School of Graduate Studies

Magnitude of postpartum anemia and associated factors among women Attending Immunization Program in Wolkite town health facilities, Gurage zone, Ethiopia 2023

MPH RESEARCH THESIS

Henok Seifu (BSC)

July 2023

Wolkite, Ethiopia

WOLKITE UNIVERSITY

School of Graduate Studies

Magnitude of postpartum anemia and associated factors among women Attending Immunization Program in Wolkite town health facilities, Gurage zone, Ethiopia 2023

A Thesis Submitted to school of graduates studies in Partial Fulfillment of The Requirements for The Degree of Master of Public Health in reproductive health

HENOK SEIFU (BSC)

Major Advisor: Kifle Lentiro (Ass.professor)

Co-Advisor: Girma Alemayehu (Ass.professor)

July 2023

Wolkite, Ethiopia

APPROVAL SHEET

Wolkite University

SCHOOL OF GRADUATE STUDIES

WOLKITE UNIVERSITY

This is to certify that the thesis entitled "Magnitude of postpartum anemia and associated factor among women Attending Immunization Program in Wolkite town health facilities, Gurage zone, Ethiopia 2023" submitted in partial fulfillment of the requirements for thedegree of Master's with specialization in Public Health in Reproductive health,the Graduate program of the School of Public Health, and has been carried out by Henok Seifu Id.No 003/14 under our supervision. Therefore, we recommend that the student has fulfilled the requirements and hence hereby can submit the thesis to the department.

Name of major advisor

Mr. kifle lentiro (Assistant professor) Signature _____Date_____

Name of co-advisor

Mr. GirmaAlemayehu (Assistant professor) Signature _____Date_____

EXAMINERS APPROVAL SHEET

SCHOOL OF GRADUATE STUDIES

WOLKITE UNIVERSITY

We, the undersigned, members of the board examiners of the final opened defense by Henok Seifu have read and evaluated his/her thesis entitled “Magnitude of postpartum anemia and associated factor among women Attending Immunization Program in Wolkite town health facilities, Gurage zone, Ethiopia July 2023”, and examined the candidate.This is, therefore to certify that the thesis has been accepted in partial fulfillment of the requirements for the degree Masters of Public Health in RH.

Name of Chairperson

_____ Signature _____Date_____

Name of Internal Examiner

_____ Signature _____ Date _____

Name of External Examiner

_____ Signature _____ Date_____

SGS Approval

_____ Signature_____ Date _____

Statement of the author

By my signature below, I declare and affirm that this Thesis is my own work. I have followed all ethical and technical principles of scholar in the preparation, data collection, data analysis and compilation of this Thesis. Any scholarly matter that is included in the Thesis has been given recognition through citation.

This thesis is submitted in partial fulfillment of the requirements for a master degree at Wolkite University. The thesis will deposit in Wolkite University Library and is made available to borrowers under the rules of the Library. I solemnly declare that this thesis has not been submitted to any other institution anywhere for the award of any academic degree, diploma of certificate.

Brief quotations from this thesis may be made without special permission provided that accurate and complete acknowledgement of the source is made. Requests for permission for extended quotations from or reproduction of this thesis in whole or in part may be granted by the Head Department when in his or her judgment the proposed use of the material is in the interest of scholarship. In all other instances, however, permission must be obtained from the author of the thesis.

Name: Signature:

Date:

School/department

ACKNOWLEDGMENTS

First and most essentially, I thank God, the Almighty, for giving me numerous blessings, knowledge, and opportunities to finally finish this thesis. I would like to thank to my advisers, Kifle Lentiro (Ass. prof) and Girma Alemayehu (Ass. prof) for their enormous effort onrevisingthe document unflinching guidance and support to make this research work accomplished.

My thanks also extend to my family, especially my mother Zuriyash Haile, for her belief in me tokeep my spirit and motivation throughout the paths. I am also grateful to my classmates and my office mates, for their contribution on editing document, providing constructivefeedbacks sessions, and moral support. Last but not least, my heart felt appreciation goes to research assistants, and study participants who put great impacted on accomplishment of this work.

ACRONYMS

ANC: Ante-natal Care

AOR; Adjusted odds ratio

APH: Anti partum hemorrhage

COR: Crude odds ratio

EDHS: Ethiopian Demographic and Health Survey

IFA: Iron Folic Acid

MUAC: Mid upper arm circumference

PPA: Postpartum anemia

PPH: Post-partum Hemorrhage

SPSS: Statistical Package for Social Science

USA: united states of America

WHO: World Health Organization

MDD-W:Minimum Dietary Diversity for Women

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Abstract

Introduction: -Anemia is one of the major public health problems affecting nearly one-third of the global population. Its highest health impact is among pregnant and postpartum women. However postpartum anemia has received very little attention, even though the issue of anemia during pregnancy has received significant attention. The consequences of postpartum anemia are reduced milk production, sadness, impaired cognitive and motor development, exhaustion, lightheadedness, and lethargy. Globally, postpartum anemia contributes to 20% of maternal death.

Objectives: -This study aims to assess the magnitude of postpartum anemia and associated factors among women Attending Immunization Program at Wolkite Town Health Facility, Gurage zone, Ethiopia, July 2023.

Methods: -An institution-based cross-sectional study was conducted from June 20 to July 30, 2023.A total of 386 postpartum mothers attending immunization were selected by systematic random sampling. The data was collected through an interviewer-administered questionnaire and hemoglobin level was measured using a hematology Analyzer. Data is entered into Epi data software and exported to SPSS version 21 for analysis. Binary logistic regression was applied to assess associated factors and variables with a P-value less than 0.05 were considered statistically significant.

Result: The magnitude of postpartum anemia was 22.9% (95% CI;(18.6-26)). Birth interval less than 24 months (AOR: 2.133,95%CI(1.172-3.883)), less than minimum dietary diversity (AOR: =2.626, 95% CI:(1.427-4.882))and grand multiparity (AOR =0.211,95% CI:(0.063-0.712)) were associated with postpartum anemia.

Conclusion and recommendation: The magnitude of post-partum anemia in this study was 22.9%.This suggests it is a moderate public health problem. There fore , focusing on counseling and educating mother about birth spacing, limiting parity, and taking diversified diet would help to decrease anemia among postpartum women.

Keywords: postpartum anemia, health facility, hemoglobin, Wolkite town

1. INTRODUCTION

1.1 Background

Anemia is a public health issue linked to adverse health outcomes such as higher risk of maternal and prenatal mortality, increased rates of preterm birth and/or low birth weight, poor physical and cognitive growth in children, and decreased adult productivity. Anemia is a common complication of pregnancy and has consequences for both the mother and the baby. Preterm birth and low birth weight are both three times more likely when a mother has maternal iron deficiency anemia during pregnancy(1).According to World Health Organization, pregnancy-specific hemoglobin values are used to characterize anemia in pregnancy and the postpartum period; specifically, mild anemia is defined as 10-10.9 g/dl, moderate anemia as 7-9.9 g/dl, and severe anemia as less than 7 g/dl(2–4).Most bodily tissues become oxygen-starved when the hemoglobin level drops below 4.1 g/dl, and the heart muscles are likely to collapse, leading to death(5).

Postpartum anemia is a widespread issue worldwide. The postpartum period is the period following childbirth, which lasts up to the sixth week postpartum and is characterized by the mother's body returning to pre-pregnancy parameters, including hormonal levels and uterine size. It's also known as the puerperium or postnatal phase (6).One of the most frequent puerperal consequences and a major cause of maternal morbidity and mortality is post-partum anemia(7). Prepartum iron deficiency anemia combined with acute bleeding at delivery, infections like malaria, intestinal worms, and disease conditions like hemoglobinopathies, poor socioeconomic conditions, and nutritional deficiencies are the main causes of postpartum anemia in developing countries(7,8).

Each year, around 500,000 maternal deaths due to labor and delivery occur worldwide, with post-partum anemia accounting for 20% of the deaths(9,10). Post-partum anemia is the most unintentional factor contributing to mother mortality in Ethiopia. Post-partum anemia accounts for roughly 29% of cases, according to EDHS 2016(11,12).

1.2 Statement of the Problem

Postpartum anemia is a leading cause of disability, infant anemia, and a major public health problem. The risks of anemia are influenced by the mother's health throughout pregnancy and the postpartum period (13,14). The WHO describes postpartum as a critical and often forgotten phase in the lives of women and newborns (7). It is estimated that there are around 1.5 billion anemic mothers worldwide. Postpartum mothers are at higher risk of anemia due to maternal iron depletion, blood losses, lacerations/tears, and episiotomy. Also, anemia leads to depressive symptoms, cognitive difficulties, exhaustion, poor work performance, compromised immune system, and inadequate breast milk (15). In a study made in 2017, 295000 women passed away immediately after or shortly after childbirth due to anemia and postpartum hemorrhage (6,16). The great majority of this happened in situations with limited resources (17). Each year, around 500,000 maternal deaths due to labor and delivery occur worldwide, with post-partum anemia accounting for 20% of these deaths (9,10). Even in countries with abundant resources, postpartum anemia affects low-income women frequently. In a study of women from low socio-economic classes in the USA, 21% of those with normal hemoglobin in the third trimester developed anemia postpartum (18). Mothers from underdeveloped countries and those who live in poverty show this more. In Ethiopia, postpartum anemia accounts for about 2% of all maternal deaths (19). In industrialized nations, post-partum anemia affects between 10% and 30% of women, but in low- and middle-income nations, it affects between 50% and 80% of women(13).According to the EDHS 2016 survey, 58% of women who gave birth within the last five years should not had taken iron supplements during their most recent pregnancy (11).Post-partum anemia is the most unintentional factor contributing to mother mortality in Ethiopia.

