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Assessment of Anemia Status Among Pregnant Women Attending Antenatal Care in Medical Facilities in Port Harcourt, Rivers State

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Abstract

This study assessed the anemia status of pregnant women attending antenatal care in medical facilities in Port Harcourt, Rivers State, Nigeria. To attain the above, descriptive cross-sectional study was adopted. Convenient sampling technique was adopted to conveniently select the sample size of 340 pregnant women. The research instrument was prepared and distributed to sampled respondents on health status of pregnant women attending antenatal care with the aid of research assistant. Data obtained were subjected to statistical analysis at 5% level of significance, using relevant statistical tool. Result obtained showed that low monthly family income, educational status, use of iron tablet during pregnancy, and malaria infection were found to be predictors for anemia in pregnancy in our study. There is a high level of ignorance and cultural beliefs about anemia in pregnancy, as well as its prevention and treatment in our environment. Almost one-fourth of pregnant women had anemia in this study. Therefore, the study recommends that further research should be conducted on assessing the factors affecting the prevalence of anemia and pregnancy related illness, and lastly, further study should be conducted to investigate why prevalence of HIV is greater than expected among pregnant women in this area.

Keywords: *Health status, pregnant women, antenatal care, anemia.*

Introduction

It is an established fact that pregnancy stage in every woman's life is a joyful moment. Amidst this joyous anticipated moment, sometimes it can be a time of fear of suffering and death especially women a woman begins pregnancy with low or absent stores of iron due to heavy menstrual period, a previous pregnancy, poor iron intake, substance abuse and increase fetal demands of iron leads to anemia (Abudu, 2011). It is pertinent to note that iron is an essential component of hemoglobin, the oxygen-carrying pigment in the blood. Iron is normally obtained through the food and by recycling iron from old red blood cells and in the absence of the required iron blood concentrations, blood cannot carry oxygen effectively and hence normal

functioning of every cell in the body will be affected. It is estimated that a median amount of 840-1210 mg of iron needs to be absorbed over the course of the pregnancy (Adinma e*t al.,* 2012). Approximately 90% of cases of anemia in pregnancy are of the iron deficiency type (Agan *et al.,* 2010).

The World Health Organization, WHO (2017) defined Anemia as a haematologic condition and a sign of an underlying disorder characterized by a reduction in the number of red blood cells, or a reduction in the concentration of haemoglobin in the blood stream to a level below 10.5 g/dL. Anemia has also been defined as a reduction below normal in the number of red corpuscles per cubic millimeter, the quantity of haemoglobin and the volume of packed red cells per 100 ml of blood as a result of impaired erythrocyte production or increased erythrocyte loss which leads to impaired tissue perfusion (Ojo and Briggs, 2019). Anemia in pregnant women has multiple adverse outcomes for both mothers and infants, including postpartum hemorrhage, cardiac failure, less exercise tolerability, thromboembolic problems, spontaneous abortion, puerperal infection, placenta previa, maternal mortality, preterm delivery, low birth weight, and prenatal death.

Anemia is defined as a reduction in the red cell mass in the blood resulting in a drop in oxygen supply to meet the metabolic needs of the body (Omigbodun, 2014). Anemia in pregnancy continues to be a global problem associated with increased maternal morbidity and mortality particularly in developing countries such as Nigeria (Adinma *et al.,* 2012). It is a disorder of great public health importance in poor countries especially in Sub-Saharan Africa. Pregnant women and young children especially preschool age group are the most vulnerable (Aimakhu and Olayemi, 2013). Anemia affects over half of the pregnant women in developing countries. Estimates in developing countries including Nigeria put the prevalence at 60.0% in pregnant woman and about 7.0% are said to be severely anemia (Aluka *et al.,* 2011). Some 20% of maternal death in Africa and 11% in Nigeria have been attributed to anemia. Anaemia has social and demographic implications. Anaemia in pregnancy is a very common medical disorder, with significant implications for both mother and child (Agan *et al.,* 2010). Its primary cause is iron deficiency, but also occurs due to other causes like parasitic infection, malaria in endemic tropical countries of Africa, nutritional deficiencies and hemoglobinopathies and recently human immunodeficiency virus infection (Bukar *et al.,* 2019).

