



Prevalence of Anemia and Associated Factors Among Women of Reproductive Age Attending ART in Addis Ababa, Ethiopia

Ahmed SM*

Menelik II Medical and Health Sciences, Addis Ababa, Ethiopia

Abstract

Background: Anemia in women of reproductive age caused by Human Immunodeficiency Virus (HIV) is a double burden and has negative consequences on newborns. Anemia is a public health problem, and there is little insight into the factors associated with anemia among women of reproductive age who live with HIV in developing countries. Hence, this study aimed to assess the prevalence of anemia and associated factors among women of reproductive age Attending Assisted Therapy (ART) clinics in selected public hospitals in Addis Ababa, Ethiopia.

Materials and Methods: A cross-sectional study was conducted from June 7th, 2021, to August 23rd, 2021, in six public hospitals in Addis Ababa. A simple random sampling technique was used to select 239 study participants. The data were collected using a checklist and interview. The data were subsequently entered into the EPI-data manager database and exported to SPSS 20 for analysis. Bivariate and multivariate logistic regression analyses were also performed. The Odds Ratio (OR) with 95% CI was retrieved, and a p value <0.05 was considered to indicate statistical significance.

Results: The overall incidence of anemia was 23% [95% CI (18.5-28.4)], which was significantly associated with a current CD4 count <500 cells/mm³ (AOR=1.5, 95% CI=0.05, 0.44); middle age (AOR=6.73, 95% CI=1.86-24.44); duration of ART <5 years (AOR=0.05, 95% CI=0.0-0.38); opportunistic infection (AOR=0.11, 95% CI=0.02-0.52); marital status (AOR=0.007, 95% CI=0.001-0.06); and occupation (no job) status (AOR=10.85, 95% CI=2.74-42.9).

Conclusion: The overall incidence of anemia in the study area was moderate. Age, marital status, occupation, current CD4 count, opportunistic infection status, and duration of ART were factors significantly associated with anemia. Thus, early diagnosis and treatment of anemia and coinfections are essential.

Keywords: Anemia; Women; ART; Ethiopia

Abbreviations

BMI: Body Mass Index; FMOH: Federal Ministry of Health; HAART: Highly Active Antiretroviral Therapy; IDA: Iron Deficiency Anemia; PLHIV: People are Living with HIV

Introduction

Anemia is a multifactorial disease that can occur as a result of nutritional deficiency, heavy blood loss, multiple pregnancies, postpartum hemorrhage, gastric ulcers, acute and chronic infections such as malaria, HIV, and parasitic infections, HAART drugs and haemoglobinopathies [1-3]. It is more prevalent in children, adolescents, pregnant women, and other women of reproductive age [4]. Women of reproductive age are at increased risk for iron deficiency anemia because of blood loss during their monthly periods, pregnancy, and delivery, and this condition occurs in 1 in 5 women (15-49) [5]. Based on its public health status, anemia can be categorized as severe for greater than 40%, moderate for 20% to 39%, or mild for 5% to 19% of the public health problems [6].

Globally, approximately 2 billion people are estimated to suffer from anemia, approximately 50% of which is caused by Iron Deficiency (IDA) [7,8]. According to the WHO, worldwide anemia is an important public health concern, estimated at 24.8% [8]. Globally, in 2016, severe public health problems were estimated to exist in many countries worldwide; for example, the prevalence of anemia among pregnant women, nonpregnant women, and all women of reproductive age was 40%,

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*Correspondence:

Sindew Mahmud Ahmed, Menelik II
Medical and Health Science College,
PO Box No: 3268, Addis Ababa,
Ethiopia, Tel: +251-9929133481

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32.5%, and 32.8%, respectively [9-11]. In Africa, a large proportion of nonpregnant women were reportedly anemic in West and Central Africa (48%), and the highest prevalence was in East Africa (28%) (19) and Ethiopia (27%) [4]. It has been reported that nearly 510,000 maternal deaths occur annually associated with childbirth or early postpartum birth. Approximately 20% of maternal deaths are caused by anemia, and the majority of deaths occur in developing countries [12,13].