Since there is no literature available about postpartum anemia up to one year in this regard, the current study was the first of its kind to be conducted in Wolkite city.

1.3 OBJECTIVE

1.3.1 General objective

- To assess the magnitude of postpartum anemia and associated factors among women Attending Immunization Program in Wolkite town health facilities, Gurage zone, Ethiopia 2023.

1.3.2 Specific objective

- To determine the magnitude of postpartum anemia among women who Attended Immunization Program in Wolkite town health facilities Gurage zone, Ethiopia 2023.
- To identify factor association of postpartum anemia among women who Attended Immunization Program in Wolkite town health facilities Gurage zone, Ethiopia 2023.

1.4Significance of the Study

Although research on anemia has been done in the general population, there is insufficient evidence on the magnitude and factors associated with postpartum anemia among mothers who gave birth in the last 12 months in Wolkite health facilities.Many variables that cause anemia during pregnancy and the postpartum period have an impact on women who are just out of the hospital. In addition, the study area's tropical climate, where intestinal parasites and malaria are common, may raise the risk of postpartum anemia Thus, the proposed study may be crucial. Thereby, postpartum mothers might benefit from the intervention taken based on the results of this study. This research may also give midwives and other health professionals a foundational understanding of postpartum anemia for their counseling efforts to reduce postpartum anemia and may support stakeholders and policymakers in strengthening their approach to prevent postpartum anemia right away. Additionally, also, the outcome could serve as a baseline for future community and institutional-based research.

1.5 Operational Definition

Postpartum period: indicates the time that begins after a woman gives birth and lasts about 6 weeks (33).

Postpartum anemia: is defined as a hemoglobin concentration of < 12 g/dl for women from the second week up to the end of the first postpartum year(36).

Hemoglobin levels from 11-11.9 g/dl was considered as mild, 8-10.9 g/dl moderate and <8 g/dl severe postpartum anemia.

MUAC STATUS: Undernourished MUAC < 23cm and well-nourished MUAC ≥23 cm.

Adherence to IFA mothers is said to be good adhered to IFA supplement if she took ≥3 but poor if took for less than 3 month during the most recent pregnancy.

Minimally adequate diet diversity: According to the minimum diet diversity women who have consumed at least 5 of the 10 possible food groups over a 24-hour recall period are classified as having minimally adequate diet diversity.

2. LITERATURE REVIEW

2.1 Prevalence of Postpartum Anemia

According to World Health Organization (WHO) research, anemia affects about 1.5 billion people globally. In both developed (22–50%) and developing (50–80%) nations, the prevalence of anemia in women of reproductive age is 29.9%, 36.3% in pregnant women, and still unacceptable high in postpartum anemia(20,21)Retrospective cohort analysis of 59,428 Special Supplemental Nutrition Program for Women, Infants, and Children participants in 12 US states Postpartum anemia was 27% common. The prevalence of anemia was higher in minority women; 48% of non-Hispanic black women and 21% of participant women who had normal hemoglobin in the third trimester had postpartum anemia(22).According to a cross-sectional study conducted in China and India36.7% and 26.5% of postpartum women had postpartum anemia respectively.(21,22)On the other hand a cross-sectional study conducted in Indonesia in the capital city of Jakarta, the prevalence of postpartum anemia is 21.6%(23).

Africa In a cross-sectional survey done in the capital city of Tanzania, Dodoma, it was discovered that the prevalence of postpartum anemia was 21.6%; it was greater among those with normal BMI (39.5%), those who had cracked nipples (50.0%), and those who were primiparous (32.6%)(23). On the other hand, a similar study conducted In Uganda shows that the prevalence of severe anemia post caesarean section was 6.79%(24).By secondary analysis of data from Demographic and Health Survey in Burkina Faso the prevalence of anemia was 51.9%(25).

According to the 2016 Demographic and Health Survey (EDHS) in Ethiopia, postpartum anemia among lactating mothers increased from 24% to 29%(11). An institutional-based cross-sectional study was conducted in the east Gojjam zone the prevalence of postpartum anemia was 21.63%(26).

2.2 Associated Factors of Postpartum Anemia

2.2.1Socio-demographic factors

In a WHO review, the prevalence of anemia was found to be associated with rising levels of education and monthly income (27).In a cross-sectional study conducted in Uganda mother's occupations were significantly associated with the risk of anemia ($p< 0.05$)(28).According to Ethiopia's demographic and health survey, Anemia is associated with a husband's educational background, profession, and rural location (11).Postpartum anemia was associated with younger maternal age according to a Univariate analysis surveillance system conducted in India (21). In Bivariable logistic regression analysis, maternal educational level, rural residency, and educational status (being unable to read and write)are associated with immediate PPA with a p-value <0.2(29).

2.2.2 Obstetrical-Related Factors

A multinational cross-sectional study conducted using 21 Sub-Saharan Africa countries between 2010 and 2017 both short and longer birth intervals were associated with the risk of maternal anemia.(30)Postpartum anemia was associated with significant bleeding experienced by the mother during delivery according to a univariate analysis surveillance system conducted in India(21). Across-sectional study conducted in Uganda, gestational age, parity, was significantly associated with the risk of anemia ($p< 0.05$)(28).In Bivariable logistic regression analysis, preterm delivery, the prolonged second stage of labor, perineal tear, postpartum hemorrhage, cesarean section mode of delivery, and were variables associated with immediate PPA with p-value <0.2(29).

2.2.3 Coexisting Infection-Related Factors

In a cross-sectional Study conducted in Indonesia, Urinary tract infection (UTI) and syphilis were associated with postpartum anemia(31). Malaria and Helminthes infections were linked to a higher incidence of anemia, according to an analytical study done among postpartum and pregnant women in Malawi, the Democratic Republic of the Congo, and Uganda(32). A cross-sectional study conducted in Seralions(HIV/AIDS) was associated with anemia(33).

2.2.4 Dietary and Program Intervention practice related factor

Univariate analysis surveillance system conducted in India, inadequate iron supplementation during the postpartum period was associated with postpartum anemia and study conducted in east gojjam not taking iron supplementation associates with PPA.(21). Study conducted in Ethiopia, IFA intake during pregnancy and Mid upper arm circumference (MUAC) are also associated with postpartum anemia (26)

2.3 CONCEPTUAL FRAMEWORK

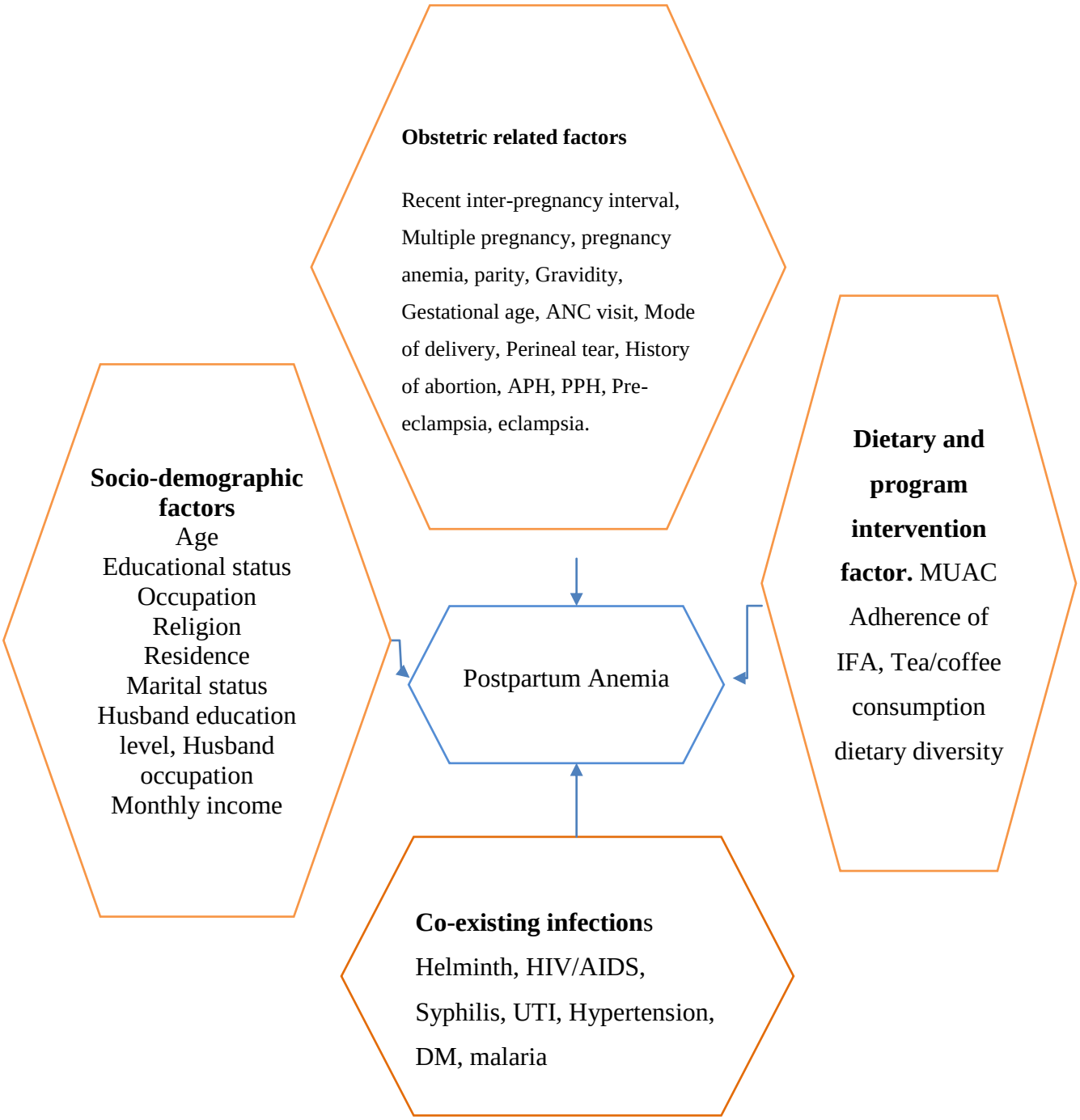

Figure 1Conceptual Framework diagram showing variables that determine post-partum anemia among mothers at Wolkite city public health facilities, Gurage zone, SNNP, Ethiopia, 2023(34,41)

