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Original Article

Anemia in Pregnant Women during COVID-19 Pandemic in Selayar Islands Regency, Indonesia: Socioeconomic and Dietary Factors

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ABSTRACT

Objective: This research aims to analyse the influence of social aspects (knowledge, parity, local policies, and economic support) and diet on the incidence of anemia in pregnant women during the COVID-19 pandemic.
Materials and methods: The type of research was analytical with a cross-sectional study approach carried out in Selayar Islands Regency. The population in this study was the number of pregnant women in Buki District, Selayar Islands Regency in 2020 and 2021, about 284 people, and the total number of respondents was 95 people. Research variables were age, education, parity, diet, upper arm circumference, knowledge about anemia, local policy, economic aspects, anemia, and degree of anemia severity. Data analysis was carried out using SPSS and the Chi-Square statistical test.
Results: The results of the research were that 65 respondents were anemic (68.4%), and the degree of anemia was mild (66.2% of respondents) and moderate (29.2%). Lack of knowledge about anemia has a significant relationship with the incidence of anemia ($p = 0.024$), and then a diet that does not meet balanced nutritional needs during pregnancy has a significant relationship with the severity of anemia ($p = 0.001$). Other social factors, such as parity, local policies, and family income, do not significantly affect the incidence of anemia in pregnant women.
Conclusion: The conclusion is that knowledge about anemia and the respondents' eating patterns significantly affect the incidence of anemia and the degree of anemia in pregnant women.

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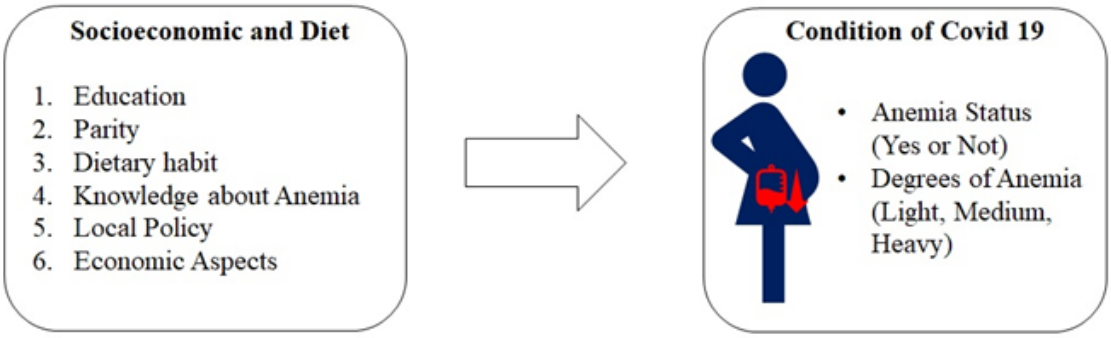
GRAPHICALABSTRACT



Introduction

Anemia is a global public health problem, affecting nearly one-third of the world's population [1], especially women of childbearing age, especially teenagers and pregnant women [2]. Anemia in pregnant women can have serious consequences for both the mother and the baby, including increased risk of premature birth, low birth weight, and maternal mortality [3]. Globally, it is estimated that 40% of children aged 6–59 months, 37% of pregnant women, and 30% of women aged 15-49 years are affected by anemia [2]. Adolescent groups are more vulnerable than other age groups; women have a higher prevalence of anemia than men, and developing countries have a higher prevalence of anemia than developed countries [4].

Indonesia is an island country with a high prevalence of anemia; as shown by the results of Riskesdas in 2018, it was recorded that 26.8% of children aged 5-14 years suffered from anemia, and 32% aged 15-24 years [5]. The results of research in Indonesia show that 38.2% of pregnant women in Indonesia experience anemia (Hb<11 g/dl) and the prevalence of pregnant women experiencing anemia in rural areas is 37.9% and in urban areas is 38.2% [6]. The incidence of anemia in pregnant women in Indonesia is still relatively high, namely 48.9% (urban and rural) and 49.5% (rural), and the figure is approaching a severe public health problem with an anemia prevalence limit of more than 40% [5, 7]. Data on pregnant women receiving Fe tablets in South Sulawesi Province decreased from 89.07% in 2016 to 86.67% in 2017 and 85% in 2018. Meanwhile, the prevalence of anemia in pregnant women in South Sulawesi Province in 2016 was 13.40%; in 2017, it was 9.76%, and in 2018 it was recorded at 6.95% [8].