Anemia is the most important clinical problem in people living with HIV/AIDS [5,14-16], and the epidemiology of anemia among HIV-infected women in developing countries is likely to be quite different from that in more developed countries [15]. Previous studies from developing countries have shown that anemia is the most common hematologic manifestation, affecting 30% of HIV-infected patients with an asymptomatic infection and 75% to 80% of HIV-infected patients with late-stage disease [17]. A cohort study performed in the USA showed that 37% of HIV-positive women were anemic [18]. In another study in India, the rates of anemia among HIV-positive participants were 64.7% in women and 49.2% in men [15]. A study performed in Ethiopia indicated that 62% of women living with HIV/AIDS were anemic, and factors that are often associated with anemia among people living with HIV/AIDS include the use of an ART regimen, the presence of Opportunistic Infections (OIs), sociodemographic status, duration of ART, advanced stage of HIV disease and a CD4 count <200 cells/dL [8].

According to the 2016 EDHS report, the prevalence of anemia in pregnant women in Ethiopia is 23% and 29%. In Ethiopia, there is a moderate public health problem for both pregnant and nonpregnant women of reproductive age, ranging from 16% to 59%, and a high incidence is found in the eastern and northeastern regions [9,12]. Ethiopia is one of the HIV/AIDS-affected countries in sub-Saharan Africa, with a high prevalence among women of reproductive age. The prevalence of HIV among the general population is 0.9%, and reports from HIV-related estimates and projections for Ethiopia 610,335 People are Living with HIV (PLHIV) more prevalent among adult women (15-59 years), and 1.2% have a twofold higher HIV prevalence than men (0.6%) [19,20]. HIV/AIDS may be a major causative factor in the development of anemia, and anemia is likely associated with severe or progressive disease [2].

The Ethiopian Federal Ministry of Health (FMoH) has been struggling to prevent anemia by focusing on pregnant women by providing iron and folic acid, providing nutritional education, providing drugs for deforming, promoting sanitation, and preventing and treating malaria; however, in the last 15 years, the trend of anemia has remained inconsistent. According to a 2011 DHS report, the incidence of all forms of anemia decreased from 27% in 2005 to 17% in 2011 and increased to 23% in 2016 [9,13].

Anemia, HIV, and being a woman of reproductive age living in resource-limited countries such as Ethiopia will be a double burden [18,8,21]. Reducing anemia among women of reproductive age is recognized as one of the key components in the improvement of the intergenerational benefits of women and their children's good health, economy, and community development. In Ethiopia, insufficient studies have been performed on anemia among women of reproductive age attending ART clinics, and anemia has not been extensively studied. Thus, the prevalence of and factors associated with this disease have rarely been investigated. Hence, this study was conducted to assess the prevalence of anemia and associated factors

among women of reproductive age attending ART clinics.

Materials and Methods

Study design and setting

An institutional-based cross-sectional study was conducted in Addis Ababa, Ethiopia, from June 7th to August 23rd, 2021. Addis Ababa is the capital city of the country and is admitted through 10 sub-cities and 116 wards. The total estimated population of Addis Ababa in 2021 was 5,006,000. There are approximately six federal and six regional hospitals [23]. This study was conducted at six selected hospitals, namely, Zewditu Memorial Hospital, Tirunesh Beijing Hospital, Menelik II Hospital, Ras Desta, Yekatit 12, and Gandhi Memorial Hospital.

Source and study population

The source population was all women of reproductive age who were receiving ART at the ART clinics of Addis Ababa. The study population included women of reproductive age who were receiving ART during the study period at selected hospitals. Patients who were critically ill, pregnant women, had anomalies, or incomplete medical records were excluded.

Sample size determination and sampling procedures

The sample size for this study was calculated using a single population proportion formula $n = \frac{z_{\alpha/2}^2 \times p(1-p)}{d^2}$ by assuming a 95% Confidence Interval (CI) and margin of error (0.05) and taking the prevalence (p) as 17% [23]. By considering the 10% nonresponse rate, the final calculated sample size was 239.

A total of six regional public hospitals in the Addis Ababa city administration providing ART services were included in the study. The total number of HIV-positive women of reproductive age receiving services in the hospital was 3712. The sample size was allocated proportionally to the size of each hospital according to the total number of HIV-positive women of reproductive age attending the ART clinic (Zewditu Memorial Hospital (n=48), Tirunesh Beijing Hospital (n=34), Menelik II Hospital (n=51), Ras Desta (n=29), Yekatit 12 (n=36), and Gandhi Memorial Hospital (n=41)). A simple random sampling method involving a lottery method was used to select the study participants [3].