3. METHODS AND MATERIALS

3.1 Study area

The study was conducted at SNNPRS, Gurage Zone, Wolkite town which is located at a distance of 155km from the capital city of Addis Ababa. The town elevates about 1910 meters above sea level. Based on Ethiopia statics agency report 2012 EC,the population of the town is estimated at90116.Women of Reproductive age account for around 20,997. Wolkite Town is divided into 3sub-cities6urban Kebeles and onerural Kebeles.In the town, there is one governmentalreferral hospital and three health centers. In the private sector three medium clinics, four lower clinics, and Fourteendrug venders are found in the town.

3.2 Study Design and Period

Institutional -based cross-sectional study was conducted from June 20 to July 30, atthe Wolkitetown health facility.

3.3 Source Population

All postpartum mothers who gave birth in the last 12 months were considered as the source population for this study.

3.4 Study Population

Postpartum mothers who gave birth in the last 12 months and attended immunization services atthe Wolkite town health facilitywere considered as the study population for this study.

3.5 Inclusion Criteria

All postpartum mothers coming for immunization services and willing to participate in the study were included.

3.6 Exclusion Criteria

Children who came with relative.

Mothers with known pregnancy.

3.7 Sample Size Determination

For calculating sample size, the single and double population proportion formula is used for specific objective one and objective two, respectively.

3.7.1 Sample size calculation for objective one

Based ona study (34)Proportion =35.3% is used to calculatea sample size. Also known values of desired precision or margin of error (D=5%), standard normaldistribution at 95% confidence interval (1.95), and thelevelof significance (5%) are used to calculate the sample size.

$n = (z\alpha/2)^2 \times P\ (1-P)/D^2$

$= (1.96)^2 \times 0.353(1-0.353)/0.05^2 = 351$

Based on the sample calculation formula above, the calculated sample size is 351 and by adding a 10% non-respondent rate, the minimum adequate sample size is386.

3.7.2 Sample size calculation for objective two

The sample size for objective two is calculated as follows by considering AOR, CI=95%, power=80%, ratio (unexposed: exposed) = 1:1, % outcome in the exposed group (P1), and % outcome in the unexposed group (P2).

Table 1Sample size calculation for objective two

Independent variables	AOR	P1	P2	10 % non-respondent
IF Supplementation (34)	3.50	49.3%	19.2%	99
Education(34)	4.18	54.5%	33.5%	215
Having PPH(35)	4.76	68%	33.1%	82
Prolonged second stage(35)	2.52	65%	35.6%	113

Therefore, the sample size of prevalence-based is higher than the factor analysis sample size.

3.8 Sampling Technique and Procedure

To study the magnitude and association factor of postpartum anemia, a systematic random sampling technique is used among mothers who attending immunizations program in three health facilities in Wolkitetown. Atotal number sample size for 3 health facilities is allocated proportionally using the following formula ni = n ×Ni/N.

Where ni= sample size taken from the select facility

n = is the total sample size calculated (386)

Ni = the population size of the selected facility (quarterlyimmunization report of eachfacility)

N = N1+N2+… is the total number of immunizations in thethree health facilities (604)

The sample size isproportionally allocated to each health facility according to the previous 3-month average immunization(N). The interval (K) of the sample collection, is computed by (K=Ni/ni=2), where Ni is the immunization coverage for eachselected health facility and ni is the proportional allocated sample size for selected health facility. Therefore, systematic random sampling is taken at the interval of 2 postpartum mothers.

3.8.1Presentation of sampling procedure

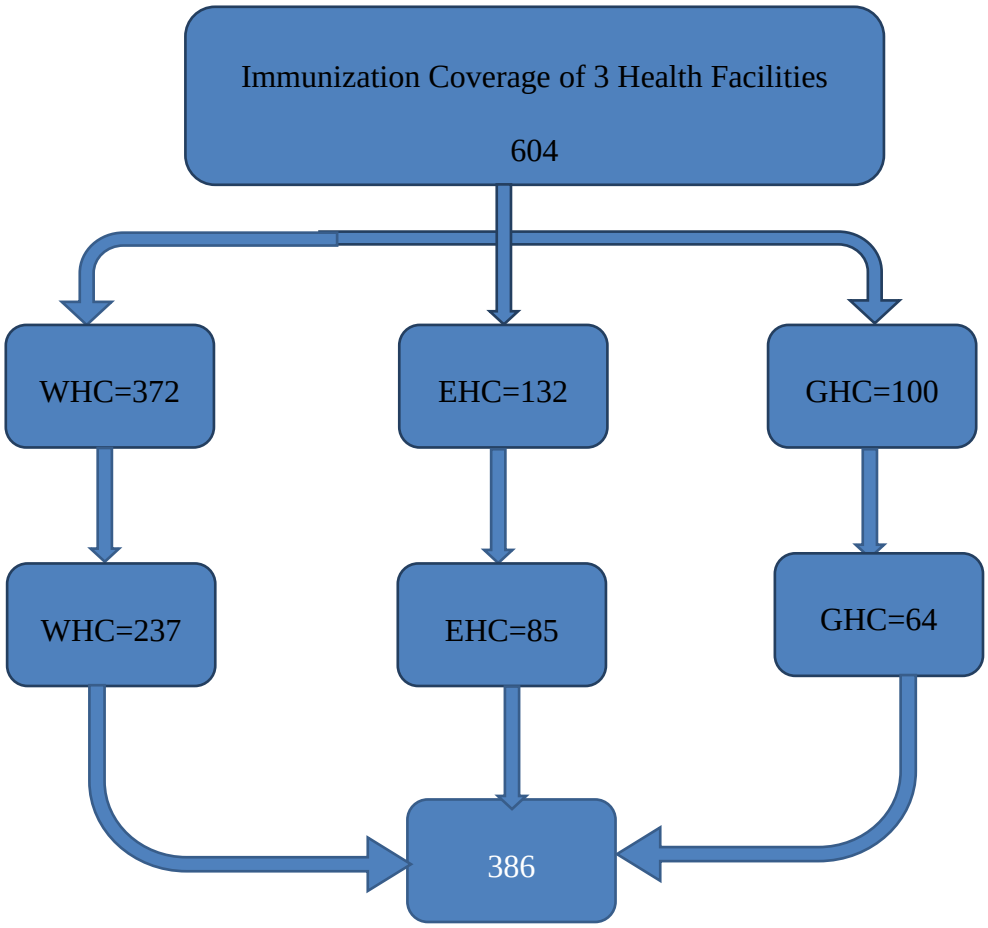

Figure 2Presentation of sampling procedure on magnitude and associated factors of postpartum anemia among mothers in Wolkite city, SNNP, Ethiopia, 2023

NOTE: ***WHC:****Wolkite health center* ***EHC:****Edigetber health center* ***GHC:*** *Gubre health center*

3.9 Variables of study

3.9.1 Dependent Variable

Magnitude of Postpartum anemia

3.9.2 Independent Variables

Socio-demographic factors: Age, maternal education level, maternal occupation, religion, residence, marital status, husband education level, husband occupation, estimated average monthly income, andemployment status of the participant.

Obstetrical Related Factors: Gravidity, parity, multiple pregnancies, inter-pregnancy interval, antenatal care visit, mode of delivery, episiotomy, perianal tear,presence of pre-eclampsia, Antepartum Hemorrhage (APH) and Postpartum Hemorrhage (PPH).

Dietary and program intervention practice: Adherence to IFA, mid-upper arm circumference (MUAC), dietary diversity score,ITN, Coffee and tea conception.

Coexisting Infection-Related Factors: Helminth's, malaria, HIV/AIDS, Syphilis and urinary tract infection (UTI), DM, Hypertension.

3.10 Data Collection Tools and Procedures

Data wascollected using pre tested interviewer-administered questionnaire, which was developed after reviewing different pieces of literature(6,16) conducted in Ethiopia.Thequestionnaire contains the socio-demographic characteristics, obstetrical-related variables, Coexisting infections-related variables, and dietary and program intervention practice.The questionnaire wasprepared in English andtranslated into Amharic language and then back to English to keep its consistency.For data collection six midwives, three laboratory technician and for supervision three health officer of degree level was recruited.MUAC is measured via tape meters on the non-dominant hand, mostly the left hand. The result has been interpreted to WHO recommendations of cutoff point <23cm as undernourished and ≥23 cm as well-nourishedand Datawas collected through face-to-face interviews.

