in the amount of consumption, food needs to be added, especially the consumption of food sources of energy to fulfill the needs of mothers and fetuses. Lack of energy intake in pregnant women would cause malnutrition or commonly called chronic energy deficiency.

Chronic energy deficiency was a condition in which a person's nutritional status was bad due to lack of food consumption of energy sources that contained macro-nutrient nutrients which were needed by the body and many micronutrients needed by the body. The need for pregnant women to increase from usual and an increase in the amount of food consumption need to be added, especially the consumption of food sources of energy to fulfill the needs of mothers and fetuses (Rahmaniar, 2013).

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