Association between Socio-demographic, Nutrition Intake, Cultural Belief, and Incidence of Anemia in Pregnant Women in Karanganyar, Central Java

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ABSTRACT

Background: Anemia in pregnancy remains a major public health issue in developing countries. Studies in Indonesia examining the effects of socio-demographic factors, dietary pattern, and cultural belief on the risk of anemia in pregnancy are lacking. This study aimed to examinethe effects of socio-demographic factors, dietary pattern, and cultural belief on the risk of anemia in pregnancy.

Subjects and Method: An analytic cross-sectional study was conducted in 5 community health centers in Karanganyar, Central Java, from February to March 2018.A total of 200 trimester I, II, and III pregnant mothers was selected for this study by fixed disease sampling, consisting of 50 mothers with anemia and 150 mothers without anemia. The dependent variable was anemia during pregnancy. The independent variables were nutrition intake, dietary pattern, consumption of iron tablet, family income, parity, family size, antenatal care visit, and cultural belief. The data were collected by questionnaire. The anemia status was obtained from medical record. The data were analyzed by path analysis performed on Stata 13.

Results: The risk of anemia during pregnancy directly decreased with better nutrition intake (b= -1.02; 95% CI= -1.73 to -0.31; p= 0.005) and regular consumption of iron tablet (b= -0.79; 95% CI= 1.48 to -0.10; p= 0.024). The risk of anemia during pregnancy was indirectly affected by better dietary pattern, higher family income, larger family size, cultural belief, parity, higher education, and antenatal care visit.

Conclusion: Good nutrition intake and regular consumption of iron tablet decreased the risk of anemia during pregnancy. Dietary pattern, family income, family size, cultural belief, parity, and maternal education have indirect effects on the risk of anemia during pregnancy.

Keywords: anemia, pregnancy, nutrition intake, iron tablet, dietary pattern

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BACKGROUND

Anemia is a serious problem for maternal health. Anemia is one of five issues targeted by the World Health Organization (WHO) by 2025. WHO targets to reduce the incidence of anemia by 50% in women of childbearing age worldwide. The study by Stevens et al. (2012) stated that pregnancy has a high risk factor for anemia incidence by 38%. Anemia during pregnancy is a public health problem in many countries. Anemia occurring in developing countries accounted for 52%, while in industrialized countries, it accounted for 20% (Lee and Okam, 2011).

Studies continue to be done to assess the prevalence of anemia. Several studies have suggested that the prevalence of

anemia in India, Ethiopia, and Indonesia still has a high enough rate in pregnant women of 73.1%, 32.8%, and 37.1% respecttively (Gogoi et al., 2016; Bekele et al., 2016; Developments, 2013).

The causes of anemia during pregnancy are affected by various risk factors. The risk factors for anemia in pregnancy are associated with sociodemographic such as family income, educational level, parity (Rai et al., 2016; Gogoi et al., 2016), types of occupations, pregnancy visits, not taking iron supplementation (Titilayoet al., 2016; Xu et al., 2016) and the large number of families also affect cases of anemia (Bekele et al., 2015).

Another very important factor in increasing cases of anemia in pregnancy is lack of nutrient intake. Iron deficiency anemia is a major contributing factor to anemia in pregnant women with a percentage greater than 50% (Stevens et al., 2013). The incidence of anemia for about 1/3 of pregnant women is caused by the lack of micro nutrients such as iron, folic acid and vitamin B12 (Lee and Okam, 2011). Nutritional intake is also related to one's culture in eating food. Culture affects mothers in restricting certain foods as in Nigeria (97.3%). Culture of abstinence will decrease the energy sufficiency causing anemia (Ekwere et al., 2015).

Based on data collection at Karanganyar District Health Office from January to September 2017, it is stated that some public health centers still have anemia prevalence more than 10%. The highest prevalence of anemia occurred in Puskesmas Colomadu II that was 22.2%. Iron deficiency anemia may result from poor nutrition fulfillment. People eating habits abstain from certain foods still occur in Karanganyar such as herbal carrying, papaya leaves, jackfruit and pineapple.

This study aimed to analyze the association between sociodemographic factors, cultural, nutritional intake, and anemia in pregnant women in Karanganyar, Central Java.

SUBJECTS AND METHOD

1. Study design
This was a cross-sectional study carried out in Tasikmadu, Colomadu I, Colomadu II, Kebakkramat I, and Jumantono community health centers, Karanganyar, Central Java, from February to March 2018.

2. Population and sample
Source population in this study was pregnant women of trimester I, II and III in Karanganyar region. The subjects of this study were anemic pregnant women and pregnant women who were not anemic. Technique of sampling selection was purposive sampling. Sample selection used was fixed disease sampling technique. There were 200 subjects with a ratio of 1:3 consisting of 50 anemic pregnant women and 150 pregnant women who were not anemic.