Factors that influence the occurrence of anemia in pregnancy are direct, indirect, and basic. Direct factors include compliance with iron consumption, infectious diseases, and bleeding [9]. Indirect factors include Antenatal Care (ANC) visits, attitude, parity, pregnancy spacing, age, and diet [10]. The basic factors include socio-economics, knowledge, education, and culture, which influence the risk of anemia in pregnant women [11]. Basic factors (socioeconomic aspects) and diet are very important in overcoming the incidence of anemia. Anemia in pregnant women is generally caused by physiological changes during pregnancy and is exacerbated by malnutrition. Anemia that is often found in pregnancy is due to iron deficiency. This occurs because of the increased need for iron to supply the fetus and placenta to enlarge tissue and red blood cell mass.

The COVID-19 pandemic has exacerbated the problem of anemia in pregnant women due to a number of factors, including: (i) The COVID-19 pandemic has disrupted healthcare services around the world, making it difficult for pregnant women to access antenatal care and other essential services [12].

This can lead to delayed diagnosis and treatment of anemia and (ii) the COVID-19 pandemic has also led to increased food insecurity, which can make it difficult for pregnant women to get the nutrients they need to prevent anemia [13]. Research on anemia in pregnant women during the COVID-19 pandemic is urgently needed to better understand the impact of the pandemic on anemia prevalence and to develop effective interventions to prevent and treat anemia in this vulnerable population. This research aims to analyze the influence of social aspects (knowledge, parity, local policies, and economic support) and diet on the incidence of anemia in pregnant women during the COVID-19 pandemic.

Materials and Methods

The type of research was analytical with a cross-sectional study approach carried out in Selayar Islands Regency. Selayar Islands Regency is located at the southern tip of Sulawesi Island and extends from North to South; it is the only Regency in South Sulawesi whose entire territory is separated from mainland Sulawesi and consists of a group of several islands to form an archipelago (Figure 1). The population in this study was the pregnant women in Buki District, Selayar Islands Regency, in 2020 and 2021, about 284. The sample in the study was pregnant women who were estimated using the Proportion Estimation formula: n = (NZ^2 P (1-P))/(d^2 (N-1)+ Z^2 P (1-P)); the sample size was 95 people. The inclusion criteria were as follows: (i) Pregnant women in their second or third trimester of pregnancy; (ii) residing in Selayar Islands Regency, Indonesia; and (iii) Willing to participate in the study. The exclusion criteria were as follows: (i) Women with chronic diseases, such as diabetes, hypertension, and kidney disease; (ii) women with multiple pregnancies. Data collection was carried out by direct interviews assisted by health workers and health cadres at the research location by implementing health protocols such as maintaining social distance, wearing masks, and disinfecting surfaces.

Research variables are age (<20 years; 20-35 years; >35 years), education (junior high school, high school, and college), and parity (<=2; >2) which was collected using a respondent characteristics questionnaire. The other variable, namely eating patterns, was collected using a pregnant women's dietary pattern questionnaire, which was then categorized into 3: adequate, inadequate, and not adequate. The variable upper arm circumference (UAC) was categorized into 2: Malnutrition if UAC <23.5 cm and Normal Nutrition status if UAC >=23.5 cm. It was best to measure UAC by a trained health worker using a special tape to find out what UAC size was. The knowledge variable about anemia was categorized into 2, insufficient knowledge if the score was <= Median (6) and sufficient knowledge if the score was > Median (6). Local policy variables were categorized into 2, which were not supporting if the score value was <= Median (6) and supporting if the score value was> Median (6). Economic aspect variables were categorized into 2, namely not supporting if the score value was <= Median (3) and supporting if the score value was > Median (3). The anemia variable is that hemoglobin levels were checked using the hematology analyzer method and then categorized as anemia if the Hb measurement results were <11 gram% and normal if ≥ 11 gram%.

