

**ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF NURSING AND MIDWIFERY
DEPARTMENT OF NURSING, POSTGRADUATE PROGRAM**

**PREVALENCE OF ANEMIA AND ITS ASSOCIATED FACTORS
AMONG ADULT PATIENTS AT SELECTED PUBLIC HOSPITALS IN
SOMALI REGION, ETHIOPIA 2023.**

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**A THESIS IS TO BE SUBMITTED TO THE DEPARTMENT OF
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This thesis by “Prevalence of anemia and its associated factors among adult patients at selected public hospitals in Somali region, Ethiopia 2023” is accepted in its present form by the board of examiners as satisfying the thesis requirement for the degree of masters in Adult Health Nursing.

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ABBREVIATIONS

AOR:	adjusted odds ratio
CI:	confidence interval
COR:	crude odds ratio
G/DL:	gram per deciliter
GGH:	Godey general hospital
HGB:	Hemoglobin
JUSHYRH:	Jigjiga University Sheik Hassen Yabare Referral Hospital
KGH:	Karamara general hospital
PI:	principal investigator
RBC:	red blood cell
SD:	standard deviation

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ABSTRACT

Background: Anemia is a decrease in the hemoglobin, hematocrit, or red blood cells, or their capacity to carry oxygen becomes insufficient to meet physiological needs - remains an intimidating global public health issue affecting over two billion individuals globally. People with anemia have an increased risk of developing several serious life-threatening health problems and complications those increasing medical care costs and lowering the quality of life. These problems are common, especially in developing countries, like Ethiopia. It affected over 2 billion individuals globally, and 61.5 million people live with a disability as a result of anemia. 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 selected public Hospitals 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 the selected public hospital in the Somali region, Ethiopia. The data was collected through face-to-face interviews using a structured interviewer-administered questionnaire and laboratory tests for hemoglobin levels. Data were entered into Epi data version 4.6 and analyzed by SPSS version 26. Descriptive, bivariable, and multivariable analysis was applied.

Results: The prevalence of anemia was 19.1% with 95% CI (15.4, 22.6). Fruit consumption of fewer 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 Recommended: This prevalence of anemia showed a mild health problem among adult patients. Malaria, leishmaniasis, and consumption of fruits were found to be independent predictors of anemia. Preventing or minimizing exposure to malaria and leishmaniasis, and increasing the consumption of fruits can significantly reduce the rate of anemia among adult patients. Further study is also needed with different study designs to identify the cause-and-effect relationship between anemia and the identified factors.

Key terms: adults, anemia, associated factor, prevalence.

1. INTRODUCTION

1.1. Background

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). It is also defined by the World Health Organization(WHO) as a low blood hemoglobin level(under 13 g/dl for men, 12 g/dl for non-pregnant women, and under 11g/dl in pregnant women(2, 3). According to its severity: 10–11.9 g/dl, 8–9.9 g/dl, and <8.0 g/dl of hemoglobin concentration for mild, moderate, and severe anemia respectively(4). It results from defects at any phase of red cell and hemoglobin production or an increased rate of red cell destruction (hemolysis), and due to blood loss(5).

According to previous studies the risk factors are widespread in developing countries, including nutritional deficiencies, and genetic hemoglobin disorders(6). Socio-demographics, lifestyle, dietary habits, and socioeconomic status pollards the distribution and severity, vulnerability, and consequences of anemia(7). The other risk factors for anemia in developing countries include deficiency of non-iron hematopoietic nutrients (folic acid, vitamin B12,), infections, and parasitic diseases (malaria, hookworm infections, leishmaniasis)(8). Low intakes of vegetables, fruits, meat, eggs, and fish are common factors of anemia among adults (9). For Iron Deficiency Anemia (IDA), 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). Malaria calls for anemia through hemolysis, increase spleen clearance of infected and uninfected red blood cells (RBC), and Hookworms are also the cause of anemia because of high red blood cell destruction and cause excessive RBC loss, and their propensity to feed on blood(11).

Patients who suffer from Anemia ordinarily come with dubious symptoms like lethargy, weakness, and tiredness. Extreme anemia may give syncope, shortness of breath, and decreased exercise tolerance (12).

Hemoglobin concentration is the most available diagnosis of anemia (13, 14)

People with anemia have an increased risk of developing several serious life-threatening health problems and complications those increasing medical care costs and lowering the quality of life(15). Anemia is complicated progressive organ infliction to the brain, kidneys, and cardiovascular system, neurocognitive dysfunction, cerebral infarction, stroke, pulmonary hypertension, and mortality(16), and it influences adults with a critical impact on efficiency and monetary growth (5).

1.2. Statement of the problem

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, an estimated 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(15), Whereas, in Africa, prevalence rates of anemia is 16.8 to 33.8% among adults reported in Uganda(11). According to a public report in Ethiopia in 2016, 24% of women and 15% of men were anemic (17).

According to WHO anemia is considered a significant public problem when the prevalence is more than 40%, a moderate public health problem when it is from 20%-40%, and a mild health problem when the prevalence is 5%-20%(18).

It is a miserable sign of a serious crux health condition. When it is left untreated can cause minimal energy strength, and productivity, which come with chronic fatigue, lethargy, loss of concentration, reduce blood pressure, shortness of breath, and even pollarded mental well-being(19, 20). It is complicated to progressive organ damage to the brain, kidneys, cardiovascular system, neurocognitive dysfunction, asymptomatic cerebral infarction, stroke, pulmonary hypertension, and mortality(16).

Even though 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(21). People living with disability due to anemia is a great physical burden of 61.5 million yearly worldwide (15).

Anemia affects not only the individual quality of life but also the social and economic development of the country, a particularly important issue in developing economies(22). The indirect outgoings for patients with anemia increase the number of days adults are absent from work and Repeated visits to the Hospital can impede full employment status for adults(16). It negatively affects General development, intellectual turn of events, and academic performance. It can likewise bring about weakness and low efficiency (productivity), which

contrarily affect the economy (23, 24). The Total economic loss is estimated to be US\$16.78 per capita or 4.05% of the GDP, and healthcare costs of \$7,000-\$30,000 then the same condition without anemia are still affecting the health systems worldwide (15).

