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Factors Associated with the Incidence of Anemia in Pregnancy: Scoping Review

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Risk Factors,
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Abstract

Anemia during pregnancy is a prevalent condition with significant implications for maternal and fetal health, posing public health challenges in various countries. This scoping review aims to identify and synthesize the factors associated with the incidence of anemia among pregnant women, examining biological, behavioral, and socio-economic influences. A systematic search was conducted across multiple databases, focusing on studies published in the last decade that address the prevalence and determinants of anemia in pregnancy. The findings indicate that anemia in pregnancy is associated with a range of factors, including nutritional deficiencies (particularly iron, folic acid, and vitamin B12), maternal age, parity, and pre-existing health conditions such as malaria and intestinal infections. Additionally, socio-economic factors such as low income, limited education, and inadequate access to healthcare services further exacerbate the risk of anemia. Behavioral aspects, including dietary habits and prenatal care adherence, also play a critical role. This review highlights the need for comprehensive strategies that integrate nutritional interventions, health education, and improved healthcare access to address the multifaceted causes of anemia in pregnancy. By understanding these factors, health policymakers and practitioners can develop targeted interventions to reduce the incidence of anemia among pregnant women, ultimately improving maternal and child health outcomes.

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INTRODUCTION

The success of development in the health sector can be evaluated by examining maternal and infant mortality rates. According to data from the World Health Organization (WHO), approximately 40% of pregnant women worldwide experience anemia. In 2017, an estimated 295,000 women died during pregnancy, childbirth, or postpartum. The primary causes of anemia include iron deficiency and acute inflammation, which can sometimes occur simultaneously. Anemia during pregnancy remains a significant health concern, particularly in developing countries, with regional prevalence rates estimated at 48.2% in Asia, 57.1% in Africa, 24.1% in the Americas, and 25.1% in Europe (WHO, 2019).

In Indonesia, the incidence of anemia among pregnant women has shown a steady increase from 42.1% in 2015 to 44.2% in 2019 (WHO, 2019). Data from the 2018 Basic Health Research (Riskesdas) categorized the

prevalence of anemia among pregnant women by age. Among pregnant women aged 15-24 years, 84.6% were found to be anemic, followed by 33.7% for those aged 25-34 years, 33.6% for those aged 35-44 years, and 24% for those aged 45-54 years (Kemenkes, 2018).

Anemia in pregnancy is defined by hemoglobin levels of less than 11g/dL during the first and second trimesters, and below 10.5g/dL in the third trimester. It is considered a "potential danger to mother and child," requiring significant attention from all stakeholders involved in healthcare (Tarwoto & Wasnidar, 2007). Anemia arises due to an increase in both plasma and erythrocytes during pregnancy. A threefold increase in plasma volume relative to erythrocytes leads to a decrease in hematocrit hemoglobin ratios, increasing the risk of physiological anemia. Furthermore, anemia reduces physical capacity due to insufficient oxygen supply to body cells, which, in pregnant women, heightens the risk of pregnancy and delivery complications. The effects of anemia in pregnancy range from mild symptoms to severe disruptions in pregnancy continuity, including abortion, prolonged labor (atonia, prolonged delivery, atonic bleeding), postpartum issues (such as uterine subinvolution), and fetal complications (Tarwoto & Wasnidar, 2007).

To mitigate anemia risks in pregnancy, the Indonesian government has implemented a policy to provide pregnant women with 90 iron (Fe) tablets during pregnancy (Kemenkes, 2023). Regular iron supplementation has been shown to reduce the risk of anemia in pregnancy. Midwives play a crucial role in promoting maternal health by implementing the Fe tablet program and providing education on anemia prevention (Ratih, 2017). While community engagement in addressing anemia is relatively high, non-compliance remains an issue, especially among pregnant women who fail to adhere to government guidelines. Such non-compliance includes irregular consumption of Fe tablets, improper food preparation, and closely spaced pregnancies (Noversiti, 2012).

