Research Article

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Prevalence of Anemia and its Associated Factor Among Adult Patients at Selected Public Hospitals in Somali Region, Eastern Ethiopia, 2023 Cross-Sectional Study.

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ABSTRACT

Background : Anemia- a low oxygen caring capacity of blood- remains an intimidating global public health issue affecting over two billion individuals globally. It negatively affects general development, intellectual turn of events, and academic performance. These problems are common, especially in developing countries, like Ethiopia. On the other hand, there is limited evidence about anemia among adults in the study area.

Objective : to assess the prevalence and associated factors of anemia among adult patients attending a selected public Hospital in the Somali region, Ethiopia.

Methods : Institution-based Cross-Sectional study was conducted among 408 randomly selected adult patients from December 30 to January 25, 2023, at selected public hospitals in the Somali region, Ethiopia. The data was collected through face-to-face interviews using a structured interviewer-administered questionnaire. Data were entered by the Epi data version 4.6 and analyzed by SPSS version 26. Descriptive, bivariate, and multivariate analysis was applied.

Results : The prevalence of anemia was 19.1% with 95% CI (15.4, 23.4%). Fruit consumption of less than three servings per day (AOR=2.893, 95% CI: 1.1517-7.274), and having a history of malaria (AOR=3.701, 95% CI:1.7371-7.886) and leishmaniasis (AOR=2.296, 95%CI 1.149, 4.568) were the main predictors of anemia.

Conclusion and Recommendation : This study showed a high prevalence of anemia among adult patients. preventing/ minimizing exposure to malaria and leishmaniasis, and increasing the consumption of fruits can significantly reduce the rate of anemia among adult patients.

KeyWords : Adults, Anemia, associated factor, Prevalence.

INTRODUCTION

Anemia is a decrease in the hemoglobin, hematocrit, or red blood cells, or their capacity to carry oxygen becomes insufficient to meet physiological needs(1). Anemia is a significant worldwide medical situation, affecting over 2 billion individuals globally. It is the most broadly recognized General medical condition in non-industrial nations happening at all phases of life(2).According to WHO, approximately 12.7% of adults worldwide experience anemia. In India, the fourth round of the National Family Health Survey (NFHS-4) revealed that 22.7% of males have anemia(3), Whereas In Africa, prevalence rates of anemia are 16.8 to 33.8% among adults reported in Uganda(4). According to a public report in Ethiopia in 2016, 24% of women and 15% of men were anemic (5).

According to WHO anemia is considered a significant public problem when the prevalence is more than 40%, a moderate public problem when it is from 20%-40%, and a mild health problem when the prevalence is 5%-20%(6)

The risk factors are widespread in developing countries, including nutritional deficiencies, infection, and genetic hemoglobin disorders(7). A complicated interplay of many concomitant factors like biological factors, socio-demographics, lifestyle, dietary habits, and socioeconomic

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status pollards the distribution and severity, vulnerability, and consequences of anemia(8). parasitic diseases, (malaria, hookworm infections, leishmaniasis), and inherited hemoglobinopathies(9). Fruit and Vegetables have beneficial effects mainly through their high non-heme iron content, and through ascorbic acid content which contributes to the high bioavailability of iron by functioning as an initiating factor in its absorption(10).

It is complicated to progressive organ damage to the brain, kidneys, cardiovascular system, neurocognitive dysfunction, asymptomatic cerebral infarction, stroke, kidney dysfunction, pulmonary hypertension, and mortality(11).

despite all recent social and economic development and health-related betterments, it remains a high global public health problem affecting people at any phase of life in both developing and developed countries and causing critical impacts on quality of life, infirmity, and mortality(12). people living with disability due to anemia have a great physical burden of 61.5 million yearly worldwide (3).

The knowledge, of a paucity of studies trying to determine the pervasiveness of anemia in Ethiopia, most are limited to children, adolescents, anemia with known chronic illness, pregnant women, and older populations, especially in this study area, and these investigations have a shortage of consistency and population representation (13).