The 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 (25). There is a piece of limited information on anemia among adults; as a result, this age group is often not included in the anemia control programs(26). More work-ups on anemia are needed to deliver public information. Therefore, this study aims to assess the current prevalence of anemia and its associated factor among adults.

1.3. Significance of the study

Studying and knowing the prevalence of anemia and its associated factors among adult patients help in planning to tackle the complication of anemia. This study will help the nursing profession and other health workers, understanding the prevalence and factors of anemia can help them to identify and diagnose anemia in their patients, and develop appropriate treatment plans. For policymakers, understanding the prevalence and factors of anemia can help them develop a targeted intervention to prevent and treat anemia. For anemic patients: Understanding the prevalence and factors of anemia can help to understand the risk factors and develop strategies to prevent and treat anemia. In addition, it will provide some insights for future researchers to work along this line, and it will help the investigator discover new knowledge and extends the expertise about anemia.

2. LITERATURE REVIEW

This literature review aims to review the existing knowledge about the prevalence and associated factors of anemia in adults to discuss the impact of the research findings on clinical practice and to identify gaps in the prevalence of anemia and associated factors in Ethiopia. As a baseline, works of literature have been reviewed and collected on socio-demographics, dietary habits, and Parasitic infection, which have an impact on anemia. There are a large number of studies on the prevalence of anemia and its associated factor in the general population. However, since the focus of this research is on the prevalence of anemia and its associated factor among adults, these will not be reviewed in detail and will only be referred to as appropriate.

2.1. Prevalence of anemia among adult patients.

Anemia is one of the ten most extreme problems in the world(27). The study conducted in Italy shows that the overall prevalence of anemia among adults was 23%(28) Another cross-sectional study conducted in Brazil shows that the predominance of anemia among Brazilian grown-ups was 9.9%(29). On the other hand cross-sectional study conducted in North Kerala, India shows that the overall prevalence of anemia is 51%(30). A study conducted in Bangladesh showed that the predominance of anemia was 41.3 %(31).and another study conducted in Ghaziabad shows that the prevalence of anemia was 23.2%(32).

The study conducted at a Hospital, in Benin City, Nigeria shows that the General pervasiveness of anemia was 27.3%(33).and in Malawi was 19.4%(34). Another cross-sectional study conducted in Buea in the southwest of Cameroon shows that the prevalence of anemia among adults was were14.8%(35). In the study conducted in Uganda, the overall prevalence of anemia was 20.3 %(11).

The study conducted in Ethiopia shows that Tigray 6.7%, Amhara 24.3%, SNNPR 20.7%, and Addis Ababa 5.5%, (18). The study conducted at Gilgel Gibe shows that the prevalence of anemia among adult patients was 40.9%(36). Other Cross-sectional study conducted at Hawassa University Referral Hospital; in Southern, Ethiopia showed that the General prevalence of anemia is 13%.(37).

According to the study conducted at Baso Liben District: cross-sectional study the prevalence of anemia was 25.94%(38).

2.2. Factors associated with anemia among adult patients.

2.2.1. Socio-demographic factors

A cross-sectional study conducted in Iran shows that married participants versus singles (AOR: 1.16, 95% CI: 1.02–1.32) had an extended chance of anemia(39).

According to a study conducted in Bangladesh people in the countryside were more likely to have anemia than those living in urban areas (AOR=0.854, 95 % CI: 1.004–0.726; $p = 0.057$)(40).

A cross-sectional study in Cambodia: ladies who have poorer economic status have more chance to be anemic as contrasted to women with richer economic status in Cambodia (AOR = 1.38), India (AOR = 1.15), in contrast to those who have followed a higher level of education in India (AOR = 1.24). Ladies who have poorer economic status have more chance to be anemic (AOR = 1.38). Women having widowed/divorced/separated are more likely to be anemic in contrast to never-union ladies in Timor-Leste (AOR = 1.73. Conversely, married women have less probability of anemia in Cambodia (AOR = 0.84) and Myanmar (AOR = 0.78)(41).

The study conducted in Ethiopia shows that the lowest wealth quintile has(AOR 1.255; 95% CI: 1.091-1.445) higher odds of having anemia(18). Most of the world population has a predominantly vegetarian diet, a slight increase in physiological iron supplement or pathological blood loss may lead to a failure to sustain iron balance, and the development of continuous iron depletion results in anemia(5). The study conducted at Debre Markos referral Hospital, Northwest Ethiopia: a Hospital-based cross-sectional study shows that monthly income (AOR=2.87; 95% CI:1.57, 5.0)(42). The study conducted at Gilgel Gibe shows that the chance of developing anemia in females is 1.78 times higher than in males (AOR = 1.78, 95% CI: [1.27,2.52]), 3.6 times higher in illiterates (AOR = 3.62, 95% CI: [1.57,8.35]) and 2.69 times higher in those who had a primary school (AOR = 2.69, 95% CI: [1.08,6.73])(36)

2.2.2. Dietary habit factor

Low intakes of vegetables, fruits, red meat, eggs, and fish are common factors of anemia. Less dietary intake is a stack for anemia among adults (9). A Cross-Sectional study in South India shows that consumption is associated with decreased odds of mild anemia. High caste is related to increased odds of moderate anemia(1)

Anemia has a great association with, fruit and vegetable consumption. For women who reported consuming less than five servings of fruits a day, the odds of being anemic is over six times [AOR = 6.64; 95% CI [4.21–10.44]]. Regarding vegetable consumption, those who did not consume at least five servings a day had 2.4 [AOR = 2.39; 95% CI [1.14–5.02]] times higher odds of being anemic(10). In a study conducted in Uganda Anemia is independently associated with low fruit consumption [AOR 1.55, 95% CI: 1.05-2.29]] (11)

The study conducted at Debre Markos Referral Hospital, Northwest Ethiopia: a Hospital-based cross-sectional study shows low dietary diversity consumption (AOR = 2.3; 95% CI: 1.12, 5.14)(43). Another cross-sectional study conducted in Arba Minch shows that, less fruit consumption [AOR=6.9, 95%: 1.36-8.9)(44).

