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Anemia Among Antenatal Clinic Attendees at Health Centers In Kigali City, Rwanda.

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Abstract

In many nations as well as throughout the entire world, anemia in pregnancy or gestational Anemia is a significant public health concern. A hemoglobin content of less than 11 g/dl is referred to as gestational anemia by the World Health Organization. The most frequent cause of gestational anemia is anemia brought on by iron insufficiency. The World Health Organization revealed that the magnitude of gestational anemia is 37% Worldwide. Previous studies revealed that gestational anemia is more prevalent in Africa with the prevalence of 41.7%, and that its prevalence is higher in developing nations than in industrialized ones. Africa was found to be the most prevalent especially in Sub-Saharan Africa in which Rwanda is located. In Rwanda the prevalence is 25% as it was shown by Demographic Health Survey 2019-2020. Although there are studies done and revealed the prevalence in Rwanda, there is no adequate data which shows the prevalence and associated factors of gestational anemia in different parts of the country. This research aims to reveal the prevalence and associated factors of gestational anemia in Kigali city. This will be useful for health decision makers to know where to put additional energy in preventive interventions of gestational anemia. This study was a cross sectional study where two stage sampling technique was used. Level one was purposive sampling for selection of two health centers in each district of Kigali city and level two was systematic sampling method to select 385 pregnant women who were attending antenatal care visits at selected health centers. Those women represented all pregnant women in Kigali city. Before being tested for anemia, pregnant women filled the questionnaire. The purpose of questionnaires was to collect some information about their social demography, social economic status obstetric health and medical history which was used to analyze associated factors of anemia during pregnancy. Then the routine laboratory test of full blood count was done and from its results, hemoglobin concentration was recorded where women with less than Hg<11g/dl was anemic according to WHO guidelines. The data was analyzed using IBM SPSS software and variables which had p-value <= 0.05 was considered as statistically significant. Descriptive analysis was done using frequencies in order to compute the prevalence of anemia. Then the type of bivariate analysis was done using crosstabs to analyze associated factors. Independent variables which were significant at this level were entered into binary logistic regression in order to adjust for confounders. After logistic regression, identified associated factors were identified variables which were significant with P-value <=0.05 were identified as factors associated with anemia in pregnancy. The prevalence was found to be 19%. The factors which are positively associated with anemia in pregnancy were having malaria within six months,

being self-employed and being in third trimester of pregnancy where negatively associated factors were found to belong in age category of 20-24and in 30-34 .

Key words: *Anemia, Antenatal Clinic, Health Centers, Attendees, Rwanda*

i.Introduction

Gestational anemia is the anemia associated with pregnancy, where the oxygen level, which reaches to the body tissues, is insufficient due to lower number of erythrocytes or the lower concentration of hemoglobin, which is below the normal. According to the guidelines of WHO, a pregnant woman is considered anemic when she has a concentration of hemoglobin which is less than 11 g/dl (WHO, 2023). Among significant health indicators, degree of anemia is included. According to WHO, in developing nations compared to developed nations, anemia is more common (WHO,2023). Prior researches have shown the severity of anaemia during pregnancy to differ across women from various cultural backgrounds, economic statuses, and lifestyles.

In 2019, World Health Organization (WHO) found that in 2019, 36.5% pregnant women were anemic worldwide and 29.6% non-pregnant women were anemic (WHO, 2021). Another meta-analysis study found that the prevalence of anemia among pregnant women over the world is 36.8% (Mohammadmahdi et al., 2022). WHO estimates that 40% of 6-59 months aged children, 37% of pregnant women, and 30% of 15-49 years aged women are anemic worldwide (WHO,2023).

Prevalence of gestational anemia in Sub-Saharan Africa was reported to be 35.6% (Fite et al., 2021). It also revealed that compared to developed countries, magnitude of anemia is higher in developing countries in which many countries in sub-Saharan Africa are included. This may be a result of the area's low economic level, poor dietary poor nutritional knowledge-related habits and While pregnancy, uneven nutritional advice. In 2015 update and MDG assessment by WHO and UNICEF, it was revealed that around 32.4 million expectant mothers had anemia worldwide with 48.7% in Southeast Asia and 46.3% in Africa (WHO & UNICEF, 2015). The prevalence of anemia is highest among pregnant women in sub- Sahara Africa (57%), followed by pregnant women in South-East Asia (48%) (Adam et al.,2018). In East Africa, the prevalence of gestational anemia varies between 57.10% in Tanzania to 23.36% in Rwanda. (Liyew et al.,2021). A report from 2019-2020 demographic health survey revealed that 25% of pregnant women in Rwanda are anemic (DHS2019-2020). With all the above prevalence estimates from world down to country, the detailed information of prevalence in different regions in Rwanda is not enough. In this study, the prevalence as well as associated factors of gestational anemia in Kigali is going to be revealed.