The Quran and Hadith emphasize the importance of resilience in the face of adversity, including health challenges like anemia. The Quran states: "And We will surely test you with something of fear and hunger and a loss of wealth and lives and fruits, but give good tidings to the patient, who, when disaster strikes them, say, 'Indeed we belong to Allah, and indeed to Him we will return'" (Al-Baqarah 155-156). Additionally, a Hadith encourages seeking treatment: "Seek healing, for Allah has created a cure for every disease except old age" (Narrated by Abu Daud and At-Tirmidhi). These verses highlight anemia as a challenge that must be faced with patience, yet also underscore the importance of seeking medical treatment.

Given the numerous factors associated with anemia in pregnancy, this study aims to identify the factors influencing anemia in pregnant women and to determine which factors have the strongest associations. This research aspires to contribute meaningfully to healthcare services in both theoretical and practical capacities. Thus, the researcher is motivated to conduct a scoping review entitled "Factors Associated with the Incidence of Anemia in Pregnancy: A Scoping Review."

METHOD

The method used by the author is a scoping review. A scoping review aims to explore information related to research activities on the topic that has been studied, map the literature, and investigate gaps or problems in the research area to be studied. Therefore, a scoping review can provide basic information about what research needs are possible to be carried out. The stages of a scoping review are outlined in Arkey & O'Malley (2005) and explained by Levac et al. (2010).

RESULT AND DISCUSSION

Characteristics of Articles

Based on the articles obtained, 10 articles with grade A were selected using quantitative methods. The articles came from Indonesia, Africa, India, Arabia, and the Philippines. The articles came from developing countries.