2. 2.3. Parasitic infection

Parasitic infection is a significant factor that contributes to the development of anemia. Hookworm has a great association with anemia primarily with iron-deficiency anemia. Hookworm infection contributes to anemia as it feeds off its host's blood causing blood loss. In a study conducted in Indonesia, the association between hookworm infection and anemia is (AOR = 2.6, 95 % CI = 1.2, 5.8, $P < 0.05$)(45).

In the study conducted in Buea in the South West of Cameroon patients with malaria had more anemia compared to those without malaria (AOR = 4.33, 95%CI = 1.21-15.43, $p = 0.02$)(35). In a research report among Adult Patients Attending the Bamenda Regional Hospital, North West Region of Cameroon malaria shows a great association with anemia that is (AOR 3.739, 95% CI 0.1607 to 0.4219)(46). In a study conducted in Uganda Anemia is independently associated with infections including malaria (AOR 3.49, 95% CI 1.78-6.82), and hookworm infection (AOR 3.45, 1.73-6.91)(11).

The study conducted in Bule Hora General Hospital in West Guji zone, Southern Ethiopia shows that malaria infection is nearly 5 times more likely [AOR=5.42, 95% CI=0.307–11.034] to have anemia than those who did not have recent malaria infection(47). The study conducted at Estie, south Gondar of Amhara Region, south East Ethiopia shows that there is a strong relation between malaria and anemia $p < 0.05$)(48).

Anemia also has a great association with visceral leishmaniasis. A study conducted in Felege Hiwot Hospital Bahirdar, Ethiopia shows that 95% of visceral leishmaniasis patients have anemia(49). The study conducted at Debre Markos referral Hospital, Northwest Ethiopia: a Hospital-based cross-sectional study shows that leishmaniasis infection (AOR = 3.20; 95% CI:1.23, 6.61)(43).

Another cross-sectional study conducted in Arba Minch public health institutions shows that being infected with malaria has a great association with anemia(AOR 6.10, 95% CI 2.25-16.43, $p < 0.000$) (44). According to the study conducted at Baso Liben: a cross-sectional study of malaria infection (AOR = 4.61).

2.3. Summary

Anemia is one of the ten most extreme problems in the world. Globally, it is one of the leading causes of organ damage and disability. It affected over 2 billion individuals globally, and 61.5 million people live with a disability as a result of anemia. Different studies have been conducted on the prevalence and factors of anemia, but those studies are more focused on children, pregnant women, patients with chronic disease, and the older population. There is a paucity of information on the prevalence and factors of anemia among the adult population.

2.4. Conceptual framework

Malaria, Leishmaniasis, and hookworm (has a great association with anemia by rupturing the mature red blood cells. The most serious effect of infection is the development of anemia and protein deficiency caused by blood loss), dietary habit related to fruit, vegetable, meat, and fish, egg and Sociodemographic: age, sex, occupation, educational status, marital status monthly income and residence have also a great association with anemia.

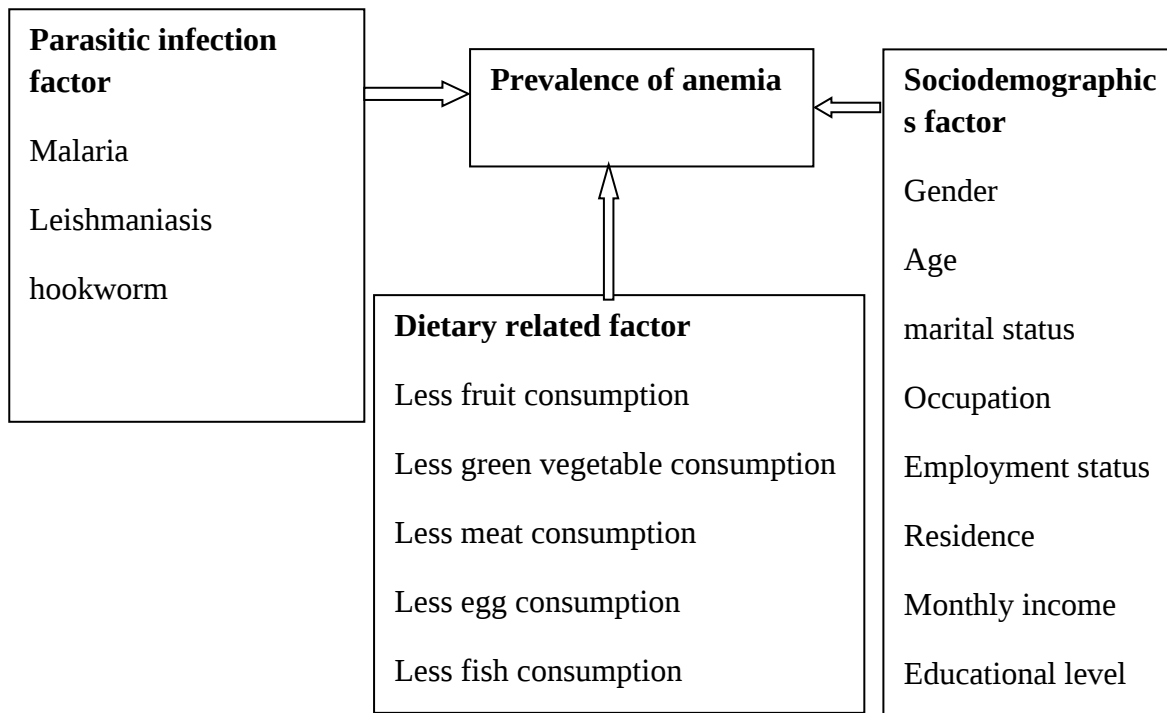


Figure1.Conceptual framework representing anemia and its associated factors among adult patients, 2023, adapted from reviewing the literature (1, 40)

3. OBJECTIVE

3.1. General objective

This study aims to assess the prevalence of anemia and its associated factor among adult patients at selected public hospitals in the Somali region, Ethiopia, 2023.

3.2. Specific objectives

To determine the prevalence of anemia among adult patients at selected public Hospitals in Somali Ethiopia, 2023.