Despite the extreme burden and rising trend of anemia, both in terms of incidence and economic impact, there is limited information on anemia among adults; as a result, this age group is often not included in the anemia control programs(14). Therefore, this study aims to assess the current prevalence of anemia and its associated factors among adults holds significant importance for improving health outcomes.

MATERIAL AND METHODS

Study Area and Period

This study was conducted at the public Hospitals that are found in the Somali regional state. Somali regional state is located in the eastern parts of Ethiopia. its territory is the largest after the Oromia region. Somali regional state borders the Ethiopia regions of Afar and Oromia and the chartered city Dire Dawa to the west, as well as Djibouti to the north Somaliland to the northeast, Somalia to the south; and Kenya to the southwest. In light of the 2007 census conducted by the Central Statistics Agency of Ethiopia, the total population was 7,445,219 of whom 3,472,490 were men and 3,972,729 were women. It has a sweltering desert with a consistently very hot climate and sparse, highly variable rainfall.

According to the Somali Regional Health Bureau's Annual Report in 2012, the region has 12 Hospitals, 208 health centers, and 1214 health posts. In the region, there are 12public Hospitals: Jigjiga University Sheik Hassen Yabare Referral Hospital (JUSHYRH), Karamara General Hospital (KGH), Fik Primary Hospital (FPH), Biki Primary Hospital (BPH), Dagahbour Hospital (DH), Garbo Primary Hospital (GPH), Godey General Hospital (GGH), Filtu Hospital (FH), Hargele Primary Hospital (HPH), Kabri Dahar Hospital (KDH), Warder General Hospital (WGH), Gashamo Primary Hospital (GPH), and Sitti General Hospital (SGH).

Jigjiga University Sheik Hassen Yabare Referral Hospital and Karamara Hospital are located at a distance of 635km and 650km east of Addis Ababa respectively. These Hospitals deliver health services to all segments of the population. They have outpatient and inpatient services, maternal and child health services, follow-up services, rehabilitative services, intensive care, and recovery services.

Godey General Hospital is located in the Shebelle zone at a distance of 1200 km from Addis Ababa and 600km from Jigjiga. It has outpatient and inpatient services, maternal and child health services, follow-up services, rehabilitative services, intensive care, and recovery services. A cross-sectional study was conducted from December 30-January 25, 2023

Population

All adult patients who visited the outpatient department (OPD) of Public Hospital in the Somali region, Ethiopia Source population whereas all adult patients who visited the OPDs of the selected Public Hospitals during the study period were considered as the study population.

ELIGIBILITY CRITERIA

Eligibility criteria

All adult patients who were ≥18 years, old and visited OPDs of the selected public hospital during the study period.

Exclusion criteria

Patients (e.g. critically ill, Psychic, who were unable to provide the required information by themselves, adults who have known chronic disease, and pregnant women Were excluded from the study.

Sample size determination

The sample size was calculated considering the following assumptions: 95% confidence level, 5% margin of error, and a 0.409 population proportion of anemia among adult patients according to a study conducted at Gilgel Gibe(15).

$$n = \frac{(z_{\alpha/2})^2 * p(1-p)}{d^2}$$

Were, n Sample size of the study

z= percent of confidence interval 95% (1.96)

