Anemia in Pregnancy Based on Rural and Urban Areas

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Article Info

Abstract

From 2013 to 2018, the proportion of anemia in pregnant women in urban and rural areas increased from 37.1% to 48.9%. This study aims to analyze the differences in determinants of anemia in pregnancy based on place of residence. Research was conducted in 2024. The research sample in rural areas was 39 pregnant women with anemia, and in urban areas was 31 pregnant women with anemia. Ratio scale data, including nutritional intake, is tested for normality with the Kolmogorov-Smirnov test, then tested using the t-independent test. Other variables are tested using the Mann-Whitney test. Regarding the various determinant factors studied, including the age of pregnant women, nutritional status, and gravida status, there is no significant difference (p-value > 0.05) in pregnant women with anemia in rural and urban areas. There is a significant difference (p-value < 0.05) between nutritional knowledge, food expenditure, and nutritional intake in pregnant women with anemia in rural and urban areas. Based on the determinant factors of anemia in pregnancy studied, food expenditure, nutritional knowledge of pregnant women, protein, iron, and vitamin C intake in pregnant women with anemia in rural and urban areas differ significantly.

Introduction

Anemia is a worldwide public health issue that impacts people of all ages in both developed and developing nations (Geta *et al.*, 2022). Worldwide, the prevalence of anemia during pregnancy is reported to be 29.9%. Despite efforts to lower the occurrence of anemia, particularly in developing nations, it remains commonplace worldwide and, if left untreated, can have serious health effects (Abd Rahman *et al.*, 2022). Unfavorable pregnancy-related events may increase if anemia is present. Anemia during pregnancy can raise the risk of postpartum hemorrhage, cesarean sections, and gestational hypertension. Anemia during pregnancy is also linked to an increased risk of gestational hypertension, fetal distress, preterm birth, cesarean section, postpartum hemorrhage, and newborn hypoxia (Detlefs *et al.*, 2022; Zhao *et al.*, 2022).

Anemia risk was considerably increased in low-socioeconomic pregnant women, first-trimester pregnant women, multipara pregnant women, and pregnant women who did not receive dietary education (El-Kholy *et al.*, 2023). The country has reduced anemia among pregnant women by implementing a national nutrition program and a micronutrient deficiency prevention and control strategy (Woldegebriel *et al.*, 2020). The prevalence of anemia was higher in rural than in urban areas (Ayensu *et al.*, 2020). Pregnancy anemia is associated with residing in rural areas, but it is also related to the multiparity factor (Nuru Yesuf & Agegniche, 2021). Women in rural areas with low levels of household wealth are more likely to suffer from anemia (Abate *et al.*, 2021).

According to research, mothers who live in rural regions are less likely to have a cesarean section but more likely to experience anemia, preterm birth, post-term pregnancies, LBW,

requirement for neonatal resuscitation, and NICU hospitalization (Mehrnoush *et al.*, 2023). Variation in anemia prevalence across urban and rural areas suggests that interventions should be focused on particular locations. 40,9% of people were anemic overall. Compared to urban people (20.1%), rural dwellers (46.6%) had a greater rate of anemia (Tesfaye *et al.*, 2020). Pregnant women's anemia was a moderate public health concern in an urban area. Anemia was found to be substantially correlated with several factors, including low income, larger families, higher parity, longer menstrual cycles, and bleeding during pregnancy (Alreshidi & Haridi, 2021).

The most significant risk variables for anemia were maternal and dietary features, but the most significant risk factor for iron deficiency during pregnancy was dietary. Numerous nutrient deficits sometimes coexist with the development of anemia and iron deficiency (Kangalgil *et al.*, 2021). Pregnancy anemia is related to the level of knowledge, the nutritional status, and the economy of pregnant women (Rahayu *et al.*, 2023). The variables that showed a statistically significant correlation with the prevalence of anemia were residence, educational status, monthly family income, occupation, gestational age, iron folic acid supplementation, dietary habits of avoiding meat and animal products, green leafy vegetables, and drinking tea and coffee right after meals (Bansal *et al.*, 2020). Based on the differences in characteristics between rural and urban areas, the author examines the determinants of anemia in pregnancy based on rural and urban areas. This study aims to analyze the differences in determinants of anemia in pregnancy based on place of residence.