Hemoglobin level was measuredfrom blood samples taken from post-partum womenusing a hematologic Analyzer by an experienced laboratory technicianat the study sites. Standard procedure for hemoglobin determination (finger prick blood sample, immediately touching blood with the test strip attached to the machine, and the concentration of hemoglobin level is quantitatively determined within five seconds in g/dl). Theanalysiswasperformedimmediatelyafterthesampleswerecollected.Finally, the level of hemoglobin is attached to their respective charts.

3.11 Data Quality Control Management

To check the quality of the data,the English version of the questionnaire wasconvertedto Amharic language and to keep its consistency,it wasconverted back to English version.A pretest wasconducted on 19 postpartum mothers who came to Abeshege Woreda Hole Health Center for immunization services before the actual data collection. Any ambiguity, confusion and difficulty of words were removed and verified based on pre-test experience. Also,one-day training wasgiven to data collectors and supervisors about the purpose of the studyand procedures of data collection.Finally, the data waschecked daily during data collection periods by the controller to confirm its completeness and the presence of missingdata.

3.12 Data processing and analysis

After data collection, Checking the integrity of the data and implementation of numerical coding was conducted by using Epi data software 3.1 and it wasexported to SPSS version 21 for further analysis.The descriptive statistics were computed and presented with texts, tables, and graphs.To identify factors associated with postpartum anemia, covariate correlation matrix was used to check multicollinearity. All variables have variance inflation factor<10 and tolerance>0.1. Binary logistic regression analysis was carried out at two levels, first bivariableanalysis was performed to each independent variable with postpartum anemia and those variables with a p-value < 0.2 were included in the final model (multivariable analysis) to control for all possible confounders. The strength of association was measured using the adjusted odds ratio, and 95% confidence intervals. Statistical significance is declared at P-value <0.05. A good fitness of the regression model was observed from Hosmer Lemeshow test (p=0.73) in backward regression analysis.

3.13ETHICAL CONSIDERATION

Ethical approval was obtained from ethical review committee of the College of Medicine and Health Sciences, Wolkite University.then a formal letter of cooperation was sent to the health office of the Wolkite town administration, and each chosen health facility was asked for their agreement. The written informed consent was obtained fromeach participant before data collection. Privacy and confidentiality were assured by removing identifiers and each participant was interviewed individually. Women who were found to be anemic and malnourished were treated according to national guide line.

3.14 DISSEMINATION OF THE RESULT

After completion of the study, itwas submitted and presented to Wolkite University, Department of Public Health. The findings also would be shared with Wolkite administration health office and for each health facility where the data were collected. Every effort will made to present findings at the national level and research symposium. Finally, the result shall bein a reputable international journal.

3. 15 Strengths and Limitations of the Study

Using primary data with hemoglobin measurement it is the first study conducted in Wolkite City public health facilities to assess the magnitude of anemia among postpartum mothers. However, some limitations should be taken into consideration. These are helminthic infection and malaria were not assessed using microscopic examination, and immediate postpartum mothers were not included in this study and it’s influenced by recall bias.

4. Result and Discussion

4.1 Result

4.1.1Socio-demographic characteristics

A Total of 384 postpartum motherswere involved in this study and it givesa response rate of 99.4%. The minimum age of the participant was 18 and the maximum age of the participant was 44 and the mean age of the participant was 27.78±SD 5.102 years. Based on the age category 192 (50%) of the study participant age range were between 28 and 37. About 160(41.7%) of participants were orthodox by religion and about 338(88%) of participants were from urban area. About 175(45.6%) of the study participants were housewives by occupation and regarding marital status 359(93.5%) of study participants were married and about 136(35.4%) of husbands were governmentemployees (table 2).

Table 2 Socio-demographic characteristics of postpartum mothers in Wolkite health facilities (n=384) Ethiopia, Wolkite,July 2023

Variable	Category	Frequency	Percent
Age	18-27	174	45.3
	28-37	192	50
	>37	18	4.7
Religion	orthodox	160	41.7
	Muslim	130	33.9
	Protestant	63	16.4
	catholic	23	6
	other	8	2.6
Residency	urban	338	88.0
	rural	46	12.0
Husband Education Level	unable to read and write	19	4.9
	able to read and write	35	9.1
	primary class completed	31	8.1
	secondary class completed	106	27.6
	diploma and above	168	43.8
Estimated Monthly income	<5000	118	30.7
	≥5000	266	69.3

4.1.2 Obstetrical and Gynecological Related Characteristics

Among three hundred eighty-four (384) study participants, 337(87.8%) of postpartum mothers were multigravida, about 61(15.9%) of study participants had a history of abortion, and among those participants, 3.1% of them had a 2-time history of abortion.209(54.4%) of study participants had less than two years birth interval between the last and current birth, around 9.6% of study participants had antepartum hemorrhage during pregnancy, three hundred seventy-seven (98.2%) of study participants had ANC follow-up during pregnancy (Table 3)

Table 3 Obstetrical and gynecological characteristicsof postpartum mothers in Wolkite health facilities, EthiopiaWolkite, July 2023.

Variable	Category	Frequency	Percent
Parity	Primipara	54	14.1
	multipara	209	54.4
	grand multipara	74	19.3
History of abortion	Yes	61	15.9
	No	276	71.9
The birth interval between the last and current birth	<24	209	54.4
	≥24	128	33.3
Twin Or multiple pregnancies	Yes	12	3.1
	No	372	96.9
ANC follow up	Yes	377	98.2
	No	7	1.8
Place of birth	health institution	379	98.7
	home	5	1.3
Mode of delivery	SVD	226	58.9
	IAVD	81	21.1
	C/S	77	20.1
Postpartum hemorrhage	Yes	53	13.8
	No	331	86.2

4.1.3 Coexisting Infection-Related Characteristics

One hundred eight (28.1%) of mothers were infected by helminthiasis during the last month, 53 (13.8%) mothers were positive for malaria-infection in the last month, about 47(12.25%) of study participants were subjected to urinary tract infection in the last one month, 3.6% of study participant were infected by syphilis during pregnancy and 7(1.28%) of study participant had HIV/AIDS (table4).

Table 4Coexisting infection-related factors among postpartum mothers in Wolkite health facilities,Ethiopia, Wolkite, July 2023(n=384)

Variable	Category	Frequency	Percent
Did you have a helminthiasis infection during the last 1 month	Yes	108	28.1
	No	276	71.9
Positive for malaria during the last 1 month	Yes	53	13.8
	No	331	86.2
Known chronic disease	Yes	45	11.7
	No	339	88.3
Positive for HIV/AIDS	Yes	7	1.82
	No	370	98.18
Have you tested positive for Syphilis during this pregnancy	Yes	14	3.6
	No	370	96.4
UTI the last 1 month	Yes	47	12.2
	No	337	87.8

4.1.4 Dietary and Program Intervention Practice

Based on the dietary diversity score assessment,twohundredtwenty-six (59.6%) of study mothers hadtaken less than five food groups based on twenty-four hours of dietary recall, three hundred nineteen(83.1%) of the study participants took IFA tablets during recent pregnancy among those 252(79%) of themtooktheir ironsupplementation for at least 90 days.About 44 (11.4%) of study participantswereundernourished based on MUAC measurement, two hundred eighty (280) of the participants were de-wormed during pregnancy. (table 5)

Table 5Dietary and program intervention-relatedpractice of postpartum anemia in Wolkite health facilities, Wolkite, Ethiopia, July 2023 (n=384)

Variable	Category	Frequency	Percent
dietary diversity	<5	229	59.6
	≥5	155	40.4
Coffee/tea consumption within 1hr of meal intake	Yes	270	70.3
	No	114	29.7
MUAC	<23	44	11.5
	≥23	340	88.5
IFA	Yes	319	83.1
	No	65	16.9
Adherence to IFA	Good	252	65.6
	Poor	132	34.4
ITN	Yes	249	64.8
	No	135	35.2
De-wormed duringpregnancy	Yes	308	80.2
	No	76	19.8

4.1.5 The magnitude of Postpartumanemia among mothers attending Immunization at Wolkite City public health facilities,Gurage zone. Ethiopia 2023

Based on thestudy,88 (22.9%) of motherswere anemic.The hemoglobin level of the study participants ranged from 8 gm/dl to 16 gm/dl, with a mean of 12.36 gm/dl and SD of 1.170gm/dl. Of the anemic women, 84 (21.9%) were mild, and 4 (1.1%) were moderately postpartum anemic.