p= population proportion 40.9%

d= Margin of error (degree of precision) 5%

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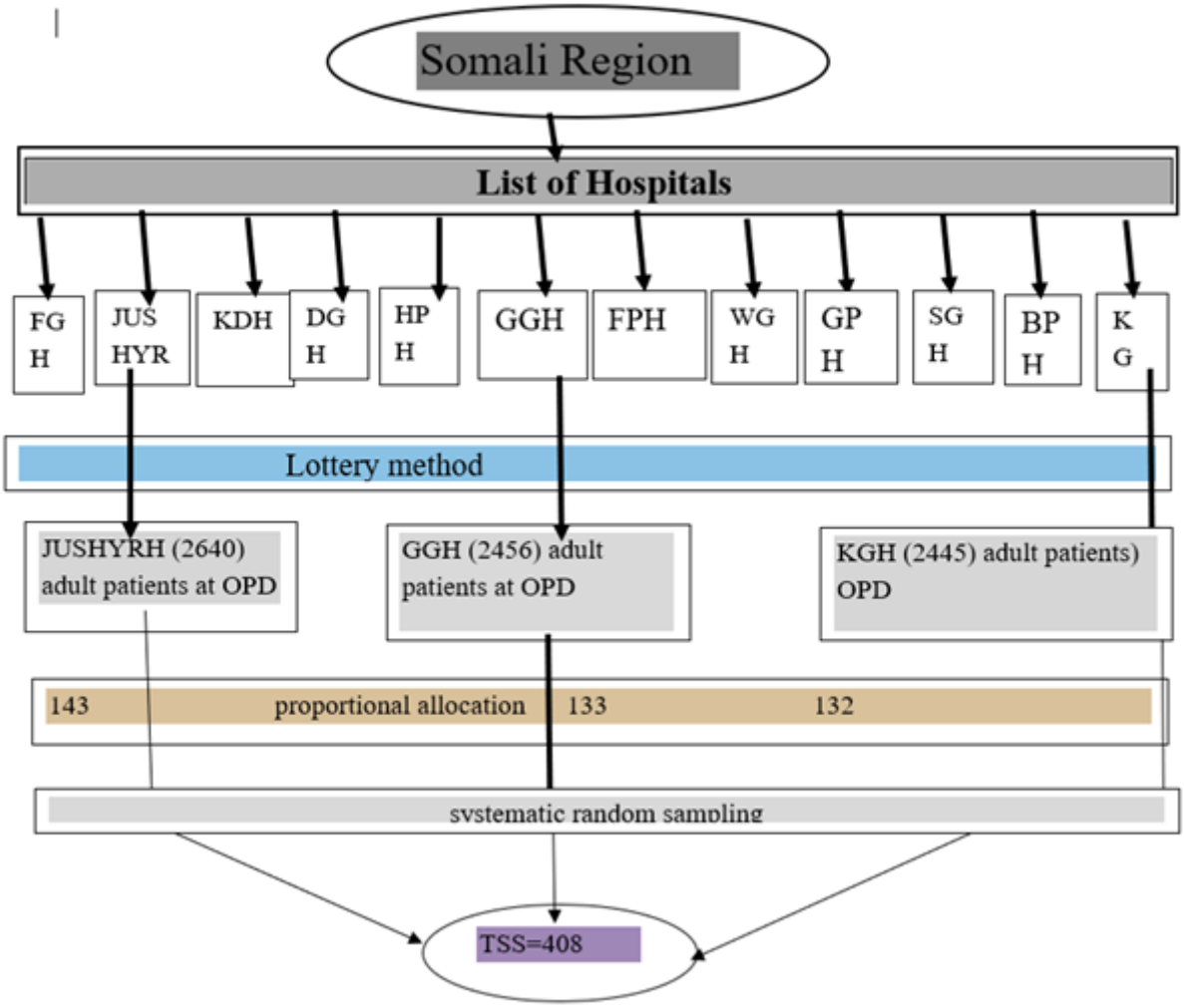
Therefore, $n = \frac{(1.96)^2 * 0.409\ (1 - 0.409)}{(0.05)^2}$ =371and a10% non-response rate was considered so that the total sample size was 371*0.1+371=408.1 ≈408

Lastly, the sample size calculated for the second objective with adding a 10% non-response rate was 391.9≈392, but it was less than the sample size calculated for the first objective. So, the sample size calculated for the first objective was taken as the final sample size for the study, which was 408.

Sampling technique and procedure

Among 12 Hospitals found in the region: JUSHYRH, KGH, and GGH were selected using a lottery method. Then the total sample size was proportionally allocated from each selected Hospital. According to the respective Hospital's monthly report in November 2022, the total number of adult patients visiting JUSHYRH, KGH, and GGH was 2640, 2456, and 2445 respectively. The systematic random sampling method was used to obtain necessary information from adult patients at JUSHYRH, KGH, and GGH OPD during the study period by recording their medical record numbers to avoid repetition. The k^{th} value was calculated based on the source population monthly attended OPD at selected hospitals. The k^{th} value for adult patients was 18 from the list of 1 to 18 adult patients, the first patient was selected by using the lottery method, then data was collected from every 18 patients starting from the first patient selected by the lottery method and continued until the desired sample size was obtained.