Method

This research is quantitative research with a comparative method. The research design used is cross-sectional, where researchers conduct observations or measurements of variables at one time. This study involved two locations, namely rural areas conducted in the working area of the Kesamben Kulon Health Center, Gresik Regency, and urban areas conducted in the working area of the Jemursari Health Center, Surabaya City. Data collection was carried out for three months, namely January-March 2024. The population in this study was all pregnant women in the working area of Jemursari Health Center, Surabaya City, totaling 56 people, and all pregnant women in the working area of Kesamben Kulon Health Center, Gresik Regency, totaling 61 people. The inclusion criteria in this study were: pregnant women with anemia with hemoglobin levels < 11 g/dL; and pregnant women who were willing to be respondents by signing an informed consent. Sampling is included in nonprobability sampling using purposive sampling techniques. The research sample in rural areas was 39 pregnant women with anemia, and in urban areas was 31 pregnant women with anemia.

The independent variables in this study are residences covering rural and urban areas. The dependent variables include nutritional intake (protein, Fe, vitamin C); knowledge of pregnant women; parity status; age of pregnant women; nutritional status; and food expenditure of pregnant women. The nutritional intake studied included protein, Fe, and vitamin C intake consumed by pregnant women during the last month. The study used the semi-quantitative food frequency questionnaire (SQ-FFQ) method. The list of food ingredients listed in the SQ-FFQ questionnaire was obtained from the Indonesian food composition table (TKPI, 2020).

Pregnant women's knowledge about anemia was studied using a questionnaire taken from previous research (Gustiana *et al.*, 2021). Knowledge of pregnant women was assessed using a questionnaire with 10 questions. Pregnant women who answered "correctly" were given a score of "+1" and pregnant women who answered "incorrectly" were given a score of "0". Pregnant women who scored more than or equal to the average score of the total knowledge assessment questions were considered to have good knowledge. Meanwhile, pregnant women who scored less than the average score of the total knowledge assessment questions were considered to have poor knowledge (Balcha *et al.*, 2023).

The nutritional status of pregnant women is assessed based on the circumference of the upper arm. Pregnant women are considered to have chronic energy deficiency if they have an upper arm circumference of

<23.5 cm (Kementerian Kesehatan RI, 2014). The instrument used to study food expenditure is a questionnaire containing questions about family income and expenditure (Dipa, 2022). The percentage of food expenditure is classified as low if < 60% and is classified as high if > 60%. The higher the food expenditure, the lower the food security of a household (Manyullei & Arundhana, 2021).

Data collection begins with screening pregnant women for anemia by conducting hemoglobin examination using a digital Hb checker, namely the Easy Touch GCHb. The examination is carried out by an enumerator. Data collection method with direct measurement and interview. The collected data is analyzed after editing, coding, and tabulating have been carried out. Ratio scale data, including nutritional intake, is tested for normality with the Kolmogorov-Smirnov test, then tested using the t-independent test. Other variables are tested using the Mann-Whitney test with a 95% confidence level. Data collection was carried out after obtaining an ethical feasibility letter from the Research Ethics Committee of Universitas Nahdlatul Ulama Surabaya with number 0363/EC/KEPK/UNUSA/2023.

Result and Discussion

The characteristics of respondents in this study included the degree of anemia in pregnant women, nutritional status before pregnancy in mothers, education, employment, nutritional information, and consumption of iron supplementation in pregnant women. Classification of anemia in pregnant women according to the World Health Organization (WHO), namely mild anemia (10-10.9 g/dL), moderate anemia (7-9.9 g/dL), and severe anemia (< 7 gr/dL) (Shi *et al*., 2022). The nutritional status of mothers before pregnancy based on body mass index is classified according to World Health Organization, namely underweight (< 18,5); normal (18.5-22.9); overweight (23-24.9); and obesity (≥ 25) (Inciong *et al*., 2020).

The education level of pregnant women is classified based on their last level of education, namely elementary school, high school, and college (Pratiwi, 2020). Characteristics of pregnant women's work include whether the mother works or is a housewife. While nutritional information means whether the pregnant woman has ever received information about nutrition for pregnant women or not. Consumption of iron supplementation is based on whether the pregnant woman consumes iron supplementation during pregnancy or not. The distribution of respondent characteristics will be explained in the table below.