Among the causes of gestational anemia, the commonest one is iron deficiency (Breymann & Auerbach, 2017) and it is most prevalent in nations with low and moderate levels of income (Daru et al., 2018). Some parasitic infections also can cause anaemia. Among those parasitic infections is malaria, which reduces the quantity of erythrocytes. Not only malaria, but also some hookworms can induce iron deficiency anaemia by chronic intestinal blood loss. Acute blood loss is also among the causes of anaemia (Bolka & Gebremedhin,2019).

This condition negatively has an impact on both the mother's and the fetus's health during pregnancy. Gestational anaemia can lead to health problems to both the mother and fetus as well because fetus life depends on the mother’s health quality (Jung et al.,2019). Thus, when tissues of mother do not get enough oxygen, the metabolism will be low and as a result, the fetus will not get enough nutrients. Severe anemia may adversely impact the mother's and baby’s health during pregnancy. Hemoglobin concentration, which is below 6g/dl lead to poor pregnancy outcomes.

Intervention approaches that lead to reduction of anemia are needed. Anemia is a sign of unhealthy diet as well as bad nutrition, and if it is not reduced, it may lead to The wellbeing and standard of living of millions of women being negatively impacted, as well as the development and learning of their children (WHO,2021). Many studies have reported that gestational anemia is more prevalent in countries with low and middle-income status. (Daru et al., 2018).
Another study done in Ethiopia identified the risk factors of gestational anemia. The associated factors were found to be the intestinal parasitic diseases, mothers who do farming as their occupation, drinking of uncleaned water and low nutritional status (Berhe et al.,2019). Identification and understanding of the factors associated with anemia is very necessary for the establishment and strengthening of evidence-based approaches leading to reduction of its magnitude or prevalence. There are, however, very few studies that were carried out in Rwanda with the intention of identifying the risk factors for anemia, and they only included children and women who were of childbearing age. Such studies lacked both national and regional representations across the nation. In order to comprehend the variations in anemia among pregnant women in Kigali city according to their demographic, social economic, obstetric, and health condition, this study will be carried out. The main objective of this study was to assess prevalence and factors associated with anemia among pregnant women in Kigali city. It was guided by the following specific objectives:

i. To determine the prevalence of anemia among pregnant women who were obtaining antenatal care services in health centers in Kigali city during February and March of 2024.
ii. To determine factors associated with anemia among pregnant women who were obtaining antenatal care services at health centers in Kigali city during February and March of 2024.

ii. Theoretical Framework

One theory, which will be based on in this study, is social-ecological Model. The "socio-ecological model" (sometimes referred to as the Ecology of Human Development) was created by psychologist Urie Bronfenbrenner in the late 1970s to recognize the reality that a variety of social influences and nested environmental interactions have an impact on humans and have an impact on their behavior. It has since been adapted to explain other health phenomena. In this case, it can also be used for analysis of the associated factors for gestational anemia. According to earlier research, depending on their financial situation, manner of life, or health-seeking practices, some women may experience gestational anemia more frequently than others. This study will be done based on ecological model where **i**ntrapersonal factors such as knowledge, beliefs, skills, economic status and some attitudes which can lead to the influencing behavior of gestational anemia will be analyzed. Some studies have shown that among associated factors of gestational anemia there is low level of education and low economic status. The social ecological model has been adopted to identify The social demographic factors, social economic status and obstetric health factors associated to anemia in pregnancy.