Figure 1. Schematic representation of the sampling procedure.



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Operational definition of terms

Adult: a person (Individuals) aged ≥ 18 and < 61 are considered an adult in this study(16).

Anemic - Patients whose hemoglobin level is <12g/dl and 13 g/dl for women and men respectively are considered anemic in this study(17).

Non-anemic- hemoglobin levels >12g/dl, and 13 g/dl for women and men respectively are considered nonanemic in this study(18).

Mild anemia- Patients whose hemoglobin level is 10-11.9 g/dl(18).

Moderate amenia- Patients whose hemoglobin level is 8-9.9 g/dl(18).

Severe anemia- Patients whose hemoglobin level is less than 8g/dl(18).

Aducate fruit and vegetable consumption: patients who consume fruit and vegetable less than three servings per day(19).

Study variable

Socio-demographic characteristics, parasitic infection, and Dietary habit-related factors were the independent variables whereas Prevalence of Anemia was the outcome variable.

DATA COLLECTION INSTRUMENT AND PROCEDURES

Data Collection Instrument

The tool was adapted from a similar study. The questionnaire was first developed in English. Then it was translated into Somali and Then back to English to check its consistency. The questionnaires had four sections. The 1st section was composed of seven items that assessed the sociodemographic characteristics of participants. The 2nd section was composed of 10 items that assessed the frequency of fruit, vegetable, meat, fish, and egg consumption. The 3rd section was composed of three items that assessed the history of parasitic infection, and the 4th section was composed of one item that was applied to collect laboratory results.

Data Collection Procedure

There were 10 data collectors, Four from JUSHYRH three from KGH and GGH expert staff nurses for data collection, and three nurses for supervisors were recruited in the outpatient department. One-day training for data collectors and supervisors was delivered by the principal investigator regarding the objectives of the study, the data collection approach, the contents and relevance of the study, and the confidentiality of the information, as well as the rights of participants. Then study participants were obtained from OPDs of selected hospitals. Those eligible and consented to participate were included in the study using a systematic random sampling method. And then Data was collected through face-to-face interviews using questionnaires. The selection and inclusion of patients were continued until the required number of participants was obtained for the study.

Three-degree holder medical laboratory technologists were recruited for standard operating procedures to determine Hemoglobin levels with HemoCue 201+

Hemoglobin determination Procedures: Peripheral blood was collected by finger pricking using a sterile lancet The site for blood collection was cleaned with alcohol-soaked cotton and pricked with a blood lancet One drop of blood was collected from a finger prick after removing the first two drops of blood to make ensure that the sample was fresh capillary blood, and was placed into a cuvette for measurement using hemoglobinometer (HemoCue 201+). And filled out the checklist which was prepared for laboratory results.

Data quality assurance

Data quality was assured by selecting the proper study design, properly selecting study participants, and preparing a proper data collection checklist and tool.

pretest was done on 5% (20 participants) of the sample size at Dagahbour Hospital, Somali region, eastern Ethiopia. Each collected data was checked each day by the supervisors to make sure that all the questions were answered consistently. In the laboratory aspect, quality assurance was performed according to the laboratory's protocol. Standard operating techniques were followed during specimen collection and processing. HemoCue 201+ was prepared and calibrated according to the manufacturer's instructions and cross-checked with a complete blood count machine.

Data processing and analysis

The data were coded, cleaned, edited, and entered into the Epi data version 4.6 and exported to SPSS version 26 for analysis. Descriptive statistics were carried out and were presented using a narrative, table, and pie chart. All variables with P value ≤ 0.25 in the Bivariate analysis model were included in the final model of multivariable analysis to control all possible confounders. The multi-co-linearity test was done to see the correlation between independent variables by using co-linearity statistics. The model of fitness was checked with the Hosmer–Lemeshow test(p=0.209). The results of regression analysis were presented as adjusted odds ratios and corresponding 95% confidence intervals (CI). A P value ≤ 0.05 was considered statistically significant.