The causes of anemia according to WHO includes the following; pregnancy and childbirth, repeated infections (malaria, hookworm), poor feeding due to socioeconomic factors (poverty and low educational status) and haematologic conditions such as impaired erythrocyte production or increased erythrocyte loss (WHO, 2015). Malaria in pregnancy is one of the predominant causes of anemia in pregnancy. Malaria accounted for more than 56% anemic cases in pregnancy in Nigeria. Globally, anemia affects 1.62 billion people (24.8%), among which 56 million (41.8%) are pregnant women. It is a major public health problem particularly among poorer segments of the population in developing countries where 95% of the world anemic pregnant women are residing (Hassan *et al.,* 2014). This study therefore is aimed at examining the prevalence of anemia among pregnant women in Port Harcourt metropolis.

Materials and methods

Study Design

The research design for this study was descriptive cross-sectional study with a target population of pregnant women attending medical facilities in Port Harcourt Local Government Area of Rivers State. Descriptive cross sectional research design involved collecting data from respondents to answer questions concerning the current status of the subject of the study and also involves a one-time observation of variables.

Study Area

The study was conducted in two medical facilities located in Port Harcourt Local Government Area, Rivers State, namely; Rivers State University Teaching Hospital (RSUTH), located at No. 84 Forces Avenue, Orogbum, Port Harcourt and Princess Hospital located at No. 46 Trans-Amadi Industrial Layout Road, Port Harcourt.

Sample Size Determination and Sampling Technique

The sampling technique the study adopted is convenient sampling technique. Here the samples were selected based on the availability and accessibility. Based on the above, the study conveniently selected respondents from the entire population based on their availability and accessibility. The researcher conveniently selected 340 pregnant women from the two selected health care facilities in Port Harcourt, Rivers State attending antenatal at these primary health care facilities. Therefore, the sample size of this study is 340 respondents.

Table 1.0 Distribution of Respondents

S/N	Name of Health Facility	No. of Pregnant Women
1.	Rivers State University Teaching Hospital	240
2	Princess Hospital	100
	TOTAL	**340**

Data collection and Quality control

A pre-tested and interviewer-administered questionnaire was used to collect data. Before data collection, 5% of the sample size was pre-tested to check clarity, and local understanding of the questions included in the data collection tool. Two laboratory technologists from Rivers State College of Health Science and Technology and 4 midwifery nurses from the two sampled hospitals participated in data collection. Two public health officers and a senior laboratory technologist supervised the data collection process. Data collectors and supervisors were trained for 2 days by the researcher with aid of the supervisor. Every day, the filled questionnaires were reviewed and checked for completeness by the supervisors and principal investigators, and the necessary feedback was offered to data the collectors in a next morning before the actual procedure.

The dietary diversity (DD) was assessed using 24 hours dietary recall method. The level of dietary diversity score (DDS) was computed out of 9, and was classified as high (DDS⩾ 6), optimal (DDS = 4 or 5) and low (DDS ⩽ 3) according to the recommendation of the Food and Agriculture Organization of the United Nations (FAO, 2010).

Approximately a drop of capillary blood was collected using capillary tubes. For each participant, a blood sample was obtained by middle finger-prick of non-dominant hand after disinfection with alcohol, drying of the skin, and removal of the first drop of the blood. Hemoglobin analyses were done using an automated hematology machine, CELL DYN 1800 (Abbott Laboratories Diagnostics Division, USA). Regarding the blood film test for malaria, before staining the blood films, the thin blood films were fixed in methanol for 30 seconds. Then smears were stained with 10% Giemsa solution for 10 minutes. The staining techniques and blood film examination were conducted employing WHO guidelines (WHO, 2015). Quality control of collected blood samples was done according to WHO standard. Microscopic examination of thick films, using high power magnification for the presence of malaria parasites and thin films, for identification of plasmodium species was carried out under a 100 × oil immersion objective.

Stool samples were collected by using a clean and labeled container from the study participants. A portion of the stool was processed with direct microscopic technique to detect intestinal parasites immediately. During the examination, a formal ether concentration technique was applied. The samples were examined microscopically first with 10× and then with 40× objective for detection of helminths eggs, larvae, and cysts of protozoan parasites. Quality control of the collected stool samples was done according to the standards (WHO, 2007).