Data analysis was carried out using SPSS and the Chi-Squared statistical test to assess factors related to anemia and the degree of anemia, and the statistical test results were significant if the *p*-value <0.05.

Results and Discussion

Table 1 presents that the majority of respondents were aged 20-35 years old (71.6%), had a high school education (48.4%) and had parity <=2 (57.9%). Based on food recall, it was found that most of the diets were inadequate (60%). The UAC measurement results showed that the majority of respondents had normal nutritional status (69.5%). Most of the respondents' knowledge about anemia was in the sufficient category (67.4%), local policy factors showed that most were supportive (71.6%), and economic aspects were also mostly supportive (66.3%).

Figure 1: Selayar islands regency

Table 1: Distribution of research variable categories (n=95)

Variables		n	%
Age (years)	< 20	6	6.3
	20 – 35	68	71.6
	> 35	21	22.1
Education	Junior high school	41	43.2
	Senior high school	46	48.4
	College	8	8.4
Parity	<=2	55	57.9
	>2	40	42.1
Dietary Habit	Fulfil	24	25.3
	Not fulfilling	57	60
	Does not meet the	14	14.7
Upper Arm Circumference (UAC)	Malnutrition	29	30.5
	Normal Nutrition	66	69.5
Knowledge about Anemia	Insufficient	31	32.6
	Sufficient	64	67.4
Local Policy	Does not support	27	28.4
	Support	68	71.6
Economic Aspect	Does not support	32	33.7
	Support	63	66.3
Anemia	Yes	65	68.4
	No	30	31.6
Degree of Anemia	Light	43	66.2
	Middle	19	29.2
	Heavy	3	4.6

Based on hemoglobin (Hb) levels, 65 respondents were anemic (68.4%), and 30 were normal (31.6%). Based on the degree of anemia, it was found to be mild in 43 people (66.2%), moderate in degree (29.2%), and severe in 3 people (4.6%). Table 2 lists the distribution of anemia according to education, showing that the percentage of anemia is highest in respondents with a high school education (65.9%) and the lowest in respondents with tertiary education (37.5%), but the results of statistical tests show a p value> 0.05, which means the distribution of anemia according to education is not significantly different. Then, the distribution of anemia according to age shows that the percentage of anemia is higher in respondents who have parity <=2 (70.9%) than those who have parity (65.0%). Diet patterns showed a higher percentage of anemia in respondents with inadequate (71.4%) and non-compliant (71.4%) diets compared to respondents who had adequate diets (58.3%). Knowledge about anemia: it was found that anemia was higher in respondents with less knowledge (80.6%) than in respondents with sufficient knowledge (62.5%). Based on the results of statistical tests, a p-value <0.05 was obtained, which means that the distribution of anemia according to knowledge is significantly different. This shows a significant relationship between knowledge and anemia, where respondents with less knowledge are more at risk of suffering from anemia than respondents with sufficient knowledge. Local policies show a higher percentage of anemia in non-supportive local policies (74.1%) than in supportive local policies (66.2%).

Table 2: Distribution of anemia based on research variables (socioeconomic and diet)