To identify factors associated with anemia among adult patients at selected public hospitals in Somali Ethiopia, 2023.

4. MATERIAL AND METHODS

4.1. Study Area and Period

This study was conducted at the public Hospitals that are found in the Somali regional state. The Somali region 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 G.C., the region has 12 Hospitals, 208 health centers, and 1214 health posts. In the region, there are 12 public Hospitals: Jigjiga University Sheik Hassen Yabare Referral Hospital (JUSHYRH), Karamara General Hospital (KGH), Fik Primary Hospital (FPH), Bik 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. According to the monthly report for November 2014 Around 2640, and 2445 at JUSHYRH and KGH adult patients were registered respectively.

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. According to the monthly report for November 2014 on average 2456, adult patients were registered. The study was conducted from December 30 to January 25, 2023.

4.2. Study design

A quantitative institution-based cross-sectional study design.

4.3. Population

4.3.1. Source population

All adult patients who visited the outpatient department (OPD) of a Public Hospital in the Somali region, Ethiopia.

4.3.2. Study population

All adult patients who visited the OPDs of the selected public hospitals during the study period Somali Region, Ethiopia.

4.4. Eligibility criteria

4.4.1. Inclusion criteria

All adult patients who were 18-60 years, and visit OPDs of the selected Public Hospital in the Somali region, Ethiopia during the study period.

4.4.2. Exclusion criteria

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

4.5. Sampling size determination and sampling technique

4.5.1. 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 at Gilgel Gibe(36).

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

Where, 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%

Therefore, $n = \frac{(1.96)^2 * 0.409(1-0.409)}{(0.05)^2} = 371$ and a 10% non-response rate was considered so that the total sample size was $371 * 0.1 + 371 = 408.1 \approx 408$.

Sample size determination for the second objective (factors associated with anemia among adult patients at selected public hospital Somali Region, Ethiopia).

Table1 Sample size determination for factors associated with anemia among adult patients at selected public hospital Somali Region, Ethiopia, 2023

Factors	Assumption	Sample size	Reference
Sex	CI: 95% Power: 80% Ratio 1:1 Exposed: 27.7% Non exposed: 15 % AOR: 2.17	356	(36)
Educational status Illiterate	CI: 95% Power: 80% Ratio 1:1 Exposed: 59.7 % Non exposed: 20.5 % AOR: 5.74	58	(36)

Lastly, the sample size calculated for the second objective with adding a 10% non-response rate was $391.9 \approx 392$, 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.

4.5.2. 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 for each selected Hospital. According to the respective Hospital's monthly report in November 2014, 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 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^{th} 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.

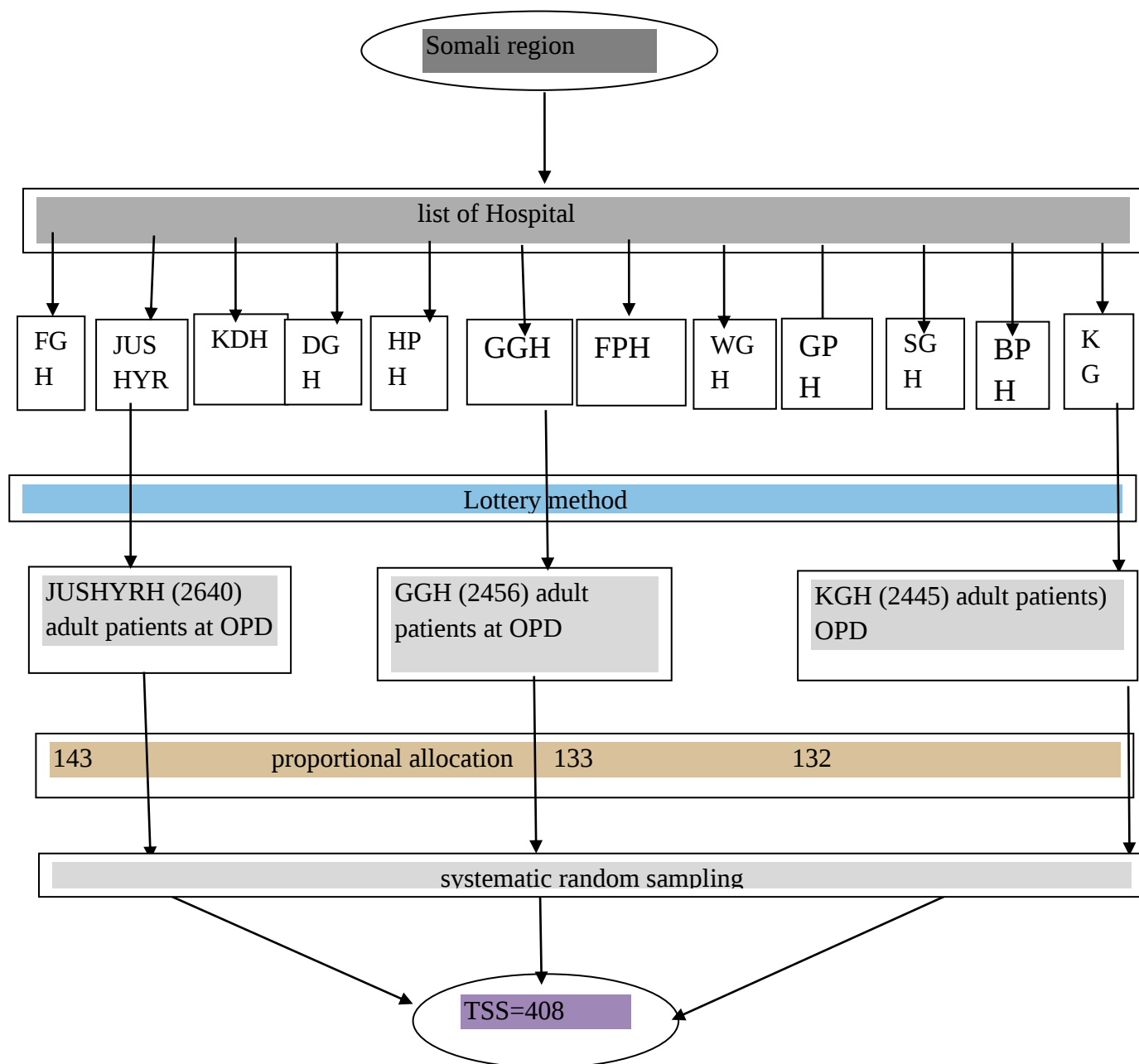


Figure 2: Schematic representation of the sampling procedure to assess the prevalence of anemia and its associated factor among adult patients at selected public hospitals in the Somali region, Ethiopia, 2023.