iii. Conceptual Framework

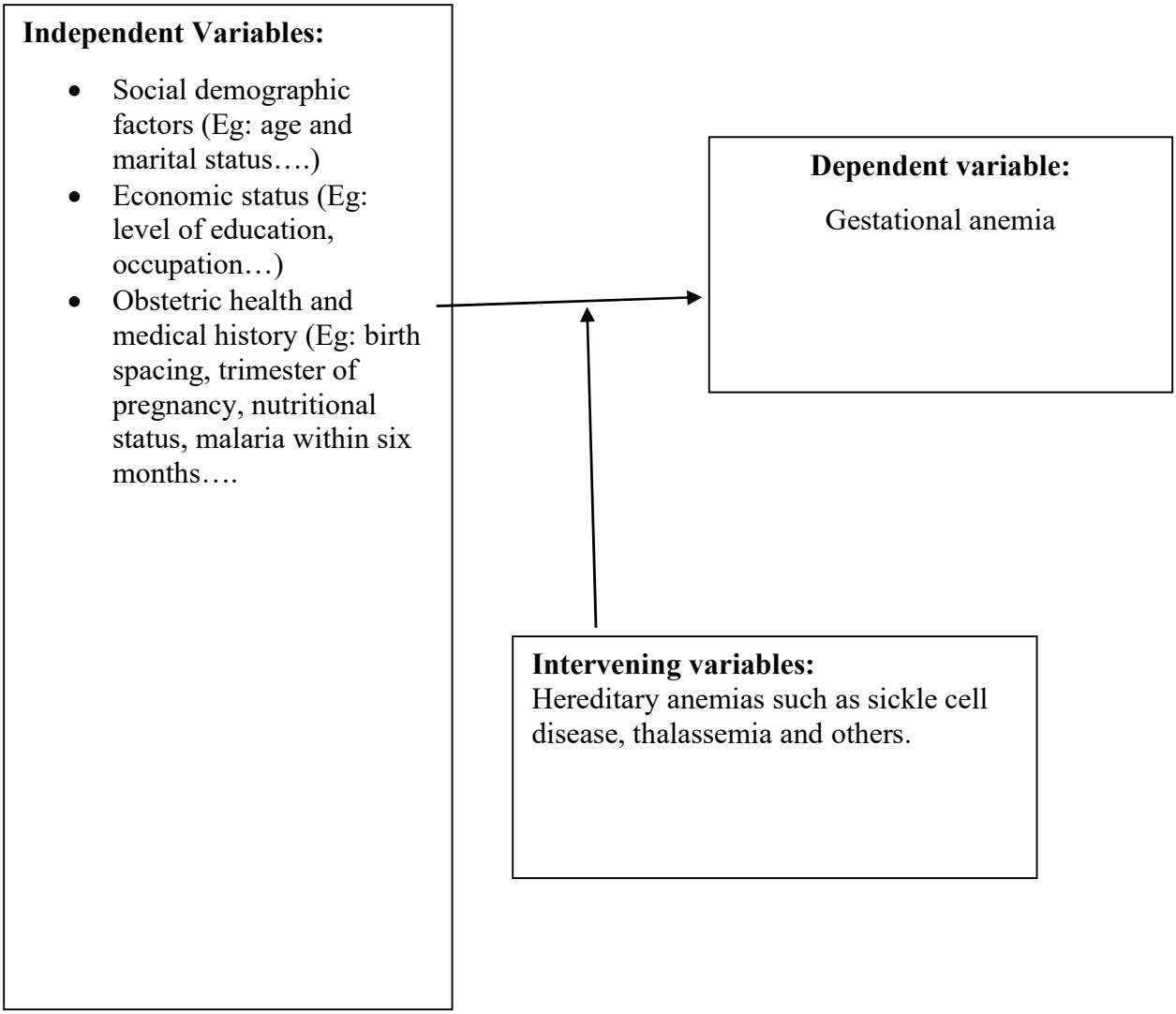

Figure 1:Conceptual Framework

Independent variables which will be analyzed are social demographic factors, social economic status, obstetric health and other health related information of participants, Social demographic and social economic status may also influence obstetric health and other health status of participant. Dependent variable will be gestational anemia. The hereditary anemia such as sickle cell and thalassemia may interfere and influence the results, thus being a confounder.

iv. Research Methodology

Research Design

This study was cross-sectional study design where information on the prevalence and factors associated with anemia in pregnancy were obtained among pregnant women who were attending antenatal care services at health centers in Kigali city.

Study Setting

The research was done at health centres in Kigali city which has three districts namely, Kicukiro, Nyarugenge and Gasabo. All those districs together have a total of thirty-seven (37) health centers. Two health centers with highest number of antenatal care attendees were selected in each of three districts which gave a total of six health centers. Those health centers were Muhima, Biryogo, Gatenga, Bethsaida, Remera and Gatsata.