Table 1. Distribution of Characteristics of Pregnant Women with Anemia

Variable	Urban	Rural	Total	p value
Anemia				
Mild anemia	36 (92.3%)	27 (87.1%)	63 (90%)	0.474
Moderate anemia	3 (7.7%)	4 (12.9%)	7 (10%)	
Severe anemia	0	0		
Nutritional Status				
Underweight	7 (17.9%)	4 (12.9%)	11 (15.7%)	0.464
Normal	18 (46.2%)	13 (41.9%)	31 (44.3%)	
Overweight	5 (12.8%)	6 (19.3%)	11 (15.7%)	
Obesity	9 (23.1%)	8 (25.9%)	17 (24.3%)	
Education				
Elementary school	3 (7.7%)	0	3 (4.3%)	
Junior high school	14 (35.9%)	2 (6.5%)	16 (22.9%)	0.000
Senior high school	18 (46.1%)	15 (48.4%)	33 (47.1%)	
College	4 (10.3)	14 (45.1%)	18 (25.7%)	

Work				
Work	11 (28.2%)	16 (51.6%)	27 (38.6%)	0.047
Not Working	28 (71.8%)	15 (48.4%)	43 (61.4%)	
Nutritional information				
Ever received	15 (38.5%)	26 (83.8%)	41 (58.6%)	0.000
Never received	24 (61.5%)	5 (16.2%)	29 (41.4%)	
Consumption of iron supplementation				
Consumption				
Not consumption	11 (28.2%)	26 (83.8%)	37 (52.8%)	0.000
	28 (71.8%)	5 (16.2%)	33 (47.2%)	

Source: primary data (2024)

Based on the table above, it is known that most (90%) of pregnant women with anemia in rural and urban areas experience mild anemia. Based on the statistical results, it is known that there is a difference (0.474) between the levels of anemia in rural and urban areas. As many as 44.3% of pregnant women with anemia in rural and urban areas have normal nutritional status before pregnancy. There is No. significant difference (0.464) between the nutritional status before pregnancy in pregnant women with anemia in rural and urban areas.

Characteristics of pregnant women with anemia based on education, more pregnant women with anemia in urban areas (45.1%) have a college education compared to pregnant women in rural areas (10.3%). In rural areas, there are no pregnant women with anemia with elementary school education. In urban areas (7.7%), there are pregnant women with anemia with elementary school education. There is a significant difference (0.000) between the education level of pregnant women with anemia in rural and urban areas. There is a difference (0.047) between the working status of pregnant women with anemia in rural and urban areas. Pregnant women with anemia in rural areas are mostly unemployed (71.8%), while in urban areas, most (51.6%) of pregnant women with anemia work.

Most (61.5%) of pregnant women with anemia in rural areas have never received information about pregnancy nutrition. In contrast, in urban areas, most (83.8%) of pregnant women with anemia have received information about pregnancy nutrition. There is a significant difference (0.000) between nutritional information on pregnant women with anemia in rural and urban areas. There is a difference (0.000) between the consumption of iron supplementation in pregnant women with anemia in rural and urban areas. Most (71.8%) of pregnant women with anemia in rural areas do not consume iron supplementation, while most (83.8%) of pregnant women with anemia in urban areas consume iron supplementation during pregnancy.

Of the 39 pregnant women with anemia, 51.3% of pregnant women with anemia in rural areas are included as high risk because they are aged < 20 years and > 35 years. In urban areas, pregnant women with anemia who are included in high-risk age groups are smaller than in rural areas (45.2%). Most (54.8%) of the 31 pregnant women with anemia have ages that are not included in high-risk. There was no significant difference (0.613) between the age of pregnant women with anemia in rural and urban areas. The nutritional status of pregnant women is measured based on the results of upper-arm circumference measurements in pregnant women with anemia. In rural areas, those who experienced chronic energy deficiency because they had an upper arm circumference < 23.5 cm were 28.2%. While in urban areas, it was higher, namely 41.9% of pregnant women with anemia in urban areas experienced chronic energy

Table 2. Determinant Factors of Anemia in Pregnancy

Variable	Rural	Urban	P value
Age			
Not high risk	19 (48.7%)	17 (54.8%)	0.613
High risk	20 (51.3%)	14 (45.2%)	
Upper arm circumference			
Not chronic energy deficiency	28 (71.8%)	18 (58.1%)	0.233
Chronic energy deficiency	11 (28.2%)	13 (41.9%)	
Gravida			
Primigravida	10 (25.6%)	11 (35.5%)	0.375
Multigravida	29 (74.4%)	20 (64.5%)	
Knowledge			
Good	4 (10.3%)	18 (58.1%)	0,000
Less	35 (89.7%)	13 (41.9%)	

Source: primary data (2024)

deficiency. There was no significant difference (0.233) between the nutritional status based on the upper arm circumference of pregnant women with anemia in rural and urban areas.