4.6. Study variable

4.6.1. Outcome (Dependent) variable

Prevalence of anemia

4.6.2. Exposure (Independent) variable

Socio-demographic (Age, Sex, Marital status, Education, occupation, residence, and monthly Income, parasitic infection: Malaria (Yes, No) Leishmaniasis (Yes, No) and Hookworm (Yes, No), Dietary habit related factors: frequency of Vegetable and Fruit consumption (<three, and $\geq$ three per day), Red meat, egg, and fish consumption (<three, and $\geq$ three per day).

4.7. Operational definition

Adult: A person (Individuals) aged ≥ 18 and < 61 are considered an adult in this study(50).

Anemic - Patients whose hemoglobin level is $<12\text{g/dl}$ and 13 g/dl for women and men respectively are considered anemic in this study(51).

Mild anemia- Patients whose hemoglobin level is $10\text{-}11.9\text{ g/dl}$ (4).

Moderate anemia- Patients whose hemoglobin level is $8\text{-}9.9\text{ g/dl}$ (4).

Severe anemia- Patients whose hemoglobin level is less than 8g/dl (4).

Non-anemic- hemoglobin levels $>12\text{g/dl}$, and 13 g/dl for women and men respectively are considered nonanemic in this study.

Educate fruit and vegetable consumption: patients who consume fruit and vegetable less than three servings per day(11)

History of malaria -patients who had malaria within one month(46).

History of leishmaniasis- patients who had malaria within one month(49).

History of hookworm- patients who had malaria within one month(45).

4.8. Data Collection Instrument and Procedures

4.8.1. Data Collection Instrument

The tool was adapted from a similar study at Wachamo University Nigst Hileni Memorial Referral Hospital(17). 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 assess the sociodemographic characteristics of participants. The 2nd section was composed of 10 items that assess 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.

4.8.2. Data Collection Procedure

There were 10 data collectors, Four from JUSHYRH and three from KGH and GGH expert staff nurses for data collection and three nurses for supervisors 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.

4.9.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.

4.10. Data processing and analysis

The data were coded, cleaned, edited, and entered into 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 Bivariable 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.

4.11. 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 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.

4.12. Dissemination plan

The findings of this study will be submitted to the Addis Ababa University Department of Nursing and Midwifery. It will also be sent to selected hospital administration departments. It will be presented at Addis Ababa university black lion health science college. With the permission of Addis Ababa University, the paper will be published in journals by coordinating with the respective advisors. It will be sent to peer review journals for publication.

5. RESULTS

5.1. The Socio-Demographic Characteristics

The study participants in the study were 371(90.7%). Over half (54.4%) of the participants were female, and the majority (36.9%) were 18-29 years old with a mean age of 35.2 (SD±11.73) years. Similarly, more than half (56.9%) were married, and urban dwellers (59 %). Nearly three-fourths of the study participants (73.9 %) had completed primary and above education (Table 2).

Table 2. Sociodemographic characteristics of adult patients who attended the selected Public Hospitals, Somali region, eastern Ethiopia,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

5.2. Dietary habit-related factor

More than three-fourths (90.8%) of the participants had consumed fruit, among those the majority (60.9%) had consumed fruit less than three servings per day (Table 3).

Table 3 1. Dietary habit characteristics of patients who attended a selected Public Hospital, Somali, Ethiopia, 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

5.3. Parasitic infection-related factor

Over one-tenth, (13.7%) of the study participants had a history of malaria. Similarly, more than one-tenth (17.5%) had a history of leishmaniasis (Table 4).

Table 4. Parasitic characteristics of patients who visited selected Public Hospital, Somali, Ethiopia, 2023 (n=371)

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

5.4. 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% were female, and 9.7% male. The majority of the study participants (11.8%) were rural, and 7.3% were urban residents.

.Regarding the severity of anemia 41(57.7%) 22(31%), and 8(11.3%), were mild, moderate, and severe anemia respectively. More than one-tenth(15.7%) of the participants had anemia and consume 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.

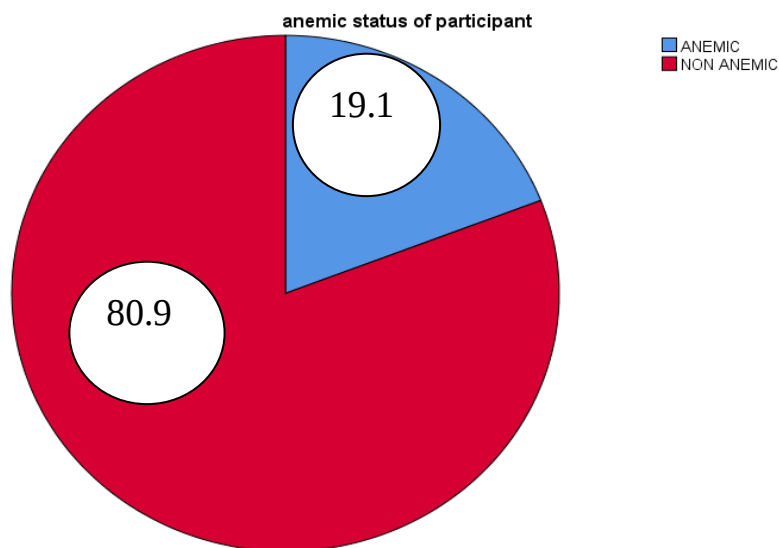


Figure 3. Prevalence of anemia among adult patients at JUSHYRH, KGH, and GGH Somali, Ethiopia, 2023.

5.5. Predictor of anemia

Bivariable and multivariable logistic regression was used for analysis to identify factors associated with anemia among adult patients. Finding 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 5). However, in the multivariate analysis frequency of fruit consumption, malaria, and leishmaniasis had a significantly significant association with anemia at a P value <0.05 (Table 5).