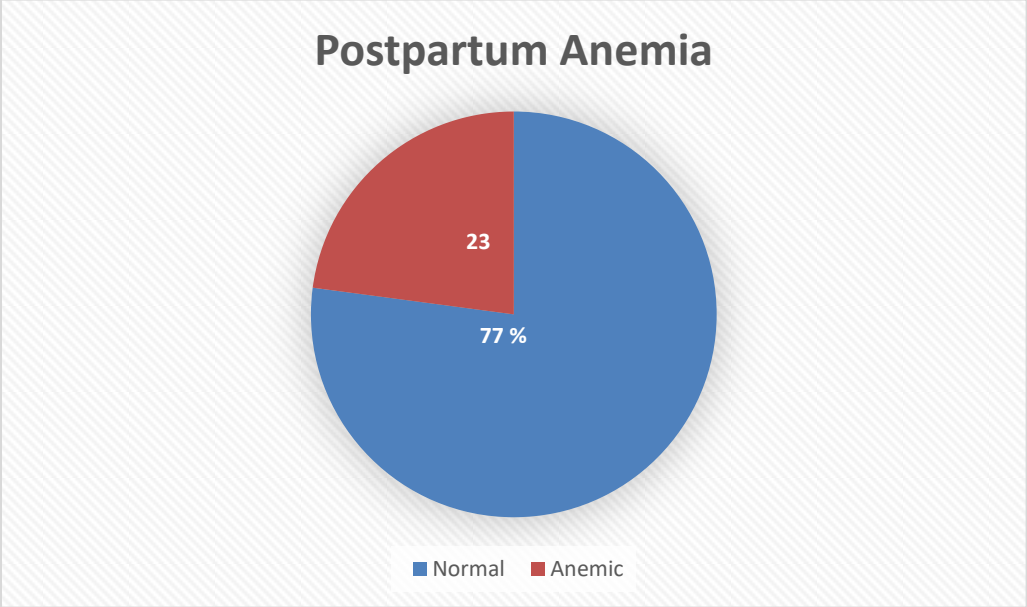

Figure 3 Magnitude of postpartum anemia among mothers attending immunization at Wolkite town health facilities, Wolkite, Gurage zone, Ethiopia,July 2023(n=384)

4.1.6 Associated Factors of Postpartum Anemia

In Bivariable logistic regression analysis, husband's educational level, monthly income, parity, birth interval, ANC Follow-up, mode of delivery, blood transfusion history, malaria positive during the lastone-month,dietary diversity, coffee and tea consumption, history of abortion, not taking IFA supplementation and MUAC<23 cm were variablescandidatefor PPA with p-value of <0.2.Afteradjustingin multi-variable analysis, variables including birthinterval,dietarydiversityandhigherparityweresignificantly associatedwith post-partum anemia.The odds of postpartum anemia among women who gave birth in less than 24 months is 2 time (AOR:2.133(1.172-3.883)), higher compared to their countergroups. The odds of postpartum anemia among Primiparaswomen were79% (AOR:0.211(0.063-0.712)) less compared to its odds among grand multiparous women and also the odds of postpartum anemia

less than minimum dietary diversity is 2.6(AOR:2.626(1.427-4.882)), more likely higher compared to their counter group (Table 6).

Table 6Multi variable analysis showing associated factors of postpartum anemia among mothers in Wolkite health facilities, Wolkite, Gurage, Ethiopia,July2023(n=384)

Variables	Categories	Postpartum anemia		COR 95%CI	AOR 95%CI
		Yes	No		
MUAC	<23	34	91	.705(.430-1.157)	.715(.319-1.189)
	≥23	54	205	1	1
husband educational level	Unable to read and write	9	11	.348(.133-.906)	.458(.080-1.590)
	Able to read and write	13	33	.722(.343-1.519)	1.145(.415-3.975)
	Primary school completed	7	20	.813(.318-2.079)	.748(.193-2.899)
	Seconder school completed	22	86	1.112(.610-2.027)	1.213(.593-2.481)
	Diploma and above	35	123	1	1
History of abortion	Yes	18	43	.664(.357-1.234)	.641(.291-1.412)
	No	60	216	1	1
Parity	Primiparas	14	33	.387(.158-.954)	**0.211(0.063-0.712)***
	multiparas	63	196	.511(.254-1026)	0.384(.139-1.059)
	Grand parity	11	67	1	1
ANC Follow up	Yes	83	294	8.855(1.687-14.471)	6.227(.608-15.666)
	No	5	2	1	1
mode of delivery	SVD	27	62	.824(.425-1.596)	.572(.209-1.566)
	IAVD	48	176	.470(.223-0.989)	1.310(.520-3.297)
	C/S	13	58	1	1
monthly income,	<5000	35	83	.590(.359-0.970)	.681(.347-1.338)
	≥5000	53	213	1	1
birth interval	<24	41	165	1.584(.950-2.642)	**2.133(1.172-3.883)***
	≥24	37	94	1	1
blood transfusion history	Yes	10	8	.217(.083-.567)	.224(0.045-1.116)
	No	78	288	1	1
Malaria positive during in the last one month	Yes	20	33	.427(.230-0.790)	.661(.254-1.720)
	No	68	263	1	1
dietary diversity	<5	44	185	1.667(1.032-2.692)	**2.626(1.427-4.882) ***
	≥5	44	111	1	1
coffee and tea conception	Yes	70	200	.536(.302-0.949)	.533(.263-1.073)
	No	18	96	1	1
Taking IFA supplementation	Yes	69	250	1.497(.824-2.719)	1.109(.485-2.535)
	No	19	46	1	1

Note: Reference category * p value less than 0.05, CI=Confidence interval COR=Odds Ratio, AOR=Adjusted Odds Ratio, Hosmer and Lemeshow test value was 0.72.

4.2 Discussion

This study assessedthe Magnitude of postpartum anemia and associated factors among women who attended immunization program inWolkite town health facilities, The magnitude of postpartum anemia among study participants was 22.9%(hemoglobin level below 12 g/dl), with 95% CI (18.8-26.8)which is slightly higher than the study conducted inJapan (10.5%)(37) Ghana (16%)(38)Kenya (16.5%) (39)respectively.

The magnitude of postpartum anemia in the current study sample was higher compared to those of the previous reports,the observed disparities in the reported prevalence could be due to better health facilities, higher literacy rates, antenatal coverage, and time at which studies in settings and variability in the dietary practice of the participants.However, in Ghana, the discrepancy can be caused by variations in the hemoglobin cut-off point (Hgb<10 g/dl), which is used to characterize anemia during the postpartum period. In Kenyamay be due to the AID funding project which was targeted at anemia prevention for pre- and post-partum mothers.

The proportion of mothers were identified to be anemic in their Postpartum period in this study is significantly similar to the study conducted inCostal Karnataka(26.5%)(15), Ethiopia among lactating (21.1%)(40),Gojjam 21.6(23),national survey (EDHS2016) (24%)(11), Mekelle (24.2%)(12)and DebreMarkos24.3% (41)respectively.Due to similar sociodemographic characteristics of the participants and nearly the same setup of health care delivery system.

The percentage, however, was far lower than research from Tanzania (36.7%)(42), southern India (47.3%)(21), and China (34.2%)(9)Gonder (47.16%)(43)respectively. The observed discrepancy could be explained by variations in the research populations and anemia definitions employed in the current and prior investigations. This research, which involved late-phase postnatal women and older children between the ages of 6 weeks and 12 months, employed a higher hemoglobin cut-off point of less than 12 g/dl to identify anemia, in contrast to the previous study which uses lowest cut-off threshold for defining anemia.

Post-partum mothers who were primiparas0.211(0.063-0.712)had about 79% lower odds of developing postpartum anemia than mothers who were grand multipara, this is supported bythestudydonein,Jimma Zone(42), in Uganda(44), andTanzania (6). This may be because pregnant women require more nutrients than usual. Between 500 mg and 600 mg of iron are lost

per pregnancy in women who have already given birth, on top of the daily iron loss at that stage of the pregnancy. Iron needs related to puerperal blood loss (200 mg to 250 mg) and the placenta (300 mg to 350 mg). This loss will also rise if there is blood loss during delivery(45). Anemia becomes considerably more prevalent because iron deflates asparity rises.

In the current study, there was a significant association found between post-partum anemia and the interpregnancy interval. The odds of post-partum anemia were found to be 2times when the interval is less than two years (AOR= 2.133(1.172-3.883))between the last two pregnancies as compared with those with more intervals.

This finding is consistent with previous study(6,46,47). This is probably becausemothermay not have fully restored their bodies' stores of vital nutrients, such as folic acid and iron, which were lost during their prior pregnancy.

Women who don’t meet the minimum with the dietary diversity were 2.6 times more likely to suffer from postpartum anemia than those with a minimum level of dietary diversity(AOR =2.626(1.427-4.882)). This result was compared to a study done among lactating women in Jimma District (AOR=2.32; 95% CI: 1.65–5.72)(42) andconsistent with Gonder (AOR = 1.83; 95% CI: 1.05–3.18)(43)There are two possible causes for this: either a lack of protein and iron-containing foods, such eggs and meat, or an inadequate dietary intake that results in deficiencies in iron, vitamin B12, folate, and vitamin A(48).

5. CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

The magnitude of post-partum anemia in public primary health care facilities in Wolkite city was 22.9%, one in five mothers had postpartum anemia. Thus, the result suggests that post-partum anemia is a moderate public health problem.Post-partum anemia was found to be associated with inter-pregnancy interval, parity, and dietary diversity.However, low parity and more than a 2-year birth interval were protective.

5.2 RECOMMENDATIONS

Given that postpartum mother is among the most susceptible populations to anemia so, solutions to interpregnancy intervals should be extended including women empowerment through formal education, getting pregnant at least 24 months of the previous pregnancy, encouraging women to have fewer children andconsuming iron-containing dietappropriately to prevent post-partum anemia. To researchers, it will be better to conduct further investigation using a cohort study design because pregnancy anemia persists through the post-partum period.

6. References

1. Scholl TO, Hediger ML, Fischer RL, Shearer JW. Anemia vs iron deficiency: Increased risk of preterm delivery in a prospective study. American Journal of Clinical Nutrition. 1992;55(5):985–8.