The human immunodeficiency virus (HIV) status of the respondents was taken from clients' records and history of chronic illness was assessed by asking respondents if they are on medication, advised to use preventive actions, had follow up visits for such diseases.

Data Analysis

The data was reviewed and organized after its collection; then coded and entered into Excel 2016 version, and the analysis was done using SPSS version 20 Software. Hemoglobin level was adjusted for altitude using the recommendation by WHO. WHO hemoglobin levels were used as cut-off values to classify anemia. Variables in the bi-variable model with a P-value less than 0.25 were taken to multivariable logistic regression to decrease the effect of confounding factors. Statistical significance was declared with $P < .05$. Finally, the result was presented using tables and charts.

Ethical consideration

Ethical clearance was obtained from the Institutional Review Board (IRB) of Rivers State College of Health Science and Technology. Before administration of questionnaires, and collection of stool and blood samples, consent was obtained from each study participants. Participants were informed about the general purpose, possible risks, and benefits of the study. To ensure confidentiality, participants' data were linked to a code number. Test results were told to them, and women who were not on iron with folic acid were supplemented with iron with folic acid coordinating with the hospital staff.

Results

The result obtained from the analysis conducted on the posed questions are presented under the following subheading using tables and charts for the purpose of clarity and simplicity.

Socio-demographic and economic information of pregnant women

Out of 340 pregnant women recruited for the study, all of them (100%) volunteered to participate. The mean age (±standard deviation) of the respondents was 26.00 (±4.6) years, and slightly more than half of the respondents 194 (57.1%) were in the age interval of 25 to 34 years. Regarding gestational age, slightly greater than two-thirds (70.3%) were in the second trimester. Pertaining to educational status, 71 (20.9%) were not attended formal education. Out of all the study participants, 144 (42.4%), 156 (45.9%) and 193 (56.8%) were housewives, similar in ethnicity, and protestant in religion respectively. Almost all of the respondents, 334 (98.2%) were married and the majority of them, 245 (72.1%) have a family size of less than 5 in number. Regarding family monthly income, 159 (46.8%) respondents reported an average monthly family income of >N50,000 or ≤ 60,000 as shown in Table 2.0.

Table 2.0 Socio-demographic and economic information of pregnant women

Variable (n = 340)	Category	Frequency	Percent (%)
Age in years	15-24 years	125	36.8
	25-34 years	194	57.1
	35-49 years	21	6.2
Gestational age	First trimester	30	8.8
	Second trimester	239	70.3
	Third trimester	71	20.9
Educational Status	Not attended formal education	71	20.9
	Elementary	129	37.9
	Secondary school and above	140	41.2
Occupation	Maid	25	7.3
	Merchant	92	27.1
	House wife	144	42.4
	Government Employee	79	23.2
Religion	Protestant	193	56.8
	Orthodox	113	33.2
	Catholic	10	2.9

	Muslim	24	7.1
Marital Status	Married	334	98.2
	Single	6	1.8
Family size	Family size <5	245	72.1
	Family size ⩾5	95	27.9
Monthly family income	<50,000	159	46.8
	> 50,000	181	53.2

Pregnancy and health service-related factors of pregnant women

About two-thirds of the respondents, 224 (65.9%) were of gravida ⩽2, and 119 (35%) had visited ANC clinic 2 times. From those who are eligible for iron, 116 (37.4%) pregnant women reported that they were not taking iron tablets, and the rest do. Only 44 (12.9%) had taken de-worming drugs during this pregnancy. Eight in ten women, 267 (78.5%), had used any kind of modern contraceptive method prior to this pregnancy. One in ten women, 37 (10.9%), reported heavy menstrual flow. Ninety-eight (28.8%) respondents had less than 2 years interval between previous and current pregnancy. More than two-thirds of women, 239 (70.3%) were in their second trimesters of pregnancy. Of those who had given birth previously, 16 (4.7%) had reported a history of heavy blood loss in last delivery as shown in Table 3.0.