Research variable			Anemia		Total	*P*-value
			Yes	No		
Education	Junior High School	n	27	14	41	0.086
		%	65.9	34.1	43.16	
	Senior High School	n	35	11	46	
		%	76.1	23.9	48.42	
	College	n	3	5	8	
		%	37.5	62.5	8.42	
Parity	<=2	n	39	16	55	0.541
		%	70.9	29.1	57.89	
	>2	n	26	14	40	
		%	65	35	42.11	
Dietary habit	Sufficient	n	14	10	24	0.489
		%	58.3	41.7	25.26	
	Less sufficient	n	41	16	57	
		%	71.9	28.1	60.00	
	Insufficient	n	10	4	14	
		%	71.4	28.6	14.74	
Knowledge about Anemia	Insufficient	n	25	6	31	0.024
		%	80.6	19.4	32.63	
	Sufficient	n	40	24	64	
		%	62.5	37.5	67.37	
Local Policy	Does not support	n	20	7	27	0.455
		%	74.1	25.9	28.42	
	Support	n	45	23	68	
		%	66.2	33.8	71.58	
Economic Aspects	Does not support	n	25	7	32	0.147
		%	78.1	21.9	33.68	
	Support	n	40	23	63	
		%	63.5	36.5	66.32	

The economic aspect factor shows a higher percentage of anemia in respondents with unsupportive economic aspects (78.1%) than those with supported economic aspects (63.5%).

Table 3 indicates the distribution of degrees of anemia according to age, where the percentage of mild degrees of anemia was found to be the highest in respondents aged < 20 years old (100%) compared to respondents aged 20-35 years old (61.7%) and those aged >35 years old (69.2%). Education level shows that the percentage of mild anemia was found to be highest in respondents with higher education (100%) compared to respondents with junior high school (70.4%) and high school (60.0%). The parity variable shows that the percentage of mild anemia was found to be higher in respondents with parity >2 (73.1%) than in respondents with parity <=2 (61.5%), while moderate and severe anemia was found to be higher in respondents with parity <=2 compared to respondents with parity >2. According to the distribution of the degree of anemia according to diet, the percentage of severe anemia was found to be highest in respondents with an inadequate diet (30.0%) compared to respondents with an adequate diet (0.0%), while moderate anemia was found to be highest in respondents with a less than adequate diet (36.6%) compared to those with an adequate (14.3%) and non-compliant diet (20.0%). Based on the results of statistical tests, a p-value <0.05 was obtained, which means that the distribution of degrees of anemia according to diet is significantly different. This shows that respondents with inadequate or inadequate diets are more at risk of moderate or severe anemia than those with adequate diets. Knowledge about anemia shows that severe anemia was higher in respondents with less knowledge (8.0%) than in respondents with sufficient knowledge (2.5%). Local policy factors show that the percentage of mild anemia was higher in non-supportive local policies (75.0%) than in supportive local policies (62.2%). Meanwhile, moderate anemia was found to be higher in those who supported it (33.3%) than in those who did not support it (20.0%). The economic aspect factor shows that severe anemia was higher in respondents with unsupportive economic aspects (12.0%) than in respondents with supportive economic aspects (0.%). Meanwhile, moderate anemia was higher in respondents with supportive economic aspects (32.5%) than in respondents with unsupportive economic aspects (24.0%).

This study's results show no significant relationship between maternal age, the incidence of anemia, and the severity of anemia with a p-value> 0.05. A mother's age that is too young (<20 years) or too old (>35 years) can increase the risk of anemia in pregnant women. Pregnant women who are too young generally have limited access to resources to support a healthy pregnancy, such as knowledge about nutrition and health and access to quality health services [14]. Research conducted at the Ranomuut Community Health Center also revealed that low Hb levels were dominant in pregnant women in the high-risk age category, the age group under 20 years [15]. This can increase the risk of pregnant women lacking iron and other important nutrients for preventing anemia. Pregnant women who are too old generally have a higher risk of experiencing pregnancy complications, such as preeclampsia and gestational diabetes [16]. The education level of respondents also showed no significant relationship with the incidence and severity of anemia. However, respondents with a low education level (junior high school and senior high school) were more likely to experience anemia. Pregnant women with low levels of education generally have lower knowledge and understanding of the importance of nutrition and health during pregnancy [17]. This can increase the risk of pregnant women lacking iron and other important nutrients for preventing anemia. In addition, pregnant women with low levels of education generally have lower access to quality health services. This can make it more difficult for them to get proper anemia screening and treatment. Good knowledge of pregnant women about anemia can help to prevent and treat anemia in pregnant women [18]. Furthermore, good knowledge about anemia can help pregnant women understand the risks of anemia, its signs and symptoms, and how to prevent and treat anemia [19].