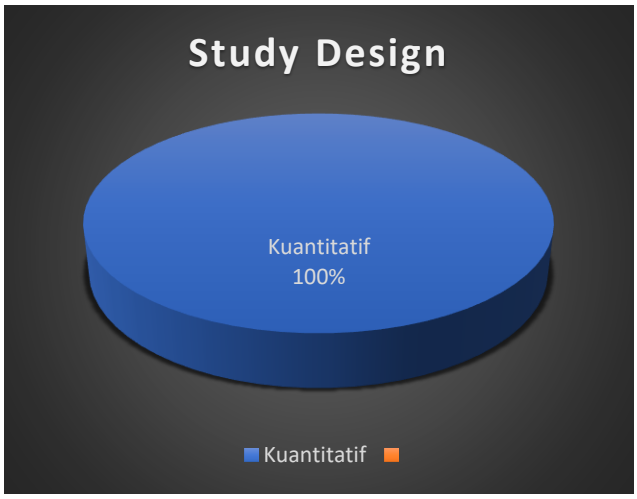

Diagram 1. Desain Studi

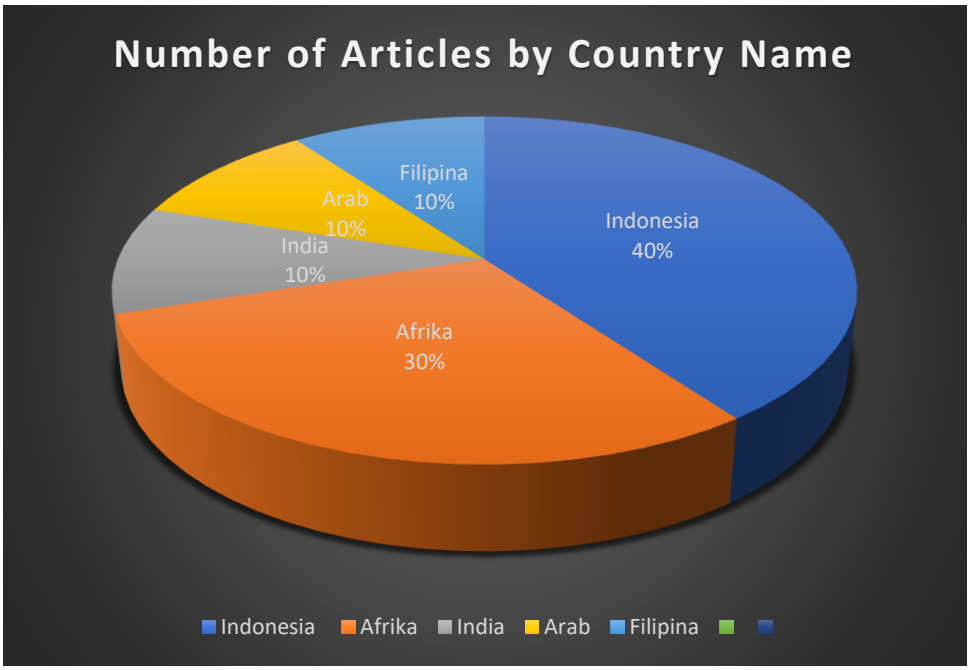

Diagram 2. Number of Articles by Country Name

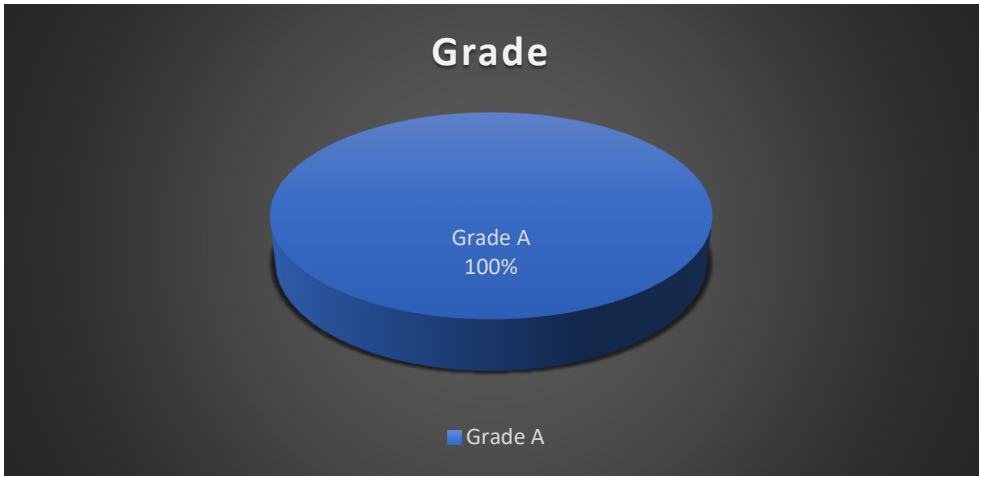

Diagram 3. Grid

Theme

In this mapping step, the researcher maps it into three themes, namely: internal factors, external factors, sociodemographic factors.

Table 1. Themes in Research

No	Theme	Subtheme
1.	Internal Factors	• Age of mother [A2, A4, A9, A10] • Parity [A1, A2] • Gestational age [A10] • Birth spacing A3, A10
2.	External Factors	• Tablet Fe [A2, A5, A6, A7, A10] • ANC [A5, A7, A9]
3.	Sociodemographic Factors	• Economic status [A2, A4, A8] • Education [A2, A4, A7]

Table 2. Article Codes in Research

No	Judul	Kode
1.	Factors Associated with the Incidence of Anemia in Pregnant Women	A1
2.	Analysis of Factors Causing the Occurrence of Anemia in Pregnant Women in the Working Area of the Kalodran Community Health Center	A2
3.	Magnitude and Factors Associated with Anemia Among Pregnant Women Admitted to Labor Ward of Hiwot Fana Specialized University Hospital Eastern Ethiopia	A3
4.	Exploring Factors Influencing the Severity of Pregnancy Anemia in India	A4
5.	Prevalence of Anemia and Associated Risk Factors among Pregnant Women in Semarang, Indonesia, During COVID-19 Pandemic	A5
6.	Prevalence and Associated Factors of Anemia Among on their Awareness Level	A6
7.	Determinants of Anemia Status Among Pregnant Women in Ethiopia: Using 2016 Ethiopia Demographic and Health Survey: Application of Ordinal Logistic Regression Models	A7

8.	Factors Influencing the Compliance of Pregnant Women with Iron and Folic Acid Supplementation in the Philippines	A8
9.	Prevalence and Associated Risk Factors for Anemia Amongst Pregnant Women Attending Three Antenatal Clinics in Eswatini	A9
10.	Different Factors Caused Anemia for Pregnant Women in Rural and Urban Areas	A10

Disscussion

Internal Factors

The mapping results in this scoping review obtained results related to internal factors, including maternal age, parity, gestational age, and birth spacing.