Patients with a history of malaria had around four times higher to develop anemia (AOR= 3.701, 95% CI: 1.7371, 7.886) as compared to patients without a history of malaria after adjusting for other variables in the model. The chance of experiencing anemia was over 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 5. Bivariable and multivariable logistic regression analysis of anemia among adult patients at selected public hospital Somali, Ethiopia, 2023 (n=371)

Variable	Category	Anemia status		COR (95%CI)	AOR (95% CI)
		Yes (%)	No (%)		
Residence	Urban	27(7.3)	192(51.8)	1	1
	Rural	44 (11.8)	108(29.1)	0.345(0.202-0.589)	0.5(0.228-1.099)
Education	unable to write and read/ able to write and read	26 (7)	71(19.1)	1.864(1.074-3.234)	0.018(0.494-2.101)
	primary/ secondary /higher education	45(12.1)	229(61.7)	1	1
Occupation	governmental employees	11 (3)	84(22.6)	1	1
	Farmer	23 (6.2)	41(11.1)	0.233(0.104,0.525)	0.686(0.228,2.077)
	daily labor/ student/ merchant	16 (4.3)	125(33.7)	0.717(0.332-1.549)	0.525(0.212, 1.298)
	Housewife	21 (5.7)	50(13.5)	0.458(0.193,1.088)	0.859(0.333,2.215)
Monthly income	<5000	57(15.4)	190(51.2)	3.481(1.713-7.073)	2.3(0.950,5.566)
	≥5000	14 (3.8)	110(29.6)	1	1
Fruit consumption	Yes	60(16.2)	277(74.7)	1	1
	No	11(3)	23(6.2)	0.453(0.210-0.979)	0.774(0.310,1.935)
vegetable consumption	Yes	53 (14.3)	250(67.4)	1	1
	No	18(4.9)	50(13.5)	0.589(0.318,0.89)	0.642(0.302,1.365)
meat consumption	Yes	55(14.8)	267(72)	1	1
	No	16(4.3)	33(8.9)	0.425(0.219-0.285)	0.557(0.254-1.223)
Frequency of fruit-eating	less than or equal to 2 times a day	57(15.7)	171(46.1)	3.071(1.64-5.754)	2.893(1.1517, 7.274) *
	greater than 2 times a day	14 (3.8)	129(34.8)	1	1
Frequency of vegetable eating	less than equal to 2 times a day	60 (16.2)	223(60.1)	1.883(0.942-3.767)	0.801(0.286,1.099)
	greater than 2 times a day	11(3)	77(20.8)	1	1
Frequency of meat-eating	less than equal to 2 times a week	52(14)	174(46.9)	2.132(1.192-3.815)	1.135(0.486,2.651)
	greater then 2 times a week	19(5.1)	126(34.1)	1	1
History of malaria	Yes	20(5.4)	31(8.4)	3.665(1.926-6.974)	3.701(1.737-7.886) **
	No	51(13.7)	269(72.5)	1	1
History of leishmaniasis	Yes	23 (6.2)	42(11.3)	2.943(1.624-5.334)	2.296(1.149,4.586) *
	No	48(12.9)	258(69.5)	1	1
History of hookworm	Yes	16(4.3)	33(8.9)	2.354(1.212-4.572)	1.683(0.772, 3.670)
	No	55(14.8)	267(72)	1	1

Key: *P-value < 0.05, **P-value<0.001

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

6. DISCUSSION

This study explored 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 to be 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%(11), and SNNPR 20.7% (18). However, it is higher than the study conducted in Brazil 9.9%(29), Buea in the southwest of Cameroon(14.8%), Hawassa University Referral Hospital 13 %(37), Tigray 6.7%, and Addis Ababa 5.5%(18). The possible justifications for the observed difference of the higher magnitude in the current study to the study done in Brazil 9.9%(29), and Buea in the southwest of Cameroon(14.8%), maybe a diagnostic method (the above study diagnostic method was using CBC machine), but this study used hemacue 201+ to determine hemoglobin level, and sample size (the above study sample size was higher than this study). 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 may be due to differences in the sample size. The sample size in the conducted at Addis Ababa, and Tigray was higher than this study.

On the other hand, this study was lower than the study conducted in Italy 23% (28), North Kerala, India (51%) (30), Bangladesh 41.3%(31), Benin City, Nigeria 27.3%(33), Baso Liben District 25.9 %(52), Amhara, 24.3%,(18), Gilgel Gibe 40.9%(36). 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 similar to the study conducted in Buea in the South West of Cameroon(35), North West Region of Cameroon(46), Uganda(11), West Guji zone, Southern Ethiopia(47), Baso Liben(38). This similarity might be due to similarities in the study design, and study period. It is also scientifically associated with anemia through hemolysis, and increase spleen clearance of infected and uninfected red blood cells(11).

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), which is similar to the study conducted in the Debre Markos referral Hospital(43). This similarity may be due to a similar study period, and healthcare system. Scientifically Leishmaniasis also has a great association with anemia by sequestration and destruction of red blood cells and alteration in RBC Membrane permeability(49).

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), which is in line with the study conducted in Uganda(11), Debre Markos referral Hospital(43), and Arba Minch(44). This similarity might be due to a similar sample size, and study period. 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 Result of low vitamin B12 or folate which are needed for erythrocytosis(10).

7. Strengths and limitations of the study

This study was conducted to assess the prevalence of anemia and its associated factor among adult patients in the Somali region, eastern Ethiopia. There are some important strengths of this study. Primary data was Collected through face-to-face interviews and direct measurement of hemoglobin levels from patients can provide accurate and reliable information about the prevalence of anemia and associated factors.

Some of the limitations of this study were, 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.

8. CONCLUSION AND RECOMMENDATION

8.1. Conclusion

This prevalence of anemia showed a mild health problem among adult patients. Malaria, leishmaniasis, and consumption of fruits were found to be independent predictors of anemia. Therefore, Malaria, leishmaniasis, and less consumption of fruits could be targeted for anemia screening and prevention.