Table 3.0 Pregnancy and health service-related factors of pregnant women in Rivers State University Hospital and Princess Hospital

Variable (n = 340)	**Category**	**Frequency**	**Percent (%)**
Gravidity	Gravida 1 & 2	224	65.9
	Gravida 3 & 4	99	29.1
	Gravida ⩾5	17	5.0
ANC visit	Once	89	26.2
	2 times	119	35.0
	3 times	77	22.6
	⩾ 4 times	55	16.2
Iron tablets taken	Yes	194	62.6
	No	116	37.4

Variable (n = 340)	Category	Frequency	Percent (%)
De-wormed during this pregnancy	Yes	44	12.9
	No	296	87.1
Taken contraceptive	Yes	267	78.5
	No	73	21.5
History of heavy menstrual cycle (⩾5 days)	Yes	37	10.9
	No	303	89.1
Birth interval	Primi-gravida	77	22.6
	<2 years	98	28.8
	⩾2 years	165	48.5
Trimester of pregnancy	First trimester	30	8.8
	Second trimester	239	70.3
	Third trimester	71	20.9
History of heavy blood loss in last delivery	Yes	16	4.7
	No	324	95.3

Dietary diversity, medical illness, and related factors of pregnant women

Regarding dietary diversity, one in four women, 84 (24.7%) were grouped under low score (DD ⩽ 3). Concerning coffee drinking habits, about half, 155 (45.6%) reported they drank coffee 1 to 6 cups of coffee per week during or immediately after a meal.

Of 340 pregnant women, 51 (15%) were identified from their record review that they were infected with HIV. Nine (2.65%), and 22 (6.5%) of pregnant women reported that they had diagnosed chronic disease, and a history of surgery respectively.

Out of all pregnant women who were tested, 24 (7.1%) confirmed that they were infected with Plasmodium vivax (*P. vivax*), and 9 (2.65%) were infected with intestine parasites. Out of the 9 intestinal parasites infested pregnant women; 5 (1.47%), 2 (0.59%), and 2 (0.57%) were infected with Ascaris lumbricoides, Entamoeba histolytica, and Giardia lamblia, respectively as shown in Table 4.0.

Table 4.0 Dietary diversity, medical illness, and related factors of pregnant women

Variable (n = 340)	Category	Frequency	Percent (%)
DD	Low	84	24.7
	Medium (Optimal)	134	39.4
	High	122	35.9
Coffee consumption	No cup of coffee	64	18.8
	1-6 cups of coffee per week	155	45.6
	1-2 cups of coffee per day	102	30.0
	⩾3 cups of coffee per day	19	5.6
HIV status	Sero-positive	51	15.0
	Sero-negative	289	85.0
P. vivax infected	Yes	24	7.1
	No	316	92.9
History of chronic diseases	Yes	9	2.6
	No	331	97.4
Intestine parasite infection	Yes	9	2.6
	No	331	97.4
History of surgery	Yes	22	6.5
	No	318	93.5

Key: DD = dietary diversity score; HIV = human immuno-deficiency virus; n = sample size; P. vivax, = plasmodium vivax.

Hemoglobin concentration and prevalence of anemia

The mean hemoglobin concentration (±SD) was 12.17 (±1.57) g/dl with 95% confidence interval (CI) of 11.99 to 12.34 g/dl. The concentrations for the first, second, and third trimesters were 11.86 (±1.72), 12.34 (±1.52), and 11.72 (±1.61) g/dl, respectively. The overall prevalence of anemia was 24.1% (95% CI: 19.55-28.69). Out of all respondents, the prevalence of mild, moderate, and severe anemia was 51 (15.0%), 31 (9.1%), and 0%, respectively (Figure 1). Of anemic pregnant women, 10 (2.94%), 46 (13.53%), and 26 (7.65%) were in first, second, and third trimesters of pregnancy.