1. Maternal Age

The reproductive age between 20-35 years is considered the ideal period for pregnancy, although there is a significant risk of complications during this period. During the reproductive age, the body tends to experience iron loss due to menstruation and postpartum, which can increase the risk of anemia during pregnancy (Fitriany & Saputri, 2018).

Based on research from Irianti (2023) it shows that pregnant women under the age of 20 have a higher risk of experiencing severe anemia (67.9%), compared to pregnant women aged around 20-35 years (62.5%). Mothers under the age of 20 have a more than one-fold risk of experiencing anemia compared to mothers aged 20-35 years.

Anemia is more common in adolescent mothers (67.6%), while pregnant women aged 40 years are more susceptible to severe anemia, which is caused by menopausal changes, reduced ability to absorb nutrients, diet, and chronic diseases (Talin et al., 2023).

In line with research Dodzo et al. (2022) the highest prevalence of anemia occurs in pregnant women aged 15-19 years (53.3%). The high prevalence of anemia at a young age is caused by low knowledge of antenatal services, lack of awareness, inappropriate self-care during pregnancy, and failure to seek antenatal services early.

Women who are pregnant for the first time at a high-risk age, namely under 20 years or over 35 years of age, are more at risk of experiencing anemia. This is because at that age the mother is not in a healthy reproductive period so that pregnancy and childbirth at that age will increase the risk of the mother experiencing anemia (Rahardjo & Wati, 2022).

2. Parity

After the third pregnancy, pregnant women are at risk of anemia due to damage to the blood vessels and uterine walls, which disrupts the supply of nutrients to the fetus. The number of previous births plays an important role in the risk of anemia in pregnant women (Wijianto, 2016).

The results of the study Irianti (2023) showed that multiparous pregnant women have a higher level of anemia (69.7%), while primiparous pregnant women also tend to experience anemia (54.5%). Multiparous pregnant women have more than twice the risk of experiencing anemia compared to primiparous pregnant women. This finding is in accordance with research Elisa Safitri & Rahmika (2022) which shows that pregnant women who experience anemia with parity are at high risk if the parity is more than 4.

3. Gestational Age

The increase in blood volume during pregnancy causes a decrease in iron storage. As the trimester increases, the need for iron in the body of pregnant women will increase so that there is a greater chance for pregnant women

in the third trimester to experience anemia compared to pregnant women in the first trimester. The gestational age in the third trimester has a 2.667 times greater risk of developing anemia when compared to respondents who have a gestational age of the second trimester (Hidayah, 2021).

This is supported by research Rahardjo & Wati (2022) which shows that increasing gestational age will increase the risk of anemia, where many pregnant women are found to be anemic in the second and third trimesters. This happens because the mother's iron intake will be shared with the fetus in the womb, reducing the iron binding capacity in the mother's blood and can reduce iron in the mother's body if the intake is not sufficient.

4. Birth interval

A pregnancy interval of less than two years allows the mother's condition to not have recovered optimally, so that the iron in her body is divided for the recovery of her body and the needs during the next pregnancy. In accordance with the findings Rahardjo & Wati (2022) which states that one of the factors causing anemia in pregnant women in rural areas is the birth interval.

In line with research Abdu et al. (2021) women whose birth interval is less than or equal to two years are 2.5 times more likely to experience anemia than other women.

External Factors

The mapping results in this scoping review obtained results related to external factors, including Fe tablets and ANC.

1. Fe Tablets

Iron supplement tablets are needed in the formation of hemoglobin in the mother's cells and also the fetus. Based on the results of the study Irianti (2023) it explains that mothers who do not comply with consuming iron supplement tablets are twice as likely to experience anemia compared to mothers who comply with consuming iron supplement tablets.

In line with the study Margawati et al. (2023) which stated that 47.1% of the group experienced anemia because they did not receive iron and folic acid supplements regularly during pregnancy.

The lack of awareness in consuming iron in pregnant women contributes greatly to the high rate of anemia. Modifying diet alone is not enough to correct iron deficiency that already exists in pregnancy, so iron supplements are needed (El-Kholy et al., 2023). These results are consistent with previous studies showing that pregnant women who consume iron experience a reduced risk of anemia (Animut & Berhanu, 2022).