2. Mremi A, Rwenyagila D, Mlay J. Prevalence of post-partum anemia and associated factors among women attending public primary health care facilities: An institutional based cross-sectional study. PLoS One. 2022 Feb 1;17(2 February).

3. Pratiwi IR, Santoso S, Wahyuningsih HP. PREVALENCE AND RISK FACTORS FOR POSTPARTUM ANEMIA. JurnalKesehatanIbudanAnak. 2018;12(2):113–8.

4. Wemakor A. Prevalence and determinants of anaemia in pregnant women receiving antenatal care at a tertiary referral hospital in Northern Ghana. BMC Pregnancy Childbirth. 2019 Dec 11;19(1).

5. Zamane H, Ouaga U, Zerbo JK, Coulibaly A, Ouedraogo A, Bonané-Thieba B. Postpartum moderate to severe anemia in a low-income country, Burkina Faso. 2019; Available from: https://doi.org/10.21203/rs.2.16342/v1

6. Mremi A, Rwenyagila D, Mlay J. Prevalence of post-partum anemia and associated factors among women attending public primary health care facilities: An institutional based cross-sectional study. PLoS One. 2022 Feb 1;17(2 February).

7. Medina Garrido C, León J, Romaní Vidal A. Maternal anaemia after delivery: prevalence and risk factors. J ObstetGynaecol (Lahore). 2018 Jan 2;38(1):55–9.

8. Petraro P, Duggan C, Urassa W, Msamanga G, Makubi A, Spiegelman D, et al. Determinants of anemia in postpartum HIV-negative women in Dar es Salaam, Tanzania. Eur J Clin Nutr. 2013 Jul;67(7):708–17.

9. WHO Recommendations for the Prevention of Postpartum Haemorrhage Department of Making Pregnancy Safer.

10. Allary J, Soubirou JF, Michel J, Amiel I, Silins V, Brasher C, et al. An individual scoring system for the prediction of postpartum anaemia. Ann FrAnesthReanim. 2013 Jan;32(1).

11. Ethiopia Demographic and Health Survey. 2016.

12. Fitaw Y, Feleke A, Degu G, Yifru S, Admasu M, Bewketu H, et al. Safe Motherhood For the Ethiopian Health Center Team.

13. Milman N. Postpartum anemia I: Definition, prevalence, causes, and consequences. Vol. 90, Annals of Hematology.Springer Verlag; 2011. p. 1247–53.

14. Spring. Understanding Anemia: Guidance for Conducting a Landscape Analysis--Second Edition [Internet]. Available from: www.spring-nutrition.org

15. Bhagwan D, Kumar A, Rao CR, Kamath A. Prevalence of anaemia among postnatal mothers in coastal Karnataka. Journal of Clinical and Diagnostic Research. 2016 Jan 1;10(1):LC17–20.

16. Abebaw A, Gudayu TW, Kelkay B. Proportion of Immediate Postpartum Anaemia and Associated Factors among Postnatal Mothers in Northwest Ethiopia: A Cross-Sectional Study. Anemia. 2020;2020.

17. WHO Technical Consultation on Postpartum and Postnatal Care.

18. Bodnar LM, Siega-RizAM, Miller WC, Cogswell ME, McDonald T. Who should be screened for postpartum anemia? An evaluation of current recommendations.Am J Epidemiol. 2002 Nov 15;156(10):903–12.

19. ETHIOPIAN Emergency Obstetric and Newborn Care (EmONC) Assessment 2016 Final Report.

20. Moya E, Phiri N, Choko AT, Mwangi MN, Phiri KS. Effect of postpartum anaemia on maternal health-related quality of life: a systematic review and meta-analysis. BMC Public Health. 2022 Dec 1;22(1).

21. Rakesh PS, Gopichandran V, Jamkhandi D, Manjunath K, George K, Prasad J. Determinants of postpartum anemia among women from a rural population in southern India. Int J Womens Health. 2014 Apr 11;6(1):395–400.

22. Bodnar LM, Scanlon KS, Freedman DS, Siega-Riz AM, Cogswell ME. High prevalence of postpartum anemia among low-income women in the United States. Am J Obstet Gynecol. 2001;185(2):438–43.

23. Tairo SR, Munyogwa MJ. Maternal anaemia during postpartum: Preliminary findings from a cross-sectional study in Dodoma City, Tanzania. Nurs Open. 2022 Jan 1;9(1):458–66.

24. Sivahikyako SA, Owaraganise A, Tibaijuka L, Agaba DC, Kayondo M, Ngonzi J, et al. Prevalence and factors associated with severe anaemia post-caesarean section at a tertiary Hospital in Southwestern Uganda. BMC Pregnancy Childbirth. 2021 Dec 1;21(1).

25. Zamane H, Ouaga U, Zerbo JK, Coulibaly A, Ouedraogo A, Bonané-Thieba B. Postpartum moderate to severe anemia in a low-income country, Burkina Faso. 2019; Available from: https://doi.org/10.21203/rs.2.16342/v1

26. Agmassie GA, Alamneh GD, Ayicheh MW, Getahun WT, Abneh AA. The magnitude and associated factors of immediate postpartum anemia among women who gave birth in east Gojjam zone hospitals, northwest- Ethiopia, 2020. PLoS One. 2023 Mar 1;18(3 March).

27. Heart N, Institute B, Institutes of Health N, Department of Health U, Services H. I N B R I E F : Anemia Your Guide to.

28. Mahamoud NK, Mwambi B, Oyet C, Segujja F, Webbo F, Okiria JC, et al. Prevalence of anemia and its associated socio-demographic factors among pregnant women attending an antenatal care clinic at kisugu health center IV, makindye division, Kampala, Uganda. J Blood Med. 2020;11:13–8.

29. Qureshi RN, Khan University A, Anto EO, Boti N, Kure MA. Immediate postpartum anemia and associated factors among women admitted to maternity ward at public

hospitals in Harari Regional State, Eastern Ethiopia: A facility-based cross-sectional study.

30. Mruts KB, Gebremedhin AT, Tessema GA, Scott JA, Pereira G. Interbirth interval and maternal anaemia in 21 sub-Saharan African countries: A fractionalpolynomial analysis. PLoS One. 2022 Sep 1;17(9 September).

31. Pratiwi IR, Santoso S, Wahyuningsih HP. PREVALENCE AND RISK FACTORS FOR POSTPARTUM ANEMIA. JurnalKesehatanIbudanAnak. 2018;12(2):113–8.

32. Kandala NI. Socio-Demographic Determinants of Anaemia and Nutritional Status in the Democratic Republic of Congo, Uganda and Malawi. 2013.

33. M'cormack FAD, Drolet JC. Assessment of Anemia Knowledge, Attitudes and Behaviors Among Pregnant Women in Sierra Leone.

34. Mulatie M. BAHIR DAR UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCES SCHOOL OF PUBLIC HEALTH POST-PARTUM ANEMIA AND ASSOCIATED FACTORS AMONG MOTHERS VISITED BAHIR DAR CITY PUBLIC HEALTH FACILITIES, NORTH WEST ETHIOPIA, 2020 BAHIR DAR UNIVESRSITY, ETHIOPIA. 2020.

35. Bambo GM, Kebede SS, Sitotaw C, Shiferaw E, Melku M. Postpartum anemia and its determinant factors among postnatal women in two selected health institutes in Gondar, Northwest Ethiopia: A facility-based, cross-sectional study. Front Med (Lausanne). 2023;10.

36. IRON SUPPLEMENTATION in postpartum women GUIDELINE.

37. Amano I, Murakami A. Prevalence of infant and maternal anemia during the lactation period in Japan. Pediatrics International. 2019 May 1;61(5):495–503.

38. Kofie P, Tarkang EE, Manu E, Amu H, Ayanore MA, Aku FY, et al. Prevalence and associated risk factors of anaemia among women attending antenatal and post-natal clinics at a public health facility in Ghana. BMC Nutr. 2019 Nov 26;5(1).

39. BURDEN AND DETERMINANTS OF POST-PARTUM ANAEMIA IN MARIAKANI SUB-COUNTY HOSPITAL. DISSERTATION IN PARTIAL FULFILLMENT OF MASTERS OF MEDICINE IN OBSTETRICS AND GYNECOLOGY AT THE UNIVERSITY OF NAIROBI.

40. Li M, Fan Y, Zhang X, Hou W, Tang Z. Fruit and vegetable intake and risk of type 2 diabetes mellitus: Meta-analysis of prospective cohort studies. BMJ Open. 2014;4(11).

41. Abebaw A, Gudayu TW, Kelkay B. Proportion of Immediate Postpartum Anaemia and Associated Factors among Postnatal Mothers in Northwest Ethiopia: A Cross-Sectional Study. Anemia. 2020;2020.

42. Alemayehu M. Factors Associated with Anemia among Lactating Mothers in Subsistence Farming Households from Selected Districts of Jimma Zone, South Western Ethiopia: A Community Based Cross-Sectional Study. J Nutr Food Sci. 2017;07(03).

43. Bambo GM, Kebede SS, Sitotaw C, Shiferaw E, Melku M. Postpartum anemia and its determinant factors among postnatal women in two selected health institutes in Gondar, Northwest Ethiopia: A facility-based, cross-sectional study. Front Med (Lausanne). 2023;10.