For pregnant women with anemia in rural areas, most (74.4%) are included in multigravida pregnancies. Similarly, for pregnant women with anemia in urban areas, most (64.5%) are included in multigravida pregnancies. There is no significant difference (0.375) between the gravida status of pregnant women with anemia in rural and urban areas. The knowledge of pregnant women with anemia studied includes knowledge about nutrition during pregnancy. Knowledge was studied using a questionnaire, and the results showed that knowledge of pregnant women with anemia in rural areas was mostly (89.7%) less, in contrast to urban areas, where most (58.1%) pregnant women with anemia had good knowledge. The results of the data analysis showed that there was a significant difference (0.000) between the knowledge of pregnant women with anemia in rural and urban areas.

Other determinant factors include food expenditure and nutritional intake. Food expenditure on pregnant women with anemia is greater in rural areas than in urban areas. The average food expenditure on pregnant women with anemia in rural areas is 52.69%, greater than the average food expenditure on pregnant women with anemia in urban areas of 45.45%. There is a significant difference (0.018) between food expenditure on pregnant women with

anemia in rural and urban areas. Nutritional intake studied in pregnant women with anemia includes protein, iron, and vitamin C intake. Where the nutritional intake is related to anemia in pregnant women. Nutritional intake in pregnant women was studied using SQ-FFQ, with the average result of protein intake in pregnant women with anemia in rural areas of 22.95%. The average protein intake in pregnant women in rural areas is higher, namely 27.57%. Based on statistical tests, it was found that there was a significant difference (0.000) between protein intake in pregnant women with anemia in rural and urban areas.

Table 3. Determinant Factors of Anemia in Pregnancy

Variable	Rural	Urban	P value
Food expenditure (%)	52.69	45.45	0.018
Protein intake (g)	42.06	49.68	0.000
Fe intake (mg)	22.95	27.57	0.000
Vitamin C intake (mg)	45.94	64.21	0.000

Source: primary data (2024)

Similarly to Fe intake, the Fe intake in pregnant women with anemia in rural areas is lower than in urban areas. The average Fe intake in pregnant women with anemia in rural areas is 42.06 grams per day, while in urban areas it is 27.57 grams per day. Based on these data, it was found that there is a significant difference between Fe intake in pregnant women with anemia in rural and urban areas. The average intake of vitamin C in pregnant women with anemia in rural areas is 45.94 mg/day. The average intake of vitamin C in pregnant women with anemia in urban areas is 64.21 mg/day. In line with protein and Fe intake, vitamin C intake in pregnant women with anemia in urban areas is greater than in rural areas. Based on data analysis, it was found that there was a significant difference between vitamin C intake in pregnant women with anemia in rural and urban areas.

The prevalence of anemia in pregnant women in Tanzania in 2015-2016 in urban areas reached 53.6%, slightly higher than the prevalence of anemia in pregnant women in rural areas reached 58.6%. Women between the ages of 15 and 19 are more likely than those between the ages of 20 and 34 to have a higher prevalence (Sunguya *et al.*, 2021). This study shows that pregnant women with non-high-risk ages are also likely to experience anemia, even with a higher rate than pregnant women with high-risk ages. Similar research results state that pregnant women of teenage age are more likely to experience anemia during pregnancy than mothers of older age (Liyew *et al.*, 2021).