Table 3: Distribution of degrees of anemia based on research variables (socioeconomic and diet)

Research variable			Degree of Anemia			Total	*P*-value
			Light	Medium	Heavy		
Age (Years Old)	< 20	n	5	0	0	5	0.439
		%	100	0	0	7.69	
	20 – 35	n	29	15	3	47	
		%	61.7	31.9	6.4	72.31	
	> 35	n	9	4	0	13	
		%	69.2	30.8	0	20.00	
Education	Junior high school	n	19	8	0	27	0.367
		%	70.4	29.6	0	41.54	
	Senior high school	n	21	11	3	35	
		%	60	31.4	8.6	53.85	
	College	n	3	0	0	3	
		%	100	0	0	4.62	
Parity	<=2	n	24	12	3	39	0.302
		%	61.5	30.8	7.7	60.00	
	>2	n	19	7	0	26	
		%	73.1	26.9	0	40.00	
Dietary habit	Sufficient	n	12	2	0	14	0.001
		%	85.7	14.3	0	21.54	
	Less sufficient	n	26	15	0	41	
		%	63.4	36.6	0	63.08	
	Insufficient	n	5	2	3	10	
		%	50	20	30	15.38	
Knowledge about Anemia	Insufficient	n	17	6	2	25	0.494
		%	68	24	8	38.46	
	Sufficient	n	26	13	1	40	
		%	65	32.5	2.5	61.54	
Local Policy	Does not support	n	15	4	1	20	0.551
		%	75	20	5	30.77	
	Support	n	28	15	2	45	
		%	62.2	33.3	4.4	69.23	
Economic Aspects	Does not support	n	16	6	3	25	0.074
		%	64	24	12	38.46	
	Support	n	27	13	0	40	
		%	67.5	32.5	0	61.54	

Therefore, the government needs to increase access to education and health services for pregnant women, especially pregnant women with low levels of education.

This can help reduce the risk of anemia in pregnant women and improve the health of the mother and baby.

Parity is the number of children born to a woman, both live and stillborn. Parity 1 to 3 is the safest regarding maternal mortality and the health of the mother and baby. Parity 4 has a high risk of developing anemia because the large number of births (parity) can affect the mother's health, making the mother susceptible to anemia [20]. Pregnant women with high parity have gone through multiple pregnancies and childbirth, which can deplete iron reserves in their bodies [21]. In addition, pregnant women with high parity generally have a higher risk of experiencing pregnancy complications, such as preeclampsia and gestational diabetes. Therefore, pregnant women with high parity need regular check-ups with an obstetrician to monitor their health and prevent anemia.

The study's results showed that the diet of pregnant women had a significant relationship

with the severity of anemia with a p-value <0.05. A diet that does not meet the needs during pregnancy (balanced nutrition) can increase the risk of anemia and the severity of anemia in pregnant women [22]. This is because pregnant women need sufficient iron intake to meet the needs of the developing fetus [23]. Iron is an important component of hemoglobin, a protein that carries oxygen throughout the body. Pregnant women with insufficient iron intake will be more susceptible to anemia. The diet of pregnant women in island areas often faces various obstacles, including: (i) Food availability [24]: Food availability in island areas is often limited, especially for foods rich in iron, vitamin C, and folic acid. (ii) Food affordability [25]: Food prices in island areas are often higher than in mainland areas. (iii) Knowledge and awareness: The knowledge and awareness of pregnant women about the importance of a healthy diet to prevent nutritional anemia is often still low [26]. These obstacles can increase the potential for nutritional anemia in pregnant women in island areas. Local policies in the form of compensation for economic benefits from the village government in the form of cash and materials can play a role in efforts to prevent and treat anemia in pregnant women [27]. This economic support can help pregnant women meet their nutritional needs, especially iron-rich foods. Apart from that, this economic benefit can also help pregnant women access health services to get the right diagnosis and treatment for anemia. A low family economy can increase the anemia risk of and severity in pregnant women [28]. This is because pregnant women with a low family economy tend to have more limited access to nutritious food, especially iron-rich ones. Likewise, pregnant women with low family incomes tend to have more limited access to health services, making it more difficult to get the right diagnosis and treatment for anemia. Pregnant women with low incomes can still meet their iron needs with the free Fe tablets given by community health center staff. Meanwhile, pregnant women with high family incomes who suffer from anemia may be caused by using their income not entirely to buy iron-rich foods but for other purposes.