Study Population

The study population was pregnant women who were obtaining antenatal care services in six health centers in Kigali city, namely, Muhima, Biryogo, Gatenga, Bethsaida, Remera and Gatsata during the month of February and March 2024.

Sample Design

Sample Size

The sample size was determined according to Cochran's formula that was discovered by William Gemmell Cochran.

$n=Z^2P(1-P)/d^2$ (Cochran,1977).

Where,

n = the sampling size,

Z= it is 1.96 for 95% Confidence Interval

P= previous prevalence from the same studies. It is 50% if there is no same study, which provided the prevalence. The prevalence of gestational anemia in Rwanda is known but no available study which previously revealed the prevalence of gestational anemia in Kigali city.

Thus P= 50% was used

d = precision (corresponding to effect size).

Thus, $n= 1.96^2\times0.50(1-0.50)/0.05^2= 385$

From the above calculations, the sample size is 385

This means that 385 pregnant women who was attending antenatal care clinics at health centers in Kigali city was studied to represent all pregnant women citizens of Kigali city.

Sampling Technique

In this study, two stage sampling method was used. Level one was purposive sampling which was used to select two health centers with highest number of ANC attendees from each of three districts of Kigali city. This gave a total of six health centers as representative of 37 health centers which are in Kigali city. Level two was systematic sampling which was applied to choose pregnant women who go to antenatal care appointments at the chosen health centers.

Data Collection Methods

Data Collection Instruments

Questionnaires was utilized to gather information about participant social demographic status, social economic status and obstetric health and medical history. Most guidance on questionnaire design was obtained from previously done studies (Lin et al., 2018, Kefiyalew et al.,2014). When constructing the questions, simple language as well as simple understood sequence was maintained as much as possible. Those questionnaires were designed in English and was translated into Kinyarwanda. The full blood test was done and the data of participants' hemoglobin concentration was recorded. When hemoglobin concentration falls between 10.0 and 10.9, 7.0 to 9.9, or below 7.0g/dl, respectively, anemia was further classified as mild, moderate, and severe for each participant according to WHO classification.

Data Collection Procedure

The first step was the application for approval from ethical review team of Mount Kenya University. After obtaining university approval, the second step was to approach and to request for approval from administration of Kigali city. Getting approval letter which was found from Kigali city was used and presented to Kicukiro, Gasabo and Nyarugenge districts to request for their approval as well. Those approvals were presented to selected health centers also to get their permission to start the study of their ANC attendees. This approval gave a permission to collect data. The following step was a pretest of questionnaire which was done on one health center and 15 respondents who had the will to participate filled the questionnaires after being informed about the objective, methods and techniques of the research and then signing informed consent and obtaining guidance on how to respond it. This pretesting of questionnaires was done aiming to measure if participants will accept to respond it and understand well the questions in it. After responding questionnaires, their blood samples were collected and tested for anemia. When the pretest was found to be successful, then the data collection at huge level was done where the questionnaires was filled following the same procedure as that of pretest. After filling questionnaires, the blood samples of participants were collected and tested for full blood count. From full blood count results, hemoglobin concentration of each participant was recorded for further interpretation and analysis.

v. Research Findings and Discussion

Demographic Characteristics Respondents

A total of 385 pregnant women attending antenatal care at health centers in Kigali city were included in the study with response rate of 100%. About 114(29.6) of the study participants were found in the age group of 20–24years. The majority, 334(86.8) of the respondents were married and most, 132(34.3%) of them were pregnant for the first time in their lifetime. Most of participants, 208(54.0) had got their first pregnancy within the age group of 20-24. Majority 164(42.6%)were in third trimester of pregnancy. About 193 (50.1) had interval of two years or more between current and pregnancy and previous birth. Many of participants 323(83.9) and 311(80.8) did not have malaria and intestinal parasites respectively within six months. About 307(79.7) were taking iron supplementation tablets. Out of all women who participated in research,

205(53.2%) had the habit of taking less than 3 meals per day. Majority of participant, 178(46.2) were self-employed 171(44.4) had only completed primary school education .