RESULTS

The Socio-Demographic Characteristics

Out Of 408 study participants, 371 study participants participated in the study giving a response rate of 90.7%. Of these, more than half (54.4) were female. The mean age of the respondents was 35.2 (SD±11.73) years (Table 1).

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Table 1. Sociodemographic characteristics of patients who attended the selected Public Hospitals, Somali, Ethiopia, 2022/2023.

Variables	Category	Frequency	Percent
Age	18-28	137	36.9
	29-39	105	28.3
	40-50	64	17.3
	51-60	65	17.5
Sex	Female	202	54.4
	Male	169	45.6
Marital status	Single	117	31.6
	Married	211	56.9
	Divorce/widowed	43	11.6
Education	unable to write and read/ able to write and read	97	26.1
	achieved primary/ secondary school/ higher education	274	73.9
Occupation	Governmental employee	95	25.6
	Farmer	64	17.3
	Daily labor/ student/ merchant/ other	141	38
	Housewife	71	19.1
Residence	Urban	219	59
	Rural	252	41
Monthly income	monthly income of participants less than or equal to 5000	252	67.9
	monthly income of participants greater than 5000	119	32.1

Dietary habit-related factor

More than three-fourths 337(90.8%) of the participants had consumed fruit, and the majority of them 226(60.9%) had consumed fruit less than three servings per day (Table2)

Table 2. dietary habit characteristics of patients who attended selected Public Hospitals, Somali, Ethiopia 2022/2023 (n=371).

Variables	Category	Frequency	Percent
Do you consume fruit	Yes	337	90.8
	No	34	9.2
Do you consume vegetable	Yes	303	81.7
	No	68	18.3
Do you consume Meat	Yes	322	86.8
	No	49	13.2
Do you consume Egg	Yes	322	86.8
	No	49	13.2
Do you consume Fish	Yes	313	84.4
	No	58	15.6
Frequency of fruit-eating	less than equal to 2 per day	226	60.9
	greater than 2 per day	145	39.1
Frequency of vegetable eating	less or equal to 2 times a day	283	76.3
	greater than 2 times per day	88	23.7
Frequency of meat-eating	less or equal to 2 times a week	226	60.9
	greater than 2 times a week	145	39.1
Frequency of egg eating	less or equal to 2 times a week	250	67.4
	greater 2 times a week	121	32.6
Frequency of fish-eating	less or equal to 2 times a week	251	67.7
	greater 2 times a week	120	32.3

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Parasitic infection-related factors

Among all the study participants, 51(13.7%), 65(17.5%), and 49(13.2%) had a history of malaria, leishmaniasis, and hookworm respectively (3).

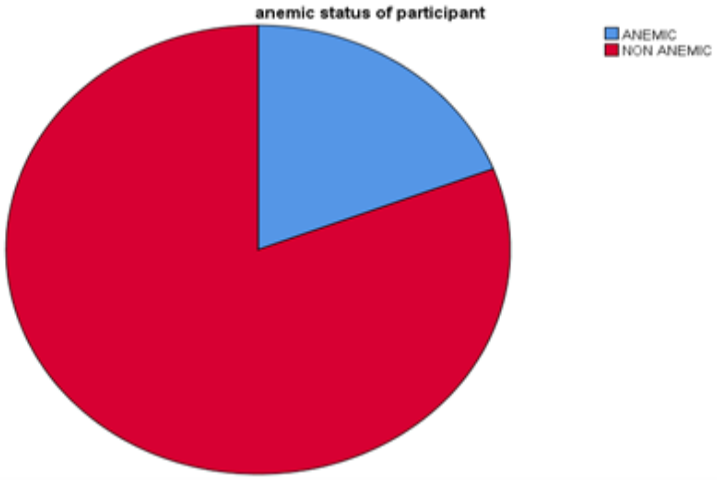
Table 3.parasitic characteristics of patients who visited selected Public Hospital, Somali, Ethiopia,2022/ 2023 (n=371)