Data collection tools and procedure

The data were collected using a checklist by assessing the available information on the women's charts and interviews. The checklist was constructed after reviewing the related literature and included information on sociodemographic information (age, educational status, occupation, monthly income), nutritional information (feeding habits, coffee/tea intake after meals, central obesity/BMI), maternal information (history of current abortion), and medical and medication information (hemoglobin, WHO clinical stage of HIV/AIDS and OIS, HAART, duration of ART, type of ART regimen and other drugs) from baseline data. The checklists were prepared in English and subsequently translated to Amharic. Before the actual data collection date, the checklist was pretested on 5% of the total sample size at one of the hospitals not included in the study. The data were collected by a trained data collector, and the completeness of each checklist was checked daily during the data collection process.

Weight, height and central obesity were measured using a standard scale that is applicable for measurement in medical setups, and waist circumference was measured by using nonelastic tape at the approximate midpoint between the lower margin of the last palpable

rib and the top of the iliac crest and was measured to the nearest 0.5 cm. Central obesity was defined by a waist circumference threshold ≥ 80 cm for women.

Operational definitions

Anemia: According to the WHO, anemia is a condition in which a deficiency of red blood cells or hemoglobin in the blood/hemoglobin level <12 g/dl is observed in nonpregnant women.

Reproductive age: Women aged 15 to 49 years.

Body mass index was defined as weight in kilograms divided by height in square meters (kg/m^2). BMI was categorized as underweight (<18.5 kg/m^2), normal (18.5-24.9 kg/m^2), overweight (25.0-29.9 kg/m^2) or obese (>30.0 kg/m^2).

Data quality assurance

To assure the quality of the data, a one-day training session was provided to the data collectors and supervisor. The supervisor checked the questionnaires for completeness and consistency, and on-spot feedback was given to the data collectors to correct the collected data immediately.

Data processing and analysis

All the data from the checklist were compiled, checked for clarity and completeness and coded. The coded data were entered into an Epi-Data Manager and exported to the SPSS version 22.0 software package for cleaning and analysis. Descriptive analysis was performed, and the results are presented in tables and figures. A bivariate logistic regression analysis was carried out to determine the statistical associations between each independent variable and the dependent variable. Variables with a p value less than 0.25 in the bivariable logistic regression analysis model were subjected to multivariable logistic regressions to control for confounders. Finally, multivariate analysis was carried out to identify independent predictors of the outcome variable, the strength of association was measured using Odds Ratios (ORs) and 95% CIs, and the presence of multicollinearity and the results of the model fitness test were checked. A p value <0.05 was considered to indicate statistical significance.

Ethics approval and informed consent

This study was conducted in accordance with the Declaration of Helsinki, and after ethical approval was obtained from the institutional research ethical committee of Kotobe Metropolitan University, the Menelik II Medical and Health Science College Ethical Review Committee. A letter of permission and support was also obtained from the Addis Ababa Health Bureau, and a support letter was written to the selected hospitals. The information of all the study participants was kept confidential. Issues of privacy and confidentiality were strictly maintained. Neither the names nor any personal identifiers were recorded. The collected data were locked, and soft copy information was secured to prevent access from occurring by any other person.

Results

Sociodemographic characteristics

A total of 232 HIV-positive women of reproductive age on ART were included in the study, for a 97% response rate. The median age of the study participants was 35 (IQR=29-40) years, and the majority (59.5%) were aged 25 to 39 years. Most (40.9%) of our study participants were married, and 41.8% had a secondary education (Table 1).

Table 1: Sociodemographic characteristics of HIV-positive women of reproductive age on ART at Addis Ababa Hospital, Addis Ababa, Ethiopia, June 2021 (N=232).

Variables	Category	Frequency	Percent
Age	Young (<25)	29	12.5
	Middle (25-39)	138	59.5
	Older (≥ 40)	65	28.0
Marital status	Single	77	33.2
	Married	95	40.9
	Divorce	43	18.5
	Widowed	17	7.3
Education status	Illiterate	23	9.9
	Primary	71	30.6
	Secondary	97	41.8
	Higher	41	17.7
Occupation	Housewife	57	24.6
	Unemployed	45	19.4
	Student	13	5.6
	Daily labor	17	7.3
	Government Employed	21	9.1
	Merchant	11	4.7
	Private employed	68	29.3

Table 2: Nutrition-related & Anthropometric characteristics of HIV positive women of reproductive age on ART at Addis Ababa hospitals, Ethiopia, June 2021.