Table 1. Demographic Characteristics of Respondents

CATEGORY		N(%)
Age in years (age groups)		
>=35		69(17.9%)
15-19		12(3.1%)
20-24		114(29.6)
25-29		104(27.0%)
30-34		86(22.3%)
Marital status		
Never married		45(11.7%)
Married		334(86.8%)
Divorced		6(1.6%)
Age of first pregnancy in years (age groups)		
<=14		2(0.5%)
15-19		56(14.5%)
20-24		208(54.0%)
25-29		96(24.9%)
30-34		23(6.0%)
Number of pregnancies by now		
	1	132(34.3%)
	2	112(29.1%)
	3	66(17.1%)
	4	30(7.8%)
	5	26(6.8%)
	6	5(1.3%)
	7	8(2.1%)
	8	4(1.0%)
	21	2(0.5%)
Interval of current pregnancy And previous one		
Less than two years		62(16.1%)
N/a		130(33.8%)
Two years or more		193(50.1%)
Age of pregnancy in (trimester)		
First trimester		61(15.8%0
Second trimester		160(41.6%)
Third trimester		164(42.6%)

Iron supplementation intake	
No	78(20.3%)
Yes	307(79.7%)
Malaria within 6 months	
No	335(87.0%)
Yes	50(13.0%)
Intestinal parasites within 6 months	
No	311(80.8%)
Yes	74(19.2%)
Number of meals per day	
Less than three times	205(53.2%)
More than three times	15(3.9%)
Three times	165(42.9%)
Level of education	
No schooling completed	32(8.3%)
Primary	171(44.4%)
Secondary	158(41.0%)
University	24(6.2%)
Employment status	
Employed	62(16.1%)
Jobless	145(37.7%)
Self employed	178(46.2%)

Presentation Of Findings

Prevalence Of Pregnancy Anemia

The overall prevalence of pregnancy anemia among antenatal clinic attendees in health centers in Kigali city was 19%(95%CI (15.1.22.9)). Thus, it is a mild public health problem.

Table 2. Prevalence Of Anemia Among Antenatal Care Attendees at Health Centers in Kigali City

Variable	Category	N(%)
Anemia status	Anemic(Hg<11g/dl)	73(19.0%)
	Normal(Hg>=11g/dl)	312(81.0%)
	Total	385(100%)

Out of all anemic women, 68.5% had mild anemia, 28.8% had moderate anemia and 2.7% had severe anemia.

Table 3. Severity Of Anemia Among Anemic Antenatal Care Attendees at Health Centers In Kigali City, Rwanda

Categories within anemic participants	N(%)
Mild anemia(Hg <7g/dl)	50(68.5%)
Moderate anemia(7.0g/dl-9.9 g/dl)	21(28.8%)
Severe anemia(10.0g/dl-10.9g/dl)	2(2.7%)
Total	73(100%)

Factors Associated With Pregnancy Anemia

According to bivariate analysis result; Marital status, malaria within six months, number of meals taken per day, level of education, employment status, age of pregnant woman, age on first pregnancy and age of pregnancy (in trimester) were found to be significantly associated with anemia in pregnancy with P-value which is less than or equal to 0.05 at 95% confidence interval.

Table 4. Factors Associated with Pregnancy Anemia by Bivariate Analysis

Variable		Anemia status		Chi-square	P-value
		Normal	Anemic		
Age in years(age groups				11.263	0.024
15-19		10(3.2%)	2(2.7%)		
20-24		88(28.2%)	25(34.2%)		
25-29		78(25.0%)	26(35.6%)		
30-34		80(25.6%)	7(9.6%)		
>=35		56(17.9%)	13(17.8%)		
Marital status				99.433	0
Never married		41(13.1%)	46(63.0%)		
Married		265(84.9%)	18(24.7%)		
Divorced		6(1.9%)	9(12.3%)		
Number of pregnancies by now				10.879	0.209
	1	109(34.9%)	23(31.5%)		
	2	91(29.2%)	21(28.8%)		
	3	53(17.0%)	13(17.8%)		
	4	20(6.4%)	10(13.7)		
	5	23(7.4%)	3(4.1%)		
	6	5(1.6%)	0(0.0%)		