Variable	Category	Frequency	Percent
History of malaria	Yes No	51 320	13.7 86.3
history of leishmaniasis	Yes No	65 306	17.5 82.5
history of hookworm	Yes No	49 322	13.2 86.8

Prevalence of anemia among adult patients

The overall prevalence of anemia among adult patients in this study was 19.1% with 95%CI (15.4, 22.6). Among those who had anemia,9.4% female and 9.7% male. The majority of the study participants (11.8%) were rural, and 7.3% urban residents. Regarding the severity of anemia 41(57.7%), 8(11.3%), and 22(31%) were mild, moderate, and severe anemia respectively. More than one-tenth (15.7%) of the participants had anemia and consumed fruit less than three servings per day. About 16.2% of the study participants who consumed vegetables less than three servings per day were anemic. About More than one-tenth (14%) of the study participants who consumed meat less than three servings per day were anemic Less than one-tenth (5.4%) who had a history of malaria had anemia. Similarly, less than one-tenth (6.2%) who had a history of leishmaniasis had anemia.Less than one-tenth (4.3%) who had a history of hookworm had anemia.

Figure 2. Prevalence of anemia among adult patients at JUSHYRH, KGH, and GGH Somali, Ethiopia,2022/ 2023.



Factors associated with anemia among adult patients.

Bivariate and multivariate logistic regression was used for analysis to identify factors associated with anemia among adult patients. From the bivariate analysis, residence, educational status, occupation, monthly income, meat, fruit, and vegetable consumption, frequency of meat, fruit, and vegetable consumption, malaria, hookworm, and leishmaniasis were associated with anemia at P value <0.25(Table 4). However, in the multivariate analysis frequency of fruit consumption, malaria, and leishmaniasis had significantly significant associated with anemia at P value <0.05(Table 4).

Patients with a history of malaria were around four times more likely to develop anemia (AOR= 3.701, 95% CI: 1.7371, 7.886) as

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compared to patients without a history of malaria after adjusting for other variables in the model. The chance of experiencing anemia was nearly two times higher among participants with a history of leishmaniasis (AOR= 2.296, 95% CI: 1.149, 4.568) compared to those who had no history of leishmaniasis. Results indicate that insufficient fruit consumption was associated with higher odds of anemia among adult study participants. Compared with adult anemic patients who consumed at least three servings of fruits per day, the odds of developing anemia were [AOR=2.893, 95%CI:1.1517, 7.274] among those who reported consuming less than three servings of fruit a day.

Table 4. Bivariable and multivariable logistic regression analysis of anemia among adult patients at selected public hospital Somali, Ethiopia,2022/2023 (n=371)