3. Study variables
The dependent variable was anemia of pregnant mothers. The independent variables included education, family income, culture, parity, number of family members, diet, nutritional intake, frequency of tablets added blood consumption, and pregnancy visits.

4. Operational definition of variables
Education was defined as the last formal education level that has been undertaken by the mother. The measurement scale was categorical, coded 0 for <senior high school and 1 for ≥senior high school.

Family income was defined as the income received by husband and mother from work calculated per month.

The number of family members was defined as the number of people who live

together in one house because of the bonds of marriage and birth. The mearement scale was continuous.

Parity was defined as the number of deliveries that a mother has ever experienced. The mearement scale was continuous.

Culture was defined as the belief of mothers in choosing foods that are considered good and less good during pregnancy. The mearement scale was continuous.

The number of pregnancy visits was defined as the number of times the mother comes to the health service for a pregnancy check up. The mearement scale was continuous.

Frequency of iron tablet consumption was defined as the number of iron tablets that has been consumed by the mother starting from the first time until the process of pregnancy. The mearement scale was continuous.

A diet was defined as a habit of eating during pregnancy that emphasizes the frequency of eating and the type of food consumed. All foods consumed by pregnant women daily from morning to night include the type and amount that affects the lack of nutrients. The mearement scale was continuous.

5. Study instruments

The collection of sociodemographic and cultural data was using questionnaires. The data about diet used FFQ Semi-Quantitative and Nutritional intake used food recall 2 x 24 hours. Hemoglobin level data were taken from maternal and child health monitor book.

6. Data analysis

Univariate analysis was done to know the frequency distribution to subject characteristic. Bivariate analysis was conducted to know the relationship between anemia and the independent variable using chi-square test. Multivariate analysis was done using path analysis.

7. Research ethics

The research Ethics includedInformend Consent, anonymity, Confidentiality and the ethical Clearance was obtained from Research Ethics Committee, Dr. Moewardi Hospital, Surakarta, Central Java, Indonesia, No 47 / II / HREC/2018.

RESULTS

1. Sample characteristics

The result of sample characteristic were 200 pregnant women based on sociodemographic factor, most of them were 21-35 year olds for about 163 people (81.5%), have education ≥SMA 127 people (63.5%), family income>Rp 1,696,000 for about 117 people 58.5%), the number of family members ≤4 people for about 152 people (76%), the number of parity ≤2 for about 172 (86%). The highest trimester of pregnancy was 99 people (49.5%), the number of pregnancy visit was 157 people (78,5%), and the frequency of regular blood tablets added were 102 people (51%).

2. Bivariate Analysis

Bivariate analysis was conducted to determine the relationship between independent variables (education, family income, culture, parity, number of family members, diet, nutritional intake, frequency of tablets added blood consumption, and pregnancy visits) and the dependent one which was anemia. The results of the analysis can be seen in Table 1.

Higher education and income decreased the risk of anemia. Similarly, adequate nutrition intake and good dietary pattern decreased the risk of anemia. Number of children and parity increased the risk of anemia.

Table 1. Bivariate analysis of anemia correlates in pregnant women

Independent variables	Anemia		Not Anemia		Total		OR	p
	n	%	N	%	n	%		
Education								
<Senior high school	27	54	46	30.7	73	36.5	0.37	0.003
≥Senior high school	23	46	104	69.3	127	63.5		
Family income								
<Rp 1,696,000	28	56	55	36.7	83	41.5	0.45	0.016
≥Rp 1,696,000	22	44	95	63.3	117	58.5		
The number of family members	30	60	122	81.3	152	76	2.90	0.002
≤ 4 members								
≥ 5 members	20	40	28	18.7	48	24		
Parity								
≤ 2	36	72	136	90.7	172	86	3.77	0.001
>2	14	28	14	9.3	28	14		
Pregnancy visits								
<4 times	8	16	35	23.3	43	21.5	1.59	0.274
≥4 times	42	84	115	76.7	157	78.5		
Frequency of iron tablet consumption	33	66	65	43.3	98	49	0.39	0.005
Less								
Enough	17	34	85	56.7	102	51		
Cultural								
Not abstain	18	36	87	58	105	52.5	2.45	0.007
Abstain	32	64	63	42	95	47.5		
Dietary pattern								
Seldom	35	70	62	41.3	97	48.5	0.30	<0.001
Often	15	30	88	58.7	103	51.5		
Nutritional intake								
Lacking	36	72	68	45.3	104	52	0.32	0.001
Enough	14	28	82	54.7	96	48		