7	5(1.6%)	3(4.1%)		
8	4(1.3%)	0(0.0%)		
Age on first pregnancy in years(age groups)			18.249	0.001
<=14	2(6%)	0(0.0%)		
15_19	37(11.9%)	19(26.0%)		
20_24	169(54.2%)	39(53.4%)		
25_29	81(26.0%)	15(20.5%)		
30_34	23(7.4%)	0(0.0%)		
			18.607	0
Age of pregnancy(in trimester)				
Third trimester	60(19.2%)	32(43.3%)		
Second trimester	129(41.3%)	24(32.9%)		
First trimester	123(39.4)	17(23.3%)		
			2.716	0.257
Interval of current pregnancy and previous one				
Less than two years	54(17.3%)	8(11.0%)		
N/a(first pregnancy	107(34.3%)	23(31.5%)		
Two years or more	151(48.4%)	42(57.5%)		
			0.343	0.558
Iron supplementation				
No	65(20.8%)	13(17.8%)		
Yes	247(79.2%)	60(82.2%)		
			112.4	0
Malaria within 6 months				
Yes	13(4.2%)	43(58.9%)		
No	299(95.8%)	30(41.1%)		
			5.662	0.059
Number of meals per day				
Less than three times	149(47.8%)	46(63.0%)		
Three times	148(47.4%)	25(34.2%)		
More than three times	15(4.8%)	2(2.7%)		
			56.329	0
Level of education				
No schooling completed	36(11.5%)	28(38.4%)		
Primary	127(40.7%)	39(53.4%)		
Secondary	127(40.7%)	6(8.2%)		
University	22(7.1%)	0(0.0%)		
			56.511	0
Employment status				
Jobless	57(18.3%)	4(5.5%)		

Self employed	99(31.7%	58(79.5)
Employed	156(50.0%)	11(15.1%)

After doing bivariate analysis, variables which had P-value of 0.05 or less were entered into Binary logistic regression to assess associated factors of anemia in pregnancy when confounding was adjusted for. As a result, factors which was found to be positively associated with anemia in pregnancy were having malaria within six months (AOR= 18.179[16.334 - 508.982]), being self-employed (AOR= 14.634[3.567-60.043]), and being in third trimester of pregnancy (AOR= 11.941[CI 2.756-51.737]). Negatively associated factors were found to belong in age category of 20-24(AOR=0.035[0.006-0.201]) and in 30-34(AOR=0.030[0.004-0.255]).

Women who had malaria in past six months were18.179 times more likely to be anemic compared to others who didn't. Pregnant women who were self-employed were 14.634 times more likely to be anemic compared to those who were employed. Similarly, being in third trimester of pregnancy has positive association by being 11.941 times more likely to have anemia compared to others. Being in age group of 20-24 and 30-34 was found to be 0.035 and 0.030 respectively less likely to be anemic compared to those above 35 years old.

Table 5. Factors Associated with Pregnancy Anemia by Binomial Logistic Regression

		95% C.I.for COR		P-		95% C.I. for AOR		P-
	COR	**Lower**	**Upper**	**value**	**AOR**	**Lower**	**Upper**	**value**
Malaria in 6 months								
Yes	27.967	15.965	68.072	**.000**	18.179	16.334	508.982	**.000**
No	Ref				Ref			
Employment status								
Jobless	.995	.305	3.251	.994	.215	.029	1.604	.134
Self employed	8.309	4.159	16.598	**.000**	14.634	3.567	60.043	**.000**
Employed	Ref				Ref			
Marital status								
Never married	.748	.245	2.282	.610	5.035	.103	245.649	.415
Married	.045	.015	.141	**.000**	.188	.004	8.241	.386
Divorced	Ref				Ref			
Level of education								
No schooling completed	3.456	.789	12.567	.302	1.865	.320	125.700	.832

Primary	.862	.168	4.413	.858	.040	.000	9.401	.247
Secondary	.045	.015	.141	**.000**	.188	.004	8.241	.386
University	Ref				Ref			
Number of meals per day								
Less than three times	2.315	.510	10.502	.276	1.618	.019	138.905	.972
Three times	1.267	.273	5.880	.763	.932	.010	84.802	.976
More than three times	Ref				Ref			
Age group in years								
15-19	.862	.168	4.413	.858	.040	.000	9.401	.247
20-24	1.224	.578	2.589	.597	.035	.006	.201	**.000**
25-29	1.436	.679	3.037	.344	.345	.077	1.557	.166
30-34	.377	.141	1.005	.051	.030	.004	.255	**.001**
>=35	Ref				Ref			
Age on first pregnancy(age group in years)								
<=14	1.000	.000		1.000	17.465	.000		1.000
15-19	1.346	.690	2.627	.384	2.893	.678	12.654	.342
20-24	1.436	.679	3.037	.344	.345	.077	1.557	.166
25-29	.862	.168	4.413	.858	.040	.000	9.401	.247
30-34	Ref				Ref			
Age of pregnancy								
Third trimester	3.859	1.986	7.498	**.000**	11.941	2.756	51.737	**.001**
Second trimester	1.346	.690	2.627	.384	2.893	.720	11.616	.134
First trimester	Ref				Ref			