8.2. Recommendations

Based on the finding of this study the following recommendations were forwarded accordingly: -

Preventing or minimizing exposure to malaria and leishmaniasis, and increasing the consumption of fruits can significantly reduce the rate of anemia among adult patients.

To policymakers: it is better to prioritize the prevention and treatment of malaria and leishmaniasis, as these conditions were found to be associated with anemia. And also consider implementing programs to increase access to and consumption of fruits, as low fruit consumption was also found to be a risk factor for anemia.

To Hospital administrators: Improve the screening and diagnosis of malaria and leishmaniasis: given that these two diseases were found to be associated with anemia, it is important to ensure that patients are screened and diagnosed early so that appropriate treatment can be provided.

To healthcare providers: The health workers should provide health education on the prevention of malaria and leishmaniasis. It is also important to educate to increase fruit consumption to minimize the occurrence of anemia.

To future researchers: Further study with different study designs is needed to identify the cause-and-effect relationship between anemia and the identified factors, and also explore the other potential risk factors.

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10.APPENDIX

10.1. ANNEX I. Participant's information sheet

My name is _____ I am working on behalf of research conducted by Takele Arega Student of Addis Ababa University, School of Nursing and midwife. I kindly request you to lend me your attention to explain the study and be selected as the study participant. If you allow me, I would like to ask a few questions which take 20 minutes after you got the following information sheet.

The study titles

prevalence and associated factors of anemia among adults attending at selected public Hospital Somali Region, Ethiopia.2023

The objective of the study

to assess the prevalence and associated factors of anemia among adults attending selected public Hospital Somali Region, Ethiopia,2023

Procedure and duration

I will be interviewing you using a structured questionnaire to provide me with pertinent data and provide two drops of the blood sample that is helpful for the study. The interview will take about 20 minutes, so I kindly request you.

Risks and benefits of study

The risk of participating in this study is so minimal, but only taking your time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for regional health planners. on the other hand, if you have anemia during the examination the management for your case will be arranged and you will be treated accordingly.

Rights of participants

Participation in this study is fully voluntary. You have the right to decide whether to participate or not in this study. If you decide to participate, you have the right to withdraw from the study at any time. You do not have to answer any question that you do not want to answer.

Confidentiality

The information you will give us will be confidential. There will be no information that will identify you in particular. Any information forwarded will be kept secret and your name will not be specified.

Contact address

If there are any questions at any time about the study or the procedures, you can contact me by using the following addresses.

Principal investigator: Takele Arega

Email address arega160@gmail.com

Phone number 0908255012

10.2. ANNEX II: Informed consent

I have read this form or it has been read to me in the language I understand. I have got the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating, and the contact address for any queries. I have been allowed to inquire questions about things that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to reply to any question that I do not want. Are you willing to participate in this study?

1. No -----(say Thanks!)
2. Yes-----I declares my voluntary consent to participate in this study with my signature as indicated below.

Name: _____ Signature of participants: _____
date_____

Data collector Name: _____ Signature of data of data
collector_____date_____

N.B. This is to be signed face-to-face in the presence of the data collector

10.3. ANNEX III: English version questionnaires

Part I Socio-demographic characteristics

	Questions/Variables	Option/Response	Remark
001	Age	____in year	
002	Sex	0. Female 1. Male	
003	Marital status	0. Single 1. Married 2.Divorced 3.Widowed	
004	Educational status	0. Unable to read and write 1.Able to read and write 2.Primary school 3.Secondary school 4.Higher education	
005	Residence	0. Urban 1. Rural	
006	monthlyincome whentransferred intocashin Ethiopian Birr	_____birr	
007	Occupational status	0.Farmer 1.Daily laborer 2.Governmental employee 3.Students 4.Merchants 5. Housewife 6.Other Specify	

	Part II: Dietary habits-related question		
101	Do you consume fruit?	0.yes1.No	
102	If yes for Q.201 How many times per week on average?	1 2 3 4 ≥5	
103	Do you consume vegetables?	0.yes1. No	
104	If yes for Q.203. How many times per week on average?	1 2 3 4 ≥5	
105	Do you consume red meat?	0.yes1. N0	
106	If yes for Q205. How many times per week on average?	1 2 3 4 ≥5	
107	Do you consume eggs?	0.yes 1. No	

108	If yes for Q.207. How many times per week on average?	1 2 3 4 ≥5	
109	Do you consume fish?	0.yes1.No	
110	If yes for Q.209. How many times per week on average?	1 2 3 4 ≥5	

Part III. infection-related Parasitic factor question

201	Do you have a history of malaria in the last month?	0.yes 1. no	
202	Do you have a history of leishmaniasis in the last month?	0.yes1.no	
203	Do you have a history of hookworm in the last month?	0.yes 1. no	

Part IV Laboratory result

301	Hemoglobin level	_____g/dl	
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10.4. ANNEX IV Somali version

Lifaaqa I. Xaashida macluumaadka ka qaybqaataha

Magacaygu waa _____ Waxaan ku hadlayaa magaca cilmi-baarista uu sameeyay Takele Arega Arweekga Jaamacadda Addis Ababa, Dugsiga Kalkaaliyaha iyo umulisada. Waxaan si naxariis leh kaaga codsanayaa inaad i siiso dareenkaaga si aan u sharaxo daraasadda iyo in lagu doorto ka qaybqaataha daraasadda. Haddii aad i ogolaato, waxaan jeclaan lahaa inaan ku weydiiyo dhawr su'aalood oo qaadanaya 20 daqiiqo ka dib markaad fahanto xaashida macluumaadka ee soo socota.

Cinwaanka daraasadda

baahsanaanta iyo arrimaha la xidhiidha dhiig-yarida dadka waaweyn ee tagaya isbitaalka Jigjiga University Sheik Hassen Yabare Referral Hospital Karamara General Hospital Somali Ethiopia.2022

Ujeedada daraasadda

si loo qiimeeyo baahsanaanta iyo arrimaha la xidhiidha dhiig-yarida dadka waaweyn ee tagaya isbitaalka Jigjiga University Sheik Hassen Yabare Referral Hospital cisbitaalka guud ee Karamara Somali Ethiopia,2022

Habka iyo muddada

Waxa aan ku waraysan doonaa aniga oo isticmaalaya xog-waraysi habaysan si aan ii siiyo xog khuseeya daraasadda. Wareysigu wuxuu qaadan doonaa ilaa 20 daqiiqo, marka si naxariis leh ayaan ku codsanayaa.