Variable	Category	Anemia status		COR (95%CI) No (%)	AOR (95% CI)
		Yes (%)	No (%)		
Residence	Urban Rural	27(7.3) 44 (11.9)	192(51.8) 108(29.1)	1 0.345(0.202-0.589)	1 0.5(0.228-1.099)
Education	unable to write and read/ able to write and read primary/ secondary /higher education	26 (7) 45(12.1)	71(19.1) 229(61.7)	1.864(1.074-3.234) 1	0.018(0.494-2.101) 1
Occupation	governmental employees Farmer daily labor/ student/ merchant housewife	11 (3) 23 (6.2) 16 (4.3) 21 (5.7)	84(22.6) 41(11.1) 125(33.7) 50(13.5)	1 0.233(0.104,0.525) 0.717(0.332-1.549) 0.458(0.193,1.088)	1 0.686(0.228,2.077) 0.525(0.212, 1.298) 0.859(0.333,2.215)
Monthly income	<5000 ≥5000	57(15.4) 14 (3.8)	190(51.2) 110(29.6)	3.481(1.713-7.073) 1	2.3(0.950,5.566) 1
Fruit consumption	Yes No	60(16.2) 11(3)	277(74.7) 23(6.2)	1 0.453(0.210-0.979)	1 0.774(0.310,1.935)
vegetable consumption	Yes No	53 (14.3) 18(4.9)	250(67.4) 50(13.5)	1 0.589(0.318.089)	1 0.642(0.302,1.365)
meat consumption	Yes No	55(14.8) 16(4.3)	267(72) 33(8.9)	1 0.425(0.219-0.285)	1 0.557(0.254-1.223)
Frequency of fruit-eating	less than or equal to 2 times a day greater than 2 times a day	57(15.7) 14 (3.8)	171(46.1) 129(34.8)	3.071(1.64-5.754) 1	2.893(1.1517, 7.274) * 1
Frequency of vegetable eating	less than equal to 2 times a day greater than 2 times a day	60 (16.2) 11(3)	223(60.1) 77(20.8)	1.883(0.942-3.767) 1	0.801(0.286,1.099) 1
Frequency of meat-eating	less than equal to 2 times a week greater then 2 times a week	52(14) 19(5.1)	174(46.9) 126(34.1)	2.132(1.192-3.815) 1	1.135(0.486,2.651) 1

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History of malaria	Yes No	20(5.4) 51(13.7)	31(8.4) 269(72.5)	3.665(1.926-6.974) 1	3.701(1.737-7.886) * 1
History of leishmaniasis	Yes No	23 (6.2) 48(12.9)	42(11.3) 258(69.5)	2.943(1.624-5.334) 1	2.296(1.149,4.586) 1
History of hookworm	Yes No	16(4.3) 55(14.8)	33(8.9) 267(72)	2.354(1.212-4.572) 1	1.683(0.772, 3.670) * 1

Key: *P-value < 0.05

Abbreviations: COR, Crude odds ratio; AOR, Adjusted odds ratio; CI, Confidence interval.

DISCUSSION

This study aimed to explore the prevalence of anemia and its associated factors among adult patients in the Somali region, of eastern Ethiopia. According to this study, the overall prevalence of anemia was 19.1 %. According to WHO classifications, this prevalence rate of anemia indicates mild public health problems and a warning sign of moderate health problems in the region among the adult population. This prevalence is in line with a study conducted in Uganda 20.3%(4), and SNNPR 20.7% (6). However, it is higher than the study conducted in Brazil 9.9(20), Buea in the southwest of Cameron(14.8%), Hawassa University Referral Hospital 13%(21), and Addis Ababa 5.5%(6). The possible reason for this variation might be due to the differences in the Study period, study area, and diagnostic methods The possible justifications for the observed discrepancy of the higher magnitude in the current study to the study done in The possible justifications for the observed difference of the higher magnitude in the current study to the study done in Brazil, and Buea in the southwest of Cameron, maybe the result of the community's relative improvements in healthcare utilization and seeking behavior, as well as the increased accessibility of skilled healthcare professionals. Moreover, the gap could be caused by methodological factors such as study time, diagnostic methods, and sample size, and some of the above studies were conducted in a single hospital. The possible justifications for the observed discrepancy of the higher magnitude in the current study to the study done in Hawassa University Referral Hospital; in Southern, Ethiopia. It was conducted only at one Hospital using a consecutive sampling method, but this study was conducted on three public hospitals with a systematic random sampling method. Whereas in Addis Ababa, and Tigray 6.7%, maybe due to differences in the sample size and study design

On the other hand, this study is lower than the study conducted in North Kerala, India (51%) (22), Bangladesh 41.3%(23), Benin City, Nigeria 27.3%(24), Baso Liben District 25.9 %(25), Amhara, 24.3%,(6), Gilgel Gibe(15). The possible explanation for this variation might be due to differences in diagnostic methods (measurement tool), sample size, and study area.

The result of the multivariate logistic regression model indicated the frequency of fruit-eating, malaria, and leishmaniasis were significantly associated with anemia.