The increasing incidence of anemia in pregnant women in Ethiopia shows that current national policies and public health strategies are ineffective. These policies and strategies need to be revised to increase food diversity, fortify food with iron and folic acid, and control infectious diseases [29]. One research finding in Indonesia indicates that the iron tablet program in Indonesia still has several weaknesses [30], which are as follows: (i) Weaknesses in the input stage involve differences in facilities and infrastructure, such as the availability of iron tablets, medical equipment, and healthcare personnel. This can hinder the optimal implementation of the iron tablet program. (ii) Weaknesses in the process stage include discrepancies in distribution, monitoring, recording, and reporting. This can result in uneven distribution, poor monitoring, and inaccurate reporting of iron tablets. Weaknesses in the output stage consist of inconsistencies in targeting and timely distribution. This can lead to the iron tablets being off-target and not distributed in a timely manner. Vulnerable areas, such as island areas, generally have limited access to nutritious food. Geographic, economic, or social factors can cause this. Local policies can help increase the availability of nutritious food in the area, for example, through programs providing additional food for pregnant women or food fortification programs with iron and folic acid. Pregnant women from low-income families have a higher risk of experiencing anemia. This is because they may not have access to nutritious food or other resources that can help them meet their nutritional needs. Family economic support can help pregnant women meet their nutritional needs through food or cash assistance.

Economic support in the form of government social assistance for pregnant women with chronic energy deficiency (CED) is one of the efforts to improve maternal and child health. Pregnant women with CED are at risk of experiencing various pregnancy complications, such as anemia, preeclampsia, and preterm birth. These complications can endanger the health of the mother and her baby. Government social assistance can help pregnant women with CED to meet their nutritional needs. This assistance can

be in the form of: Commodity assistance, which contains staple foods such as rice, sugar, cooking oil, and eggs, cash assistance can be used to purchase food and other basic necessities, and food subsidy program assistance, such as the Family Hope Program (PKH) and Non-Cash Food Assistance (BPNT) [31].

Conclusion

The knowledge of respondents about anemia significantly affects the incidence of anemia in pregnant women in the Buki Community Health Center area, Buki District, Selayar Islands Regency. Respondents with good knowledge about anemia tend to have a lower risk of experiencing anemia. Other social factors, such as parity, local policies, and family income, do not significantly affect the incidence of anemia in pregnant women. The respondent's diet significantly affects the anemia degree in pregnant women. Respondents with poor eating patterns tend to have a higher degree of anemia. Diet is the most important thing in overcoming anemia in pregnant women. The regional government (district health office) educates the public about implementing a balanced nutritional menu. In particular, pregnant women must eat 3 times a day according to MCH (maternal and child health) regulations. The village government needs to form a special group (cadre) to handle malnutrition and anemia by providing contributions as cadre motivation. It is recommended that the Selayar Islands Regency Agriculture Service increase public knowledge about using yards to cultivate spinach and cassava leaves because these contain much iron.

The findings of this study suggest that public health and clinical interventions should focus on educating pregnant women and their families about anemia, promoting healthy eating habits among pregnant women, and screening and managing anemia in pregnant women.

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Conflict of Interest

No potential conflict of interest was reported by the authors.

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Authors' Contributions

All authors contributed to data analysis, drafting, and revising of the article and agreed to be responsible for all the aspects of this work.

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