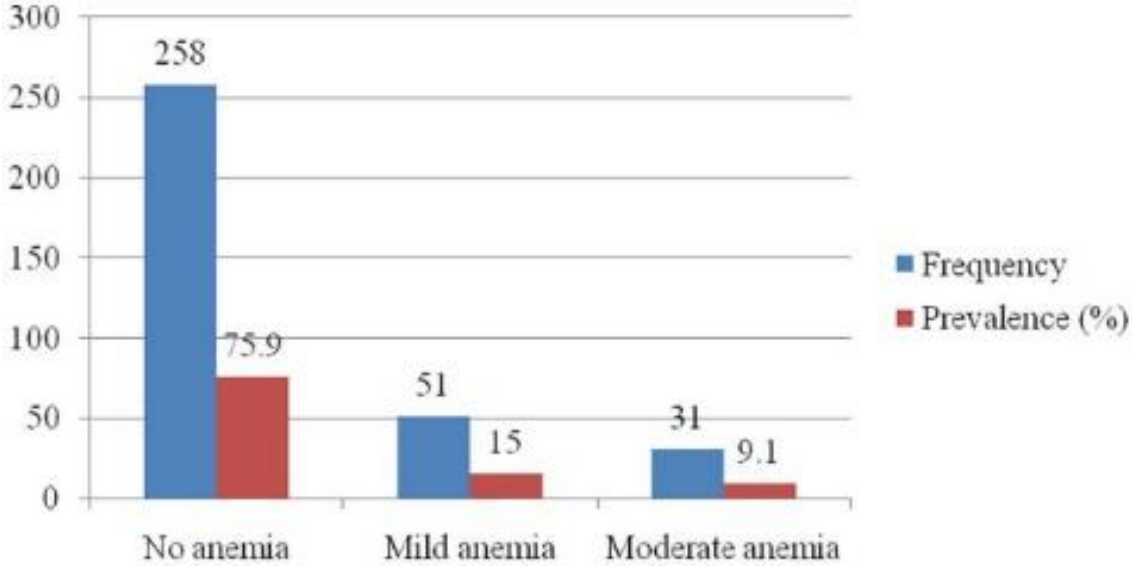

Figure 1.0 Anemia status and severity among pregnant women attending ANC

Factors associated with the prevalence of anemia among pregnant women

Those variables that had a P-value less than .25 on bi-variable logistic regression analysis were considered for multivariable logistic regression analysis to identify the independent predictors of anemia among pregnant women. Variables that qualified for multivariate regression analysis were; average monthly family income, gravidity, educational status of respondents, ANC visits, coffee consumption habit immediately after a meal, history of diagnosed chronic disease, iron tablet consumed during this pregnancy, malaria-infected, de-worming drug has been taken during this pregnancy, contraceptive has been taken prior to this pregnancy, DDS, HIV zero-status of respondent and history of the heavy cycle prior to this pregnancy.

The multivariable logistic regression analysis outputs confirmed that average monthly family income (P = .016), not attended formal education (P = .008), not consumed iron tablets during pregnancy (P = .006), and malaria infection (P = .0001) were independent predictors of anemia.

This study revealed that as the household income increased, the chances of being not anemic are also increased. Pregnant women with household monthly income less than N50,000 (Adjusted odds ratio (AOR) = 2.08; 95% CI: 1.15, 3.76) were 2 times more likely to be anemic as compared to those who had a monthly income of greater than N50,000. Regarding the

educational study, not attended formal education (AOR = 3.86; 95% CI: 1.42, 10.54) were 3.8 times more anemic as compared to respondents who were educated high school and above. Compared to their counterparts, the odds of anemia were higher among pregnant women who not using iron tablets during pregnancy (AOR = 2.64; 95% CI: 1.33, 5.27). Furthermore, this study reported also that those pregnant women who had been infected with malaria were 7 times more likely to be anemic (AOR = 7.58; 95% CI: 3.11, 18.47). But the rest of the observed predictors were not significantly associated with the anemia in the multivariate regression analysis as shown in Table 5.0.