The odds of developing anemia were over three times higher for patients who were exposed to malaria (AOR= 3.701,95%CI:1.737-7.886), which is in line with the study conducted in Buea in the South West of Cameroon(26), North West Region of Cameroon(27), West Guji zone, Southern Ethiopia(28), Baso Liben(29), and Uganda(4) This similarity might be due to similarities in the study design, and study period. It is also scientifically associated with anemia through hemolysis, and increased spleen clearance of infected and uninfected red blood cells(4).

The odds of developing anemia were over two times higher for patients who were exposed to Leishmaniasis (AOR= 2.296, 95%CI:1.149,4.586). This finding is in line with a study conducted in the Debre Markos Referral Hospital(30). Scientifically Leishmaniasis also has a great association with anemia by sequestration and destruction of red blood cells and alteration in RBC Membrane permeability(31).

The odds of developing anemia were around three times higher for patients who consumed fruit less than three servings a day (AOR=2.893, 95%CI:1.1517, 7.274), This finding is in line with a study conducted in Uganda(4), Arba Minch(32), and Debre Markos referral Hospital(30) This similarity might be due to a similar sample size, study period, and study design. Scientifically, fruit consumption has beneficial effects mainly through their high non-heme iron content, and through ascorbic acid content which contributes to the high bioavailability of iron by functioning as an initiating factor in its absorption. Adults who do not have access to fruit become anemic as a Result of low vitamin B12 or folate which are needed for erythrocytosis(10).

Strengths and limitations of the study

This study was conducted to assess the prevalence of anemia and its associated factors among adult patients in the Somali region, of eastern Ethiopia. There are some important strengths of this study. firstly, in this study, a face-to-face interview was done which prevents ambiguity for data completeness. Secondly, this study included different

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independent variables.

Some of the limitations of this study were, that there was no measure of incidence, and also as this study was carried out using a cross-sectional study design, it couldn't draw a cause-and-effect relationship between anemia and the identified factors.

CONCLUSION

The overall prevalence of anemia among adult patients visiting Jigjiga University Sheik Hassen Yabare Referral Hospital, Karamara Hospital, and Godey General Hospital in the Somali region, Ethiopia, 2023 was 19.1%. According to WHO this prevalence shows mild health problems, but warning signs of moderate health problems. An important predictor of anemia among adult patients was identified in this study. The identified predictors were the presence of a history of malaria, and leishmaniasis, and less fruit consumption was significantly associated with anemia. This predictor could help to develop a policy that may mitigate the occurrence of anemia among adult patients. Further study with different study designs and long study periods is needed to illustrate the prevalence and determinants as well as the cause-effect relationship of anemia among adult patients.

Acronyms And Abbreviations

AOR: adjusted odds ratio, BSc: bachelor of science, CI: confidence interval, COR: crude odds ratio, GGH: Godey General Hospital, G/DL: gram per decilitre, HGB: haemoglobin, **JUSHYRH**: Jigjiga University Shiesk Hassen Yabare referral hospital, KGH: Karamara general hospital, OR: Odds Ratio, SD: standardization, RBC: Red blood cell.

Ethical consideration

To conduct this study ethical approval was obtained from the institutional review board of the College of Health Sciences, Addis Ababa University. The official letter was written to the selected Hospital. Before informed consent was obtained, a clear description of the study title, procedure, duration, and possible risks and benefits of the study were explained to each study participant. Written informed consent was obtained before the face-to-face interview. Participation in the study was voluntary. The participants were informed of their right to quiet/refuse their participation at any stage of the study. To ensure the confidentiality of participant information, codes were used, and an identifier of participants was not written on the questionnaire

Availability of data and materials

Anyone who wants to an additional material can contact the corresponding author as well.

Conflict of interest

The authors would like to declare that have no any Competing interests.

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Authors' contribution/Authorship

TAG has carried out the overall design and execution of the study, performed data collection, and statistical analysis, and drafted the manuscript. ZA, WA, WB, FAG, HMW, and GSA have conceived the study, critically revised the design of the study, and data collection techniques, and helped with the statistical analysis. All authors read this manuscript and finally approved it for submission.

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