Discussion

This research was done with the aim of determining the prevalence and associated factors of anemia in ANC attendees at health centers in Kigali city. To diagnose anemia, WHO criteria was based on where those having hemoglobin less than 11g/dl were considered to be anemic. According to findings from this study the prevalence of anemia among studied pregnant women attending ANC was found to be 19% (Table 4.2). This prevalence of this study is lower compared to the one reported by WHO in 2019 where the global prevalence was reported to be 36.5% (WHO,2019), meta-analysis study which revealed the global prevalence of 36.8% in 2022 (Mohammadmahdi et al., 2022). The meta- analysis study done in 2022 revealed that global prevalence of anemia in pregnancy was 36.8% and 41.7% in Africa (Mohammadmahdi et al., 2022) which is higher than 19% revealed by this study. It was also found to be lower compared to another study done in Sub-Saharan Africa which revealed the prevalence of 35.6%(Fite et al.,2021), another study done in East Africa which found 41.81% and 23.36% in east Africa and Rwanda respectively (Liyew et al.,2021) and also with 23.36% and 23.5% prevalence in Rwanda as reported by World bank and Rwanda demographic and health survey respectively. The prevalence of 19% which was revealed by this study is lower than those revealed by those comparative studies which may have caused by different methodology such as research designs. This discrepancy may also have resulted from improvement of health services and interventions towards better antenatal health.

Factors positively associated with pregnancy anemia was found to be in third trimester, being self-employed and having malaria in past six months. Being in age group of 20 to 24 and 30 to 34 was found to be negatively associated with pregnancy anemia (Table 4.5). The high prevalence of pregnancy anemia was found to be increased in third trimester of pregnancy by being 11.941 times more likely to be anemic than those in first pregnancy. This finding is consistent with a study conducted in Nigeria (Ugwu & Uneke, 2020) and another which was done in East Africa (Siteti et al.,2014). However, these findings are different from the one done in Tanzania which found that being in first trimester of pregnancy increases the likelihood of being anemic during pregnancy (Sunguya et al.,2021) and another one done in Rwanda which revealed second trimester to have positive association with pregnancy anemia (Nuwabaine et al., 2022).
Being self-employed was shown to increase the prevalence of anemia in pregnancy. Self-employed women were 14.634 times more likely to have anemia in pregnancy compared to those who are employed. This one disagree with the research done in Rwanda which found pregnancy anemia to be increased by being jobless (Nuwabaine et al., 2022).
Having malaria attack in last six months was also found to increase the prevalence of anemia in pregnancy where women who had it were 18.179 times more likely to have anemia compared to their counterparts. This is consistent with the study done Felegehiwot Referral Hospital, Bahirdar city of Ethiopia (Yesuf & Agegniche, 2021).
Belonging to 20-24 and 30-34 age group was also associated negatively with pregnancy anemia. Women within those age group were found to be less likely anemic than others during pregnancy. This is consistent with research done in Rwanda (Nuwabaine et al., 2022) and other in East Africa which found that anemia in pregnancy to increase with younger age 15-19 (Liyew et al.,2021).

vi. Conclusion and recommendation

According to previous studies done in Rwanda and the report from 2020 demographic and health survey which found the prevalence of 24.6%, pregnancy anemia is being low. Its severity is reducing as it was found by this study to be mild public health problem.

Recommendations

Although pregnancy was found to be a mild public health problem, 19% prevalence is still a big problem. Health interventions and approaches toward better pregnancy health must be improved. Concerned stakeholders (health professionals working at hospitals and health centers found in the study area) should work on the prevention of malarial attacks, through giving information about prevention methods and provision of an insecticide-treated bed net, particularly for pregnant women and children. Concerned bodies (Government and other stakeholders) should work in collaboration to teach women how to take care of themselves during pregnancy.

vii.References

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