Table 5.0 A bivariate and multivariate binary regression analysis output of the factors associated with anemia among pregnant women attending in antenatal care

Variable (n = 340)	Category	Anemic status		COR (95% CI)	AOR (95% CI)	*P*-value
		No (%)	Yes (%)			
Monthly family income	< N50,000	109 (42.2)	50 (61)	2.14 (1.29-3.55)	2.08 (1.15-3.76)	.016*
	> N50,000	149 (57.8)	32 (39)	1	1	
Gravidity	Gravida 1 and 2	174 (67.4)	50 (61)	1	1	
	Gravida 3 and 4	74 (28.7)	25 (30.5)	1.18 (.68-2.04)	1.01 (.49-2.06)	.982
	Gravida 5 and above	10 (3.9)	7 (8.5)	2.44 (.88-6.73)	1.29 (.35-4.74)	.703
Educational status	Not attended formal education	43 (16.7)	28 (34.1)	3.91 (1.99-7.65)	3.86 (1.42-10.54)	.008*
	Elementary school	95 (36.8)	34 (41.5)	2.15 (1.16-3.97)	1.54 (.66-3.61)	.324
	Secondary school and above	120 (46.5)	20 (24.4)	1	1	
ANC visits	Once	56 (21.7)	33 (40.2)	3.46 (1.46-8.22)	2.11 (.72-6.18)	.173
	Two times	93 (36)	26 (31.7)	1.64 (.69-3.91)	1.44 (.53-3.93)	.473

Variable (n = 340)	Category	Anemic status		COR (95% CI)	AOR (95% CI)	*P*-value
		No (%)	Yes (%)			
Coffee consumption habit immediately after meal	Three times	62 (24)	15 (18.3)	1.42 (.56-3.63)	1.37 (.46-4.09)	.578
	Four or more times	47 (18.3)	8 (9.8)	1	1	
	No cup of Coffee	51 (19.7)	13 (15.8)	1	1	
	1-6 cups of coffee per week	121 (47)	34 (41.5)	1.10 (.54-2.26)	1.13 (.48-2.62)	.783
	1-2 cups of coffee	75 (29)	27 (33)	1.41 (.67-2.99)	1.60 (.67-3.85)	.294
	⩾ 3 cups of Coffee	11 (4.3)	8 (9.7)	2.85 (.95-8.53)	1.88 (.46-7.64)	.378
Diagnosed chronic disease	Yes	5 (2)	4 (4.9)	2.59 (.68-9.90)	3.41 (.59-19.69)	.170
	No	253 (98)	78 (95.1)	1	1	
Used iron tablet	Yes	185 (71.7)	35 (42.7)	1	1	
	No	73 (29.3)	47 (57.3)	3.40 (2.03-5.69)	2.64 (1.33-5.27)	.006*
P. vivax infected	Yes	8 (3.1)	16 (19.5)	7.58 (3.11-18.47)	7.58 (3.11-18.47)	.0001*
	No	250 (96.9)	66 (80.5)	1	1	
De-wormed	Yes	37 (14.3)	7 (8.5)	1	1	
	No	221(85.7)	75 (91.5)	1.79 (.77-4.19)	1.55 (.56-4.26)	.395

Variable (n = 340)	Category	Anemic status		COR (95% CI)	AOR (95% CI)	*P*-value
		No (%)	Yes (%)			
Used contraceptive	Yes	198 (76.7)	69 (84.2)	1.61 (.83-3.11)	1.55 (.56-4.26)	.395
	No	60 (23.3)	13 (15.8)	1	1	
DDS	Low	55 (21.3)	29 (35.4)	3.01 (1.56-5.78)	1.24 (.46-3.29)	.673
	Medium	89 (34.5)	33 (40.2)	2.11 (1.14-3.93)	1.70 (.72-4.03)	.227
	High	114 (44.2)	20 (24.4)	1	1	
HIV sero-status	Positive	31 (12)	20 (24.4)	2.36 (1.26-4.43)	2.20 (.93-5.20)	.072
	Negative	227 (88)	62 (75.6)	1	1	
History of heavy menstrual cycle	Yes	24 (9.3)	13 (15.8)	1.84 (.89-3.80)	2.05 (.85-4.92)	.108
	No	234 (90.7)	69 (84.2)	1	1	

Abbreviations: AOR = Adjusted Odds Ratio; CI = Confidence Interval; COR = Crude Odds Ratio; DD.