Variables	Category	Frequency	Percent
BMI	Underweight	55	23.7
	Normal	150	64.7
	Overweight	27	11.6
Meal in- take frequency per day	Irregular	133	57.3
	Regular	99	42.7
Meal per day	More than three times	25	10.0
	Three times	92	42.0
	Less than three times	110	47.1
Habit of Skipping meal	No	87	37.5
	Yes	145	62.5
Skipping meal (n=145)	Breakfast	60	41.0
	Lunch	30	21.0
	Dinner	50	34.0
Reasons for skipping meal (n=145)	Lack of food	47	32.4
	loss of appetite	50	34.3
	Absence of time	26	18.0
	Fasting	22	15.7
Coffee/tea	No	88	38.0
	Yes	144	62.0

Nutritional and behavioral characteristics of the study participants

Of the total respondents (23.7%) of the study participants, 18.5 kg/m^2 were underweight. One hundred thirty-three (57.3%) respondents had irregular feeding practices a total of 145 (62.5%) of the respondents had a habit of skipping a meal; most (34.3%) of the

Table 3: Health-related characteristics of women of reproductive age on ART at Addis Ababa Hospital, Addis Ababa, Ethiopia, June 2021 (n=232).

Variables	Category	Frequency	Percent
Years lived with HIV	<=5 years	76	32.8
	5.1-10 years	76	32.8
	>10 years	80	34.5
WHO Clinical Stage	Stage I	72	31
	Stage II	15	6.5
	Stage III	83	35.8
	Stage IV	62	26.7
Treatment progressive stage	T I	154	66.4
	T II	18	7.8
	T III	60	25.9
Opportunistic infection disease	No	87	37.5
	Yes	145	62.5
CD4 count (cell/mm ³)	<350	8	3.4
	>500	132	56.9
	350-500	92	39.7
Viral load	<1000 copies/ml	176	75.9
	>1000 copies/ml	33	14.2
	Not documented	23	10
Drug regime	1J	197	84.9
	1E	35	15.1
Abortion	No	189	81.5
	Yes	43	18.5

participants lost their appetite 50 (34.3%) of the time to skip a meal. The majority of the study participants (144; 62%) consumed tea or coffee immediately (within one hour) after a meal (Table 2).

Magnitude of anemia among HIV-positive patients on ART

Among the total 232 HIV-positive patients on ART, 54 (23.3%) (95% CI: 18.5-28.4%) were anemic, and the median hemoglobin level was 13 (st.d. \pm 1.80 [12.4, 13.4]). Approximately 14 (6%) patients were severely anemic, 31 (13.4%) had moderate anemia, and 9 (3.9%) had mild anemia.

Maternal, medical and medication-related factors of the study participants

The study also revealed that 43 (18.5%) of the women had a history of abortion, 110 (47.4%) had a history of abortion, and 54 (23.3%) and 67 (28.9%) had primary gravidity and nulligravid, respectively. Approximately 76 (32.8%) women had lived on ART for five to ten years, and 80 (34.5%) had been on ART for more than ten years. The majority (83 [35.8]) of women on ART were classified as WHO clinical stage III.

Out of the 232 study participants, 176 (76%) had a viral load <1000 copies/ml, and 132 (57%) had a CD4 count greater than 500 cells/mm³ (Table 3).

Factors associated with anemia among women of reproductive age on ART

To identify factors associated with anemia, selected explanatory variables were entered into binary logistic regression models, and those associated with anemia in binary regression were entered

into multiple logistic regressions. Thereafter, multivariable logistic regression analysis was applied to control for potential confounding factors. Women's education, occupation, and abortion were observed to be associated with anemia in the study area. However, such associations did not remain the same after adjustment for possible confounders.

Multivariate logistic regression analysis revealed that age, marital status, duration of living with HIV, gestational age, and opportunistic infection were significantly associated with anemia.

Compared with older women, 6.7-year-old women (AOR=6.73; 95% CI= (1.86; 24.44) p=0.004) were anemic. Unemployed women were 11 times more likely to be anemic (AOR=11; 95% CI 2.74; 42.9) than women who were employed.

Women who did not develop opportunistic infections were found to be 89.3% less likely to be anemic than women who did develop opportunistic infections. Single participants were 93% less likely (AOR=0.007; 95% CI=0.001; 0.06; p=0.0001) to be anemic than divorced, separated and married women were 89% (AOR=0.11; 95% CI=0.025; 0.50; p=0.0004) less likely to be anemic than divorced and separated participants were. Among women who were multigravid 4.2 times [AOR=4.2; 95% CI: (1.68; 10.42) p=0.002] more likely to be anemic than women with null gravidity.