2. ANC

Antenatal Care (ANC) is an important component of prenatal care, which accommodates various health promotion services and prevention of complications in pregnant women. The World Health Organization recommends a minimum of four ANC visits (Chusniah Rachmawati, 2019).

The results of the study Margawati et al. (2023) showed that pregnant women who were less compliant with ANC visits were more likely to experience anemia. Compliance with ANC visits is very influential in detecting early conditions of maternal pregnancy at risk, including anemia, so that intervention problems can be addressed immediately.

The study Animut & Berhanu (2022) added that not only ANC visits during pregnancy, but visits to health facilities in the previous twelve months can help minimize pregnant women experiencing anemia.

Gestational age at the first ANC visit was also positively associated with anemia where the first ANC visit was made in the third trimester (OR = 9.59, P < 0.001) was six times more likely to experience anemia compared to those whose first ANC visit was in the second trimester (El-Kholy et al., 2023).

Sociodemographic Factors

The mapping results in this scoping review obtained results related to socio-demographic factors, namely economic status and education.

1. Economic Status

An individual's economic status plays an important role in assessing a person's financial condition and also affects the ability to meet household needs. Research Irianti (2023) explains that most of the respondent group experienced severe anemia (67.6%) with low economic status. The percentage shows that mothers with low economic status are one time more likely to experience anemia than mothers with good economic status

In line with research Talin et al. (2023) which states that socio-economic status greatly affects the prevalence of anemia. Severe to moderate anemia is more likely to occur in pregnant women from low socio-economic backgrounds compared to pregnant women from wealthy families. Severe to moderate anemia is more common in the poorest pregnant women at 69.8%. Pregnant women from low-income households in India are more susceptible to anemia than pregnant women from high-income households. A significant relationship was found between the socio-economic status of pregnant women and the risk of anemia.

Better financial capacity allows access to supplies and antenatal health services to be met properly so that health knowledge about anemia will be given more attention (Felipe-Dimog et al., 2021).

2. Education

Education plays an important role in preventing pregnancy-related anemia. A person who receives education will have better nutritional knowledge and a better understanding of pregnancy factors compared to someone who does not receive good education. By having knowledge and awareness, people who are educated can take better care of themselves or other women during pregnancy so that they can reduce the risk of anemia. The literacy rate among women is one of the most important factors underlying the prevalence of anemia. Educated women usually have more access to health services and facilities, thus helping to reduce the risk of anemia. With increasing levels of education, women are increasingly equipped with knowledge about the health risks associated with anemia. Therefore, the higher the education given to women, the better their ability to prevent or treat anemia, thereby reducing the likelihood of anemia.

In line with research Talin et al. (2023) which states that educated women are observed to have more resistance to the prevalence of anemia. When considering higher education as a reference level, pregnant women with minimal or no education account for 37%, with basic education 32% and those with secondary education 22.2% are more susceptible to anemia. It is known that the higher a person's education level, the lower the likelihood of developing anemia. Research supported by Animut & Berhanu (2022) found that the level of education of pregnant women is a potential indicator of anemia status. Women with elementary, junior high, or high school education are less likely to experience worse anemia status than women who have no education.

CONCLUSION

Based on the analysis and discussion of the scoping review on factors associated with the incidence of anemia in pregnancy, several conclusions can be drawn. The incidence of anemia in pregnant women is influenced by internal factors, including maternal age, parity, gestational age, and birth spacing. Additionally, external factors such as the provision of iron (Fe) tablets and regular antenatal care (ANC) visits play a role. Sociodemographic elements, including economic status and educational level, further contribute to the risk of anemia during pregnancy.

Efforts to reduce anemia incidence in pregnancy require targeted interventions. These may include education about ideal pregnancy conditions, such as the appropriate maternal age, gestational age, optimal number of children, and adequate birth spacing. Emphasis should also be placed on increasing adherence to iron tablet consumption and ensuring that ANC visits are conducted regularly according to the recommended schedule. Strengthening collaboration with the community and healthcare providers is essential to foster greater awareness and compliance with these preventive measures.

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