44. Nkonwa IH, Mugyenyi GR, Ssalongo WG, Joseph N, MasembeMD S, Lubega A, et al. Medicine and Nursing www.iiste.org ISSN [Internet]. Vol. 23, An International Peer-reviewed Journal. 2016. Available from: http://www.accessbio.net/eng/products/products01_02.asp

45. WHO Technical Consultation on Postpartum and Postnatal Care.

46. Bireda A, Mohammed A, Hailu M, Ali K. Magnitude and Factors Associated with Immediate Postpartum Anemia among Singleton postpartum women at Public Hospitals in

Dire Dawa Administration, Eastern Ethiopia. 2022; Available from: https://doi.org/10.21203/rs.3.rs-2294352/v1

47. Kumar H, Gupta S, Ruhela S, Tanya S. A retrospective study on magnitude and factors associated with anemia in postnatal period from coastal South India. Ann Med Health Sci Res. 2014;4(5):775.

48. Abbaspour N, Hurrell R, Kelishadi R. Review on iron and its importance for human health. Journal of Research in Medical Sciences. 2014.

7.Annexes

7.1 Annex 1 Study participant information and agreement sheet

Dear Madam_____My name is _____ and I am working as data collector for the study conducted by Henok Seifu who is a MPH student at Wolkite University. This study is entitled as "Magnitude of postpartum anemia and associated factor among women who attending immunization program inWolkite town health facilities, Gurage zone, Ethiopia 2023" and it is the requirement for the fulfillment of master's degree. I truly informyou participating in this study will not provide direct benefit for you. But the outcome of this study may become sources of information or baseline for health care providers to appropriately intervene during maternal care to satisfy you about the service. However, participating in the study will not expose you for any risk. The information which obtained from you was strictly kept under confidentiality. Your name will not be required during the interview and there is no information which tells about your confidentiality. You have the right to decide whether to participate or not in the study. If you have any discomfort, even if after starting the interview, you have the right to withdraw at any time and your refusal and withdraw from the study will no lead you to any risk. If there wasanything unclears you can ask at any time. Should you not take part in this study? If "yes", continue to sign consent form If "No", stop here

I have been informed that the purpose of this study is to asses' magnitude of postpartum anemia and associated factors among woman who give birth the last 12 months in Wolkite district public health facilities I have understood that participation in this study is entirely voluntarily. I have been told that my answer to the question will not affect my confidentiality in any way and participation in this study does not involve risks. I understood that Henok Seifu is a contact person if I have doubt about the study or about my right as a study participant.

Respondent's Signature _____Date_____ Start interview_____

Data collector's name _____ signature _____

Address of investigators: Tell: 091990694 e-mail: heniseifu9@gmail.com

7.2 Annex 2 English Version questionnaire

Part one: Socio demographic characters			
001	Age	……...year	
002	Marital Status	1. Married 2. Un married 3. others (specify)……	
003	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Others(specify)	
004	Residency	1. Urban 2. Rural	
005	Educational status	1. Unable to read and write 2. Able to read and write 3. Primary class completed 4. Secondary class completed 5. Diploma and above	

006	Occupation	1. Housewife 2. Government employee 3. Private employee 4. Merchant 5. Others(specify)	

007	Husband Education Level	1. Unable to read and write 2. Able to read and write 3. Primary class completed 4. Secondary class completed 5. Diploma and above	
008	Husband Occupation	1. Government employee 2. Private employee 3. Merchant 4. Farmer 5. Others(specify)	
009	Estimated Monthly income	In Ethiopian Birr……..	

Obstetrics characters of women			
010	Gravidity	----------(in number)	If G1, jump to Q016
011	Parity	----------(in number)	
012	History of abortion	1. Yes 2. No	
013	If yes for Q 012, how many times?	----------(number)	
014	Birth interval between the last and current birth (Ifthe mother is gravida 2 and more)	----------(in months)	
015	Twinor Multiple pregnancies?	1. Yes 2. No	
016	Antepartumhemorrhage during pregnancy?	1. Yes 2. No	

017	If yes for question 016, gestational age at that		

	time?	----------GA (in weeks)	
018	Doyou have ANC follow up?	1 Yes 2 No	
019	If yes for question 018, how many times did you visit ANC?	----------(number)	
020	If yes for question 018, at what gestational age ANCinitiated?	----------(in weeks)	
021	If answered no for Q 018 what was the reason?	1. I don't know its advantage 2. No health facility near here. 3. health professionals are not comfortable 4. Other….	
022	Gestational age during delivery	----------(weeks)	
023	Place of birth	1. Health institution 2. Home	

024	Mode of delivery	1. SVD 2. IAVD 3. C/S	
025	Mode of previous delivery (If the mother is gravida 2 and more)	1. Home 2. SVD 3. C/S 4. IAVD	
026	During your pregnancy, were you given or Did you buy any iron-folic acid tablets?	1.Yes 2.NO	If no. skip to Q.028
027	If yes to Q.026 for how long you consumed Iron-folic acid tablet during your pregnancy?	----------	
028	Episiotomy	Yes no	
029	Perineal tear	Yes	

		no	
030	The status of anemia during your pregnancy?	1.anemic 2.not anemic 3.don't knows	
031	Was there postpartum hemorrhage during/after delivery?	1.Yes 2.NO	
032	Did you take blood transfusion during your pregnancy?	1.Yes 2.NO	
033	did you have postpartum care?	1.Yes 2.NO	If no skip to Q.036
034	If answered yes for the Q. 033 how many times?	----------	
035	Did you take iron/folic acid tablet during postpartum period?	1.Yes 2.NO	

036	Do you exclusively breast feed your child?	1.Yes 2.NO	
037	Preeclampsia/Eclampsia during this pregnancy?	1 yes 2 No	
	Morbidity related factors		
038	Deworming during pregnancy	1 Yes 2.NO	
039	Did you have helminthiasis infection during the last 1 month?	1 Yes 2.NO	
040	Did you use insecticide treated nets during this pregnancy?	1.Yes 2.NO	
041	Did you have malaria infection during the last 1 month?	1.Yes 2.NO	
042	Have you tested positive for Syphilis during this pregnancy?	1 yes 2 no	

043	Have you ever acquired HIV/AIDS?	1 yes 2 No	
044	If yes, for Q 043, does the mother started medication and follow up?	1 yes 2 No	
045	Have you tested positive for urinarytract infection during this pregnancy?	1 yes 2 NO	
046	If yes for Q 045, Does the mother treated?	1. Yes 2.No	
047	Do you have known chronic disease?	1. Yes 2.No	If no skip Q.048
048	If yes for Q.047what type of disease? Do you have?	1. diabetes mellitus 2. hypertension 3. kidney disease 4. bone disease	
	dietary and micronutrient related factor		
049	Do you usually take	1. Yes	

	tea or coffee within one hour of mealconsumption?	2. No			
050	Dietary Diversity Score	1. Grains, roots, and tubers	Porridge, bread, rice, noodles or other foods made from grains	Yes	No
			Potatoes, beet root, kocho, cassava		
		2.Pulses	Any foods made from beans, peas, lentils		
		3 Nuts and seeds	nuts or seeds		
		4 Dairy	Milk, such as tinned, powdered or fresh animal milk, Yogurt, Cheese or other dairy products		
		5 Meat, poultry, and fish	Liver, kidney, heart or other organ meats		
			Any meat, such as pork, lamb, goat, chicken fish, shellfish or seafood		

		6Eggs	Eggs		
		7 dark leafy green and vegetable	Any dark green vegetables [Gommen, Kosta]		
		8 Other Vitamin A-rich fruits and vegetables	Pumpkin, carrots, squash or sweet potatoes that are yellow or orange inside		
		9 Other vegetables	Any other vegetables		
		10 Other fruits	other fruits		
051	Mid upper arm circumference	---------(in cm)			
052	Current hemoglobin level in g/dl (measure)				

መ ረጃ እና የተሳታፊ ስም ም ነት ቅፅ

ው ድ እመ ቤት _____ ስሜ _____ይባላል ።በወ ልቂጤ ዩኒቨርሲቲ የማ ስተ ርስ ተማ ሪ በሆ ነው በ ሄኖ ክ ሰይፉ ለሚ ሰራዉ ጥናት መ ረጃ ሰብ ሳቢ ሆ ኜ እየሰራ ሁ ነው ። ጥ ናቱ " ከወሊድ በኋ ላ የሚ ከሰት የደም ማ ነስ እና ተያያዥ ም ክንያቶች በወ ልቂጤ ከተማ ጤ ና ተቋ ማ ት ጉራጌ ዞን፤ደቡ ብ ክልል ፤ ኢ ት ዮጵ ያ " ይ ሰኛል ። ጥ ናቱ የሚ ካሄድ በት ዋና አላማ በስነተዋልዶ ጤ ና ማ ስተርስ ዲግሪ ለመ መ ረቅ ማ ሟ ያ ነዉ ። በዚህ ጥ ናት መ ሳተፍ ለእርስዎ ቀጥተኛ ጥ ቅም እንደማ ይሰጥ በግልፅ አሳው ቃለሁ ። ነገር ግን የዚህ ጥናት ው ጤ ት የጤ ና አጠ ባበቅ አቅራቢ ዎች ስለ አገልግሎ ቱ እርስዎን ለማ ርካት በእናቶች እንክብ ካቤ ወ ቅት በአግባቡ ጣ ልቃ እንዲ ገቡ የመ ረጃ ም ንጭ ወ ይም መ ነሻ ሊሆ ን ይ ችላል። ሆ ኖም በጥ ናቱ ው ስጥ መ ሳተፍ ለማ ንኛው ም አደጋ አያጋልጥዎትም ። ከእርስዎ የተገኘ መ ረጃ በሚ ስጥርት ይጠ በቃል። በቃለ መ ጠ ይቁ ወቅት ስም ዎ አያስፈልግም እና ስለእርስዎ ሚ ስጥራ ዊ ት የሚ ናገር ም ንም መ ረጃ የለም ። በጥናቱ ው ስጥ መ ሳተፍ በእርስዎ ስም ም ነትላይ የተመ ሰረተ ነው ። በጥናቱ ለመ ሳተፍ ወይም ላለመ ሳተፍ የመ ወሰን መ ብ ት አልዎት ። ም ንም አይነት ም ቾት ካልተሰማ ዎት ፣ ቃለ መ ጠ ይቁን ከጀመ ሩ በኋላም ቢሆን፣ በማ ንኛው ም ጊዜ የመ ተው መ ብ ት አለዎ ት እና እም ቢተኛ ነትዎ እና ከጥ ናቱ መ ው ጣ ት ወደ ም ንም አይነት አደጋ አይመ ራ ዎ ትም። ግልጽ ያልሆ ነ ነገር ካለ በማ ንኛው ም ጊዜ መ ጠ የቅ ይችላሉ። ስለዚህ በጥናቱ ቢሳተፉ ም ን ይመ ስልዎታል፤