Among those who lived with HIV, 92% (AOR=0.05; 95% CI=0.0; 0.38) p=0.0004) were living with HIV for less than 5 years, and 83% (AOR=0.17; 95% CI=0.05; 0.610) p=0.0007) were less likely to be anemic than were those who lived for more than 10 years. Participants with a CD4 T-cell count <500 cells/ μ l were 1.5 times more likely to have anemia (AOR=1.5, 95% CI 0.05; 0.44) than patients with a CD4 T-cell count >501+cells/ μ l were (Table 4).

Discussion

This study assessed the prevalence of anemia and associated factors among women of reproductive age at the ART Clinic Hospital of Addis Ababa, Ethiopia. The prevalence of anemia was 23.3% (95% CI: 18.5-28.4), which is comparable with findings from Rwanda (23.6%) [17] and 29% in Nepal [15]. However, compared to a previous study performed in Ethiopia, this figure was 17% [23]. However, the prevalence of anemia in the present study was lower than that reported in a previous study of Wolita Sodo (36.4%) [8], Gondar (62%) [24], (37.8%) and the northwestern zone of Tigray (36.1%) [23]. Forty four percent (44%) in Ghana [25] in Northwest Vietnam (37.57%) [26].

The possible reason for the difference observed in the incidence of anemia in women of reproductive age on ART was that the incidence was lower in this study than in studies conducted in other areas, including Ethiopia. These differences could be due to differences in sample size, inclusion and/or exclusion criteria for recruiting study participants, socioeconomic level, geographical location, characteristics of the study participants, awareness level, access to information available on the nutritional status of the client and reducing the incidence of OIs, chronic illnesses, changes in treatment modalities, age group of the study participants, and efficacy of HAART. Untreated anemia in people living with HIV/AIDS and/or taking ART is associated with pathophysiologic changes and progression of the disease to an advanced stage, and this may result in the death of the individual. In this case, the burden may double, especially for women who live in a poor country such as Ethiopia.

Table 4: Factors associated with anaemia among women of reproductive age on ART at Addis Ababa hospitals, Addis Ababa, Ethiopia June 2021 (n=232).

Variables	Anemia Status (%)		COR (95% CI)	p value (CoR)	AOR (95% CI)	p value (AOR)
	Anemic	Non anemic				
Age						
Younger (<25)	2 (6.9)	27 (93.1)	0.25 (0.05; 1.16)	0.57	4.55 (0.28; 72.80)	0.284
Middle (25-35)	37 (26.8)	101 (73.2)	1.12 (0.61; 2.43)	0.077	6.73 (1.86; 24.44)	0.004
Older (>35)	15 (23.1)	50 (76.9)	1		1	
Education						
Cannot read and write	12 (52.2)	11 (47.8)	4.50 (1.46; 13.86)	0.009	4.50 (1.46;13.86)	0.009
Primary	19 (26.8)	52 (73.2)	1.51 (0.59; 3.83)	0.389	1.50 (0.59;3.86)	0.389
Secondary	15 (15.5)	82 (84.5)	0.76 (0.29; 1.95)	0.561	0.78 (0.29;1.95)	0.78
Higher	8 (19.5)	33 (80.5)	1		1	
Marital status						
Single	3 (3.9)	74 (96.1)	0.06 (0.16; 0.20)	0	0.007 (0.001; 0.06)	P ≤ 0.000
Married	26 (27.4)	69 (72.6)	0.53 (0.27; 1.05)	0.067	0.11 (0.025; 0.50)	0.004*
Others	25 (41.7)	35 (58.3)	1		1	
Occupation						
No job	31 (27.0)	84 (73.0)	1.51 (0.82; 2.79)	0.19	10.85 (2.74; 42.9)	<0.001*
Has a job	23 (19.7)	94 (80.3)	1			
Central obesity						
Obese ≥80	9 (19.6)	37 (80.4)	0.76 (0.34; 1.70)	0.51		
Non obese	45 (24.2)	141 (75.8)	1			
BMI						
Underweight	28 (50.9)	27 (49.1)	3.63 (1.27; 10.37)	0.02	3.63 (1.27-10.37)	0.016
Normal	20 (13.3)	130 (86.7)	0.54 (0.19; 1.49)		0.538 (0.94-1.496)	0.235
Overweight	6 (22.2)	21 (77.8)	1			
Meal frequency						
Irregular	33 (24.8)	100 (75.2)	1.23 (0.66; 2.28)	0.52		
Regular	21 (21.2)	78 (78.8)	1			
Coffee & tea intake						
Yes	8 (9.1)	80 (90.9)	0.21 (0.09; 0.48)	P<0.0001	0.213 (0.095-0.477)	P ≤ 0.0001
No	46 (31.9)	98 (68.1)	1			
Gravida						
Null	8 (11.9)	59 (88.1)	1			
1 to 2	25 (23.4)	82 (76.6)	0.54 (0.27; 1.08)	0.08	2.25 (0.95;5.33)	0.66
3+	21 (36.2)	37 (63.8)	0.23 (0.09; 0.59)	0.002	4.19 (1.69;10.4)	0.002*
Abortion						
Yes	43 (22.8)	146 (77.2)	0.86 (0.34; 1.84)	0.69		
No	11 (25.6)	32 (74.4)	1			
CD4 count						
>500	14 (10.6)	118 (89.4)	0.17 (0.09; 0.35)	0	0.15 (0.05; 0.44)	0.001*
≤500	40 (40.0)	60 (60.0)	1			
Opportunistic infection						
Yes	7 (8)	80 (92.0)	0.18 (0.08; 0.43)	0	0.11 (0.02; 0.52)	0.006*
No	47 (32.4)	98 (67.6)	1			
HAART Duration						
≤ 5 years	3 (3.9)	73 (96.1)	0.53 (0.02; 0.18)	0	0.05 (0.0; 0.38)	0.004*
5.1 to 10 years	16 (21.1)	60 (78.9)	0.34 (0.17; 0.69)	0.003	0.17 (0.05;0.610)	0.007*
>10 years	35 (43.8)	45 (56.2)	1			