3. Path analysis

Figure 1 depicted path analysis model on the determinants of hemoglobin level with parameter estimates. Path analysis model that was built by the researchers according to the theory were checked and tested against sample data.
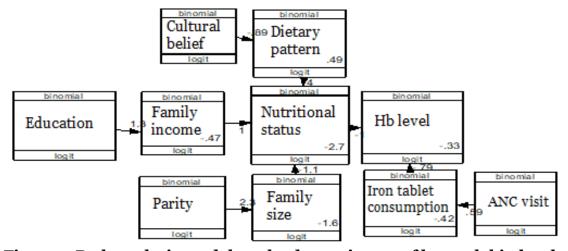

Figure 1. Path analysis model on the determinants of hemoglobin level

Table 2. Path analysis results of the relationship between sociodemographic, cultural, and nutrition intake factors with anemia in Karanganyar

Dependent Variable		Independent Variable	Path Coefficient	95% CI		p
				Lower Limit	Upper Limit	
Direct Effect						
Anemia	←	Nutrition Intake	-1.02	-1.73	-0.31	0.005
	←	Frequency of iron tablet consumption	-0.79	-1.48	-0.10	0.024
Indirect Effect						
Nutrition intake	←	Dietary pattern	3.98	3.06	4.90	<0.001
	←	Family income	1.04	0.14	1.95	0.024
	←	Family size	-1.09	-2.16	-0.01	0.048
Dietary pattern	←	Cultural	-0.89	-1.46	-0.32	0.002
Family size	←	Parity	2.34	1.45	3.23	<0.001
Family income	←	Education	1.33	0.72	1.93	<0.001
Frequency of Iron Tablet Consumption	←	Number of Antenatal Care Visit	0.59	0.10	1.28	0.092
Observation Score= 200						
Log likehood= -666.42						

DISCUSSION

1. The relationship between education and anemia

Education was indirectly related to anemia through income and nutrition intake. Highly-educated mothers would have good knowledge about nutrition intake (Andriani et al., 2016). Health education provided by health personnel would lead to awareness in taking iron supplementation in order to reduce the case of anemia (Khatod et al., 2013).

2. The relationship between family income and anemia

There was an indirect relationship between family income and anemia through nutrition intake. This showed that the higher the family income, the better the nutrition intake, therefore, it decreased the risk of anemia.

The case of anemia was greater in low and middle-income countries, it was because the high prevalence of malaria, malnutrition, and the lack of iron(Rahman et al., 2016). High family income can reduce the risk of anemia cases by 1/10 times compared to low family income (Andriani et al., 2016). High income was one of the important factors that contribute to the fulfillment of nutritional needs during pregnancy (Rai et al., 2014: Tembhare et al., 2015; Xu et al., 2016).

Family income was a reflection of the ability to buy food ingredients. Family income under the MW would affect the selection of food with limited nutrients, and it can caused the mothers to suffer from iron deficiency anemia (Prahesti et al., 2016; Andriani et al., 2016). The purchaseing power of food also has an association with anemia (Kurniati et al., 2016).Low family income was not only lead to iron deficiency anemia, but mothers were also at risk for other micronutrient deficiency conditions(Darnton-hill and Mkparu, 2015)

3. The relationship between family size and anemia

Family size has an indirect relationship with anemia through nutrition intake.

Larger family members would reduce the nutritional intake of pregnant women.

The largest number of families was <4 people (76%). The number of family <4 represent the core family consisting of the mother, father, and 2 children. The number of family ≥5 was probably a large family consisting of grandparents who live in one house. Families with more than five members have the risk of anemia. The Ethiopian study mentioned that the number of families over four members has an association with anemia (Gedefaw et al., 2015).

The number of families was related to the consideration of the economic status effect in fulfilling the nutritional adequacy during pregnancy that was shared with other family members (Gedefaw et al., 2015). Food consumption depend on the type and amount of food purchased, cooked, and distributed in family members. The family number of more than five members has higher food insecurity (Bekele et al., 2015).

4. The relationship between parity and anemia

Parity has an indirect relationship with anemia through family size. This showed that the more the maternal parity, the greater the number of the family. High parity also influenced the maternal physical condition (Ivoke, 2013)as well as reduced maternal nutrition. Parity lead to an enhancement in the need for iron lost during pregnancy and labor (Khatodet al., 2013).

5. The relationship between cultural and anemia

There was an indirect relationship between cultural and anemia through dietary pattern. This showed that mothers who have dietary restrictions would have a poor dietary pattern compared to mothers who have no dietary restrictions during pregnancy.

Mothers who have cultural abstinence to eat were at higher risk for anemia than mothers who do not have a culture of abstinence to eat (Ekwere et al., 2015). Myths about dietary restrictions during pregnancy would increase 4.5 times than mothers who did not do dietary restrictions (Andriani et al., 2016). Some of the food substances that cannot be eaten by pregnant mothers were actually have iron content (Andriani et al., 2016).

6. The relationship between dietary pattern and anemia

There was an indirect relationship between dietary pattern and anemia through nutrition intake. Mothers with poor dietary pattern have a risk to get less nutritional intake compared to mothers who have a good dietary pattern.