In rural areas, the age of pregnant women are at a higher risk, while in urban areas, pregnant women are at a lower risk. This is related to the higher maternal mortality rate in rural areas than in urban areas (Merkt *et al.*, 2021). Pregnant women with chronic energy deficiency are at twice the risk of developing anemia. There is an increase in the volume of fluid and red blood cells and a decrease in the concentration of nutrient-binding protein in the blood. So pregnant women with nutritional problems are at risk of developing anemia (Azmi & Puspitasari, 2022). The results of this study show that the number of chronic energy deficiencies in pregnant women is higher in rural areas than in urban areas. This is different from research conducted by (McKay *et al.*, 2020) that rural areas are more susceptible to nutritional problems because there is food insecurity in rural areas.

Research by (Veile *et al.*, 2022) also states that people in rural areas are more susceptible to nutritional problems, especially malnutrition, compared to people in urban areas. While in urban areas, they are more susceptible to overweight or obesity than in rural areas. The number of birth histories is related to the occurrence of anemia in pregnant women (Sharma, 2020). The more often a woman is pregnant and gives birth, the greater the risk of developing anemia, because anemia drains iron reserves in the body (Astriana, 2017). The results of this study are that there is no difference between the gravida status of pregnant women with anemia in rural and urban areas. This is in line with research by (Wulandari *et al.*, 2021), that the distribution of gravida in pregnant women in rural and urban areas is not much different. Knowledge of pregnant women is related to the behavior of mothers, where mothers who have good knowledge of pregnancy nutrition can meet nutritional needs during pregnancy well. So that pregnant women can avoid nutritional problems during pregnancy (Karyuni *et al.*, 2020). Knowledge affects behavior, where eating behavior will influence nutritional status during pregnancy (Nashih *et al.*, 2024).

The results of this study are that the

knowledge of mothers in urban areas is better than that of mothers in rural areas. This is in line with research (Aljassim & Ostini, 2020) that the majority of studies found that in developing countries, the level of health literacy of urban residents is higher than that of rural residents. Different results stated that there was no difference between the knowledge of rural and urban residents (Chen & Chen, 2020). Food security is the state in which all people have physical and economic access to sufficient food to fulfill their dietary needs to live a productive and healthy life. Household food security status related to protein intake levels in pregnant women (Sudaryati *et al.*, 2021). Pregnant women with nutritional problems are associated with lower household expenditure. Food security and higher levels of household food expenditure will affect nutritional problems in pregnant women (Dewi *et al.*, 2020).

Engel's Law states that low-income households tend to spend most of their income on necessities. Conversely, high-income households tend to spend only a small portion of their total expenditure on necessities (Nicholson, 1995). Poverty in rural areas results in the level of food expenditure of rural residents being much higher than in urban areas (Lagakos, 2020). Anemia is a serious public health problem among pregnant women. Inadequate dietary diversity coupled with inadequate daily food intake are eating habits that cause anemia in pregnant women (Gibore *et al.*, 2021). Anemia in pregnancy can be caused by iron deficiency, low vitamin B12, and low vitamin C intake (Atanu & Bhadra, 2020).

Differences in nutritional knowledge among rural and urban residents are related to the food intake they consume (Egg *et al.*, 2020). Living in rural areas tends to have low levels of education which is a factor in low nutritional literacy and unhealthy eating habits (Scalvedi *et al.*, 2021). In addition to knowledge and education, rural residents tend to shop more for food at less healthy stalls and shops (Lacko *et al.*, 2020). Compared to women from urban regions, the prevalence of protein deficiencies was much greater in women from rural and semi-urban areas (Gómez-Cantarino *et al.*,

2020).

Conclusion

Based on the results of the study, it can be concluded that from the various determinant factors studied, including the age of pregnant women, nutritional status, and gravida status, there is no significant difference in pregnant women with anemia in rural and urban areas. In contrast, there is a significant difference between nutritional knowledge, food expenditure, and nutritional intake in pregnant women with anemia in rural and urban areas. Suggest to health workers in every region, especially in rural areas, to be able to provide nutritional information to every pregnant woman from the beginning of pregnancy. Providing nutritional education can improve the nutritional behavior of pregnant women, so that pregnant women can meet their nutritional needs properly. That way, there are no nutritional problems during pregnancy. Although urban areas have better health outcomes, the problem of anemia still exists, so it is necessary to study the risk factors that cause anemia in pregnant women, both in urban and rural areas, so that interventions can be provided that follow each problem. Economic equality also needs to be carried out both in rural and urban areas, so that people do not have difficulty in meeting their food needs, and food expenditure can be reduced in each family.

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