Drug Regime					
1 J	46 (23.4)	151 (76.6)	1.03 (0.44; 2.41)	0.950	
1 E	8 (22.9)	27 (77.1)	1		

*Statistically significant

The incidence of anemia was highest among women who had a CD4 lymphocyte count <500 cells/ μ L and lowest among women with a CD4 lymphocyte count >500 cells/ μ L, which showed that the CD4 count was significantly associated with anemia. This finding is consistent with those of studies conducted at Gondar University Hospital [24], Zewditu Memorial Hospital, Ethiopia [23], and Rwanda [17]. This is due to lysis and decreased production of Red Blood Cells (RBCs), resulting in low Hgb levels in advanced HIV infection and HIV-related diseases and deterioration of hemoglobin, exposing them to opportunistic infections that lead to a deficiency of micronutrients such as iron [15,8]. Having opportunistic infections leads to a deficiency of micronutrients such as iron and a greater risk of anemia. Oral candidiasis, bacterial pneumonia, and tuberculosis were shown to be associated with a high risk of anemia [23].

In this study, women who were married and middle aged were more likely to be anemic than were those who were single, divorced, or separated and were older. This study is consistent with studies conducted in Ethiopia [28] and Uganda [5]. Women who have multiple pregnancies are more likely to be anemic than women with no pregnancy, and the findings of these studies are consistent with those of reproductive-age women in Ethiopia [9]. This group is particularly susceptible to iron deficiency anemia because of the presence of drains on iron stores that result in blood loss, pregnancy, abortion, and delivery [27].

This study revealed that the likelihood of having anemia was greater among HIV/AIDS women on ART who were unemployed and who could not read and write studies in Ethiopia; moreover, anemia was more prevalent in people with poor economic and educational status [28,29]. This is because economic problems and lack of awareness may lead women to lack the diversified food that is essential for nutrient adequacy, as there is no single food that may contain all of the essential nutrients that are needed for good optimal health and good nutritional status.

Individuals who lived with HIV for less than 5 years were more likely to be anemic than were those who lived with HIV for more than 10 years. It is also possible that ARTs play a role in decreasing the risk of comorbidities [30].

Conclusion

The current study showed that the overall incidence of anemia was a moderate public health problem among HIV-positive reproductive-age women on ART in the study area. Anemia was significantly associated with age, marital status, occupation, current CD4 count, opportunistic infection, gravida, and duration of HAART. Thus, interventions to address these factors and for the early diagnosis and treatment of anemia and opportunistic infection are recommended.

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