This study was in line with Oktriyani et al. (2014), who stated that dietary pattern affected the adequacy of energy intake, the amount of food consumed by the mothers would affect the maternal nutritional intake. Maternal dietary pattern was different in every trimester. In the first and second trimester, pregnant mothers tend to experience chronic energy deficiency due to unstable conditions.

A good dietary pattern occured when the type of food consumed varies with the appropriate amount or dose as needed (Ministry of Health, 2014). The fulfillment of balanced nutrition was not only obtained from one type of food, but a variety of food ingredients, especially in the case of anemia that should consume the ingredients which contained iron (Kurniati et al., 2016).

The results showed that pregnant women consumed more green vegetables (71%) than chicken meat (42%). Food consumption habits derived from vegetables which higher than meat consumption can lead to anemia (Xuet al., 2016). Based on the study by Bedi et al. (2014) in India, it

was stated thatvegetarian mothers were more suffering from anemia than non-vegetarian mothers.Good food consumed to increase hemoglobin levels were food with a high content of iron which was hemethat found in meat and non-heme contained in vegetables (Tadesse et al., 2017; Tembhare et al., 2015).

7. The relationship between nutrition intake and anemia

The result of this study showed that good nutrition intake decreased the risk of anemia. It showed that pregnant women who have good nutrition intake can reduce the risk of anemia. This was in line with a study by Darnton-hill and Mkparu (2015) which stated that the lack of nutrition during pregnancy should be considered because it closely related to the incidence of anemia (Ivoke, 2013; Bekele et al., 2016).

Fulfilling balanced nutrition during pregnancy was useful to overcome the nutritional problems such as nutritional deficiencies. Based on the guidelines of balanced nutrition, nutritional needs of pregnant women were enhanced, namely macro and micro nutrients (Ministry of Health, 2014). Micronutrient deficiency in pregnancy became global burden of the cause of anemia. Anemia was half of the problems due to micronutrient deficiency such as iron (Stevens et al., 2013).

The needs of iron during pregnancy were still below from the recommendation of Nutrition Adequacy Rate (70%), the average of calories obtained by pregnant woman was 63.4%, and the average of iron intake was 44.5%. The lack of calorie intake would affect the incidence of anemia (Khatod et al., 2013). The need of inadequate iron because of the mothers has increased due to the addition of blood volume and tissue during pregnancy. According to Pritasari et al. (2017), theiron needs of

pregnant mothers were estimated about 1,000 mg.

8. The relationship between the number of antenatal care visit and anemia

The number of antenatal care visit has an indirect relationsip with anemia through iron tablet distribution. This showed that the more often the pregnant women to visit the antenatal care in health facilities, the more the iron tablets being received and consumed. This was in line with a study by Abdullahi et al. (2014) which stated that the number of iron tablet consumed increased with the age of pregnancy by increasing the visit. Older pregnancies consumed 3 times higher than young pregnancies.

Some pregnant women consumed fewer iron tablets due to less antenatal care visits. Some pregnant women never visited health provider when entering the second trimester. Anemia visits should be done early on at least the second trimester to prevent the development of the baby from anemia (Adanikin and Awoleke, 2015).

Iron tablets can be given during pregnancy classes according to the schedule. The midwives provide counseling related to anemia in pregnant women by recommending to eat nutritious foods which contain iron (Prahesti et al., 2015). Health education was expected to provide awareness for mothers to consume iron supplementation as an effort to reduce the case of anemia (Khatod et al., 2013).

9. The relationship between the frequency of iron tablet and anemia

The result of this study showed that the frequency of iron tablets has a direct relationship with anemia. The regularity of taking iron tablets can decrease the risk of anemia.

This finding is in line with a study by El Ashiry et al., (2014), which stated that the cases of anemia occur when the mother

did not consume the iron tablets adequately. Good frequency of iron tablets can reduce anemia cases especially in the third trimester. According to Titilayo et al.*, (2016), that the occurrence of anemia was caused by a lack of 90 iron tablet consumption during pregnancy.

Iron tablet was very useful to reduce anemia. Iron tablets and a combination of folic acid can also decrease the incidence of anemia (Abdullahi et al., 2014). Effectiveness benefits usually occur after 3 months from the first time consuming (El Ashiry et al., 2014). The benefits of iron tablets were to increase the hemoglobin, ferritin serum, average cell volume, iron serum, and saturation transfers, therefore, it can prevent iron reduction especially in the third trimester (Abdullahi et al., 2014; Bedi et al., 2015). Iron tablet was highly recommended to overcome the nutritional problems when the mothers have dietary restrictions and poor dietary pattern (Darnton-hill and Mkparu, 2015).

CONFLICT OF INTEREST
The authors declare that there is no conflict of interest regarding the publication of this article.

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