Discussion

It was realized that in the present study, the overall prevalence of anemia among pregnant women was 24.1% (95% CI: 19.55%-28.69%). According to the WHO classification of the public health importance of anemia, it is a moderate public health problem. The findings of this study were in line with the WHO Africa report of 2015 which states 23% of pregnant women in Nigeria were anemic. This study was also comparable with the studies done in Southeast Nigeria 27.9%, South-South 19.7%, North-East Nigeria 24.2%, South-West 21.6%, Southern Nigeria 23.2%, and Enugu Specialized Hospital was 21.3%. The finding was higher than the studies done in Enugu General Hospital of Nigeria, 7.9% and Saint Paul's Hospital and Maternity, 11.6%. But it is lower than the studies done in Abuja, with 36.6%, Cross Rivers State with 39.94%, Imo State with 31.5%, Ekiti with 49.3%, Ondo State with 53.9%. The

Lower prevalence of anemia among pregnant women in this study is likely related to access to information about adequate nutrition during pregnancy, socio-economic factors, and accessibility of health care services as it was conducted in an urban area. This discrepancy could also result from the geographical variation of factors and differences in the study period and study design.

This study has assessed socio-economic variables associated with anemia but only family income (AOR = 2.08; CI: 1.15-3.76) and not attended formal education (AOR = 3.86; CI: 1.42-10.54) had shown statistically significant association with anemia which indicates the higher prevalence of anemia in pregnant women with low monthly family income and not attended formal education. Regarding family income, the current study showed increased odds of anemia was observed in pregnant women who have a lower monthly income. This finding is consistent with studies done in Wolaita Sodo, SNNPR, Ethiopia and Arba Minch town, SNNPR, Ethiopia by Mohammed *et al.* (2022). This implies that empowering women in income and decision-making power are essential strategies to decrease anemia risk and betterment of health status of pregnant women and the community as a whole.

The current finding showed that malaria infection was significantly associated to anemia. Other studies which were done in Azezo health center, Amhara National Regional State, Ethiopia and Illu abbabori, Oromia National Regional State, Ethiopia (Mohammed *et al.,* 2022) also support the current finding. This is due to the fact that failure to seek health care early, early diagnosis and treatment of malaria, and malaria infection itself might lead to increased red blood cell destruction and consequently, end up in anemia. Major transmission of malaria occurs in Ethiopia from September to December, following the major rains, and the data collection was done during this period (October 1-December 15) by laboratory-confirmed malaria test. Therefore, this might contribute to the association of malaria with anemia.

In the present study, pregnant women who did not take iron supplementation were at a 2.6 times higher risk to be anemic as compared to pregnant women who took their iron supplementation (AOR = 2.64; 95% CI: 1.33-5.27). This result was consistent with other studies conducted in Arba Minch town, SNNPR, Ethiopia, Saint Paul's Hospital, Addis Ababa, North West Tigrai of Ethiopia, Azezo health center, Amhara National Regional State, Ethiopia, and Sidama National Regional State, Ethiopia. The reason for this might be taking iron tablets can help pregnant women to increase their hemoglobin level, and as result helped them to prevent anemia.

Conclusion

Anaemia in pregnancy is a very common medical disorder, with significant implications for both mother and child. Its primary cause is iron deficiency, but also occurs due to other causes like parasitic infection, malaria in endemic tropical countries of Africa, nutritional deficiencies and hemoglobinopathies and recently human immunodeficiency virus infection. There is a high level of ignorance and cultural beliefs about anemia in pregnancy, as well as its prevention and treatment in our environment. Almost one-fourth of pregnant women had anemia in this study. Anemia had moderate public health significance in the study area. Low monthly family income, educational status, use of iron tablet during pregnancy, and malaria infection were found to be predictors for anemia in pregnancy in our study.

Based on the theoretical and empirical observations, it can be reasonably concluded that different factors were studied to identify the determinants of anemia among pregnant women. Housewife occupation, prolonged menstrual period and malnutrition were the determinants of anemia among pregnant women. Therefore, pregnant women with prolonged previous menstrual bleeding needs to take iron-rich food and iron supplementation. Anemia prevention and control strategy in pregnant women is required to include adequate dietary intake for the prevention of anemia. Strengthening nutritional counselling for pregnant women during antenatal care is also required by health care provider.

Recommendation

Further research should be conducted on assessing the factors affecting the prevalence of anemia and pregnancy related illness, and lastly, further study should be conducted to investigate why prevalence of HIV is greater than expected among pregnant women in this area.

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