Katara iyo faa'iidooyinka waxbarashada

Khatarta ka-qaybgalka daraasaddan waa mid aad u yar, laakiin kaliya qaadashada waqtigaaga. Ma jiri doonto lacag toos ah ka qaybqaadashada daraasaddan. Laakiin natiijooyinka ka soo baxay cilmi-baarista ayaa laga yaabaa inay daaha ka qaadaan macluumaadka muhiimka ah ee qorshayaasha caafimaadka Redional. Dhanka kale, haddii aad qabto dhiig-yaraan inta lagu jiro baaritaanka maamulka kiiskaaga ayaa la diyaarin doonaa oo waxaad raaci doontaa si waafaqsan.

Xuquuqda ka qaybgalayaasha

Ka qaybqaadashada daraasaddan waa ikhtiyaari. Waxaad xaq u leedahay inaad cadweekso inaad ka qaybqaadato ama aadan ka qaybqaadan karin daraasaddan. Haddii aad go'aansato inaad ka qaybgasho, waxaad xaq u leedahay inaad ka baxdo daraasadda wakhti kasta. Uma baahnid inaad ka jawaabto su'aal kasta oo aadan rabin inaad ka jawaabto.

Qarsoodi

Macluumaadka aad na siin doontaa waxay ahaan doontaa qarsoodi. Ma jiri doono macluumaad si gaar ah kuu aqoonsan doona. Macluumaad kasta oo la soo gudbiyo waa la qarin doonaa oo magacaaga lama cayimi doono.

Cinwaanka lagala soo xidhiidho

Haddii ay jiraan wax su'aalo ah ama weydiimo ah wakhti kasta oo ku saabsan daraasadda ama nidaamka, waxaad ila soo xiriiri kartaa adigoo isticmaalaya ciwaannada soo socda.

Baaraha maamulaha: Takele arega

Ciwaanka iimaylka arega160@gmail.com

Nambarka telefoonka 0908255012

Lifaaqa II: Oggolaanshaha la wargeliyay

Waan akhriyey foomkan ama waxa la iigu akhriyey luqadda aan fahmayo. Waxaan si cad u fahmay ujeedada cilmi-baarista, hababka, khatarta iyo faa'iidooyinka, arrimaha sirta, xuquuqda ka qaybqaadashada, iyo ciwaanka xiriirka ee su'aalo kasta. Waa la ii oggolaaweek in aan weydiiyo su'aalo ku saabsan waxyaalaha laga yaabo in aan cadweekn. Waxaa la igu wargeliyay inaan xaq u leeyahay inaan ka baxo daraasadda wakhti kasta ama inaan ka jawaabin su'aal kasta oo aanan rabin. Diyaar ma u tahay inaad ka qaybgasho daraasaddan?

1. Maya ----- dheh Mahadsanid!)

2. Haa---- Waxaan cadeynayaa oggolaanshahayga ikhtiyaarka ah si aan uga qaybqaato daraasaddan saxeexayga sida hoos ku cad.

Magaca: _____ Saxeexa ka qaybgalayaasha:
 _____ taariikhda_____

Magaca xog ururiyaha: _____ Saxeexa xogta xog
 ururiyaha_____ taariikhda_____

N.B. Tani waa in si fool ka fool ah loo saxeexaa iyadoo uu joogo xog-uruiyaha

Lifaafa III: Su'aalaha qaabka ingiriiska

Qaybta I sifooyin-bulsheed

Su'aalaha/Waxyaabaha Kala Duwanaaya/Xulashada Jawaabta

001	Dada	____sanadka	
002	Galmo	0.Dheddig 1. Lab	
003	Xaaladda guurka	0. Doobnimo 1. Guursaweek 2. La furay 3. Carmal	
004	Heerka waxbarasho	0. Aan akhriyin waxna qori Karin 1. Wax akhriyi kara waxna qori kara 2. Dugsiga hoose 3. Dugsiga sare 4. Waxbarashada sare	
005	Deegaan	1. magaalo0. Miyi	
006	Dakhli bishii Birr Itoobiya		
007	Heerka shaqada	0. Beeraley 1. Shaqaale maalmeed 2. Shaqaale dawladeed 3. Arweekda	

		4. Ganacsatada 5. Naag guri 6. Kuwo kale sheeg	
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Qaybta II: caadooyinka cuntada

101	Maisticmaashaa khudaar?	0.Maya1. Haa	
102	Hadweek haa tahay Q.12. Celcelis ahaan imisa maalmood todobaadkii?	1 2 3 4 ≥ 5	
103	Ma isticmaasha khudaar?	0.Maya 1. Haa	
104	Hadweek haa tahay Q.13. Celcelis ahaan imisa maalmood todobaadkii?	1 2 3 4 ≥ 5	
105	Hilibka cas ma cuntaa?	0.Maya1. Haa	
106	Hadweek haa tahay Q.14. Celcelis ahaan imisa maalmood todobaadkii?	1 2 3 4 ≥ 5	
107	14 Ma cuntaa beedka?	0.Maya1. Haa	
108	Hadweek haa tahay Q.15. Celcelis ahaan imisa	1 2	

	maalmood todobaadkii?	3 4 ≥5	
109	Miyaad isticmaashaa kalluunka?	0.Maya1.Haa	
110	Hadweek haa tahay Q.16. Celcelis ahaan imisa maalmood todobaadkii?	1 2 3 4 ≥5	

Qaybta IV. Fayraska la xidhiidha caabuqa dulinka

201	Ma leedahay taariikh duumo?	0.Maya 1. Haa	
202	Ma leedahay taariikh leishmaniasis?	0.Maya 1. Haa	
203	Miyaad leedahay taariikh hookworm	0.maya 1. Haa	

Natiijada shaybaadhka

301	Heerka hemoglobin ee g/dl	
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