ፀ። አዎ ፀ። አይ

አዎ ከሆነ፣ ስም ም ነትአስፈርመ ዉ ይ ቀጥ ሉ ። አይ ከሆነ፣ እዚህ ያቁሙ ። የዚህ ጥናት አላማ ከወሊድ በኋላ የሚ ከሰት የደም ማ ነስ እና ተያያዥ ነት ያላቸው ን ም ክንያቶች በወ ልቂጤ ከተማ ጤ ና ተቋማ ት ው ስጥ ለማ ጥ ናት እንደሆ ነተ ነግሮኛል። በዚህ ጥ ናት ው ስጥ መ ሳተፍ ሙ ሉ በሙ ሉ በፈቃ ደኝነት እንደ ሆ ነ ተረድ ቻ ለሁ ። ለጥያቄው የም ሰጠ ው መ ልስ ም ስጪ ራ ዊ ነቴን በም ንም መ ልኩ እንደማ ይነካው እና በዚህ ጥ ናት ው ስጥ መ ሳተፍ አደጋዎ ችን እንደማ ያጠ ቃ ልል ተነግሮኛል። ስለ ጥ ናቱ ወ ይም የጥ ናት ተሳታፊ የመ ሆን መ ብ ቴን በተመ ለከተ ጥርጣ ሬ ካደረብ ኝ ሄኖክ ሰይፉ ተጠ ሪ ሰው እንደሆ ነ ተረድ ቻ ለሁ።

የተሳታፊ ፊርማ _____ ቀን _____

ክፍል 1 የማህበራዊ ና ስነህዝብባህሪያትንየሚዳስሱ መ ጠ ይ ቆች			
001	እድሜ	_____ አመ ት	
002	የጋብቻሁኔታ	1. ያገባች 2. ያላገባች 3. ሌላካለይጠቀስ _____	
003	ሃይማኖት	1. ኦርቶዶክስ 2. ሙስ ሊ ም 3. ፕሮቴስታንት 4. ካቶሊክ 5. ሌሎ ች (ይግለጹ)----------	
004	መኖሪያ	1. ከተማ 2. ገጠር	
005	የትምህርትደረጃ	1. ማንበብ ና መፃፍየማትችል 2. ማንበብ ና መጻፍየምትችል 3. አንደኛደረጃያጠናቀቀች 4. ሁለተኛደረጃያጠናቀቀች 5. ዲፕሎማእናከዚያበላይ	

006	ስራ	1.	የቤትእመቤት	
		2.	የመንግስትሰራተኛ	
		3.	የግልሰራተኛ	
		4.	ነጋዴ	
		5.	ሌሎ ች (ይግለጹ)----------	
007	የባለቤትዎትምህርትደረጃ	1	ማንበብ ና መፃፍየማ ይ ች ል	
		2	ማንበብ ና መጻፍየሚችል	
		3	የመጀመሪያደረጃትምህርትያጠናቀቀ	
		4	የሁለተኛደረጃትምህርትያጠናቀቀ	
		5	ዲፕሎማእናከዚያበላይ	
008	የባለቤትዎስራ	1.	የመንግስትሰራተኛ	
		2.	የግልሰራተኛ	
		3.	ነጋዴ	
		4.	ገበሬ	
		5.	ሌ ሎ ች (ይግለጹ)_____	

009	ግምታዊወርሃዊገቢ	በኢትዮጵያብር _____	
ክፍል ሁ ለት ፡የሴቶችየጽንስናተያያዥባህሪያት			
010	ለምንያህልጊዜአርግዘዋ ል?	_____ (በቁጥር)	ለመጀመሪያጊዜከሆነ ቁ.015 ወደጥያቄ ይለፉ
011	ስንትልጆችአሉሽ?	_____ (በቁ ጥ ር)	
012	የፅንስ ማስወረድ አጋጥምዎትያዉቃል?	1. አዎ 2. አይ	
013	ለጥያቄ ቁ 012 መልሱአዎከሆነ፣ስንትጊዜአጋጥምዎታል?	_____ (ቁጥር)	
014	ባለፈዉእናበአሁኑእርግዝ ና መካከልያለዉጊዜ ም ን ያህልነዉ?	_____ (በወራት)	
015	መንታወይምከዚያበላይእርግዝ ና አጋጥምዎትያዉቃል?	1. 1አዎ 2 አይ	
016	በዚህእርግዝናወቅትከወሊድበፊትደምመፍሰስ ገጥምዎታል?	2. አዎ 3. አይ	

017	ለጥያቄ ቁ 016 መልሱአዎከሆነ፣በዚያንጊዜየእርግዝናዉዕድሜ ስንትነበር	_____(በሳምንታ ት)	
018	የነፍሰጡርክትትልነበርዎት?	1. አዎ 2. አይ	
019	ከላይላለውጥያቄአዎከሆነ፣ስንትጊዜተከታትለዋል ?	_____(ቁጥር)	
020	ተራቁጥር 18 አይከሆነምክንይቶምንነበር	1. ጥቅሙንስለማላቅ 2. ጤናጣብይአቅራቢያዬ ላይስለሌለ 3. የጤናባለሞያዎችንአገ ልግሎቱንለመስጠትፋ ቃደጆችአይደሉም 4. ሌላ.....	
021	የመጀመሪያየነፍሰጡርክትትልሲያደርጉየጽንሱእ ድሜስንትነበር?	_____ (በሳምንታት)	
022	በወሊድጊዜየጽንሱእድሜስንትነበር?	_____ (በሳምንታት)	
023	የትነበርየወለዱት ?	1. በጤናተቋም 2. ከቤት	
024	የወለዱበትዘዴ	1. በማህፀን 2. በመሳሪያበመታገዝ 3. በቀዶጥገና	

025	ያለፈዉልጅዎንየወለዱበትዘዴ	1. ቤት 2. በማህፀን 3. በመሳሪያበመታገዝ 4. በቀዶጥገና	
026	በእርግዝናወቅትየደምማነስነበረበዎት?	1. ነበረብኝ 2. አልነበረብኝም 3. አላዉቅም	
027	በ እርግዝናወቅትየደምማነስመድሀኒትወስደዋል?	1. አዎ 2. አይ	
028	ለጥያቄ 027 መልሱአዎከሆነለምንያክልቀንተጠቀሙ ?	.....	
029	በወሊድጊዜስቲሽተደርጎልዎታል?	1. አዎ 2. አይ	
030	በወሊድጊዜማህጸንአካባቢመተርተር	1. አዎ 2. አይ	
031	የድህረወሊድጊዜመጠኑከፍያለየደምመፍሰስችግ ርገጥሞሽነበር?	1 አዎ 2. አይ	
032	ስትወልጅወይምከወለድሽበኋላየደምልገሳተደርጎ ልሽነበር?		

033	የድህረወሊድክትትልአድርገሽታውቂያለሽ?	1. አዎ 2. አይ	
034	ለጥያቄ 33መልስዎአዎከሆነስንትጊዜ?	1. አዎ 2. አይ	
035	ከወለድሽበኋላየደምማነስንየሚከላከል (አይረን፣ፎሊክአሲድ) መድሃኒትወስደሻል?	1. አዎ 2. አይ	
036	ልጅሽንጡትብቻነውየምታጠቢው?	1. አዎ 2. አይ	
037	በዚህእርግዝናወቅትየደምግፊት፤መጨመር፤ራ ስንየመሳት፤የማንዘፍዘፍችግርገጥምዎታል?	1. አዎ 2. አይ	
ክፍልሶስት፡ አብረውየሚኖሩኢንፌክሽኖች			
038	በእርግዝናወቅትየትላትልመድሃኒትውጠዋል ?	1 አዎ 2.አይ	

039	ባለፈው 1ወር ውስጥእናትየውበትላትልበሽታተይዘዋል?	1. አዎ 2. አይ		
040	በዚህእርግዝናወቅትአጎበርወይምዛንዚራተጠቅመዋል?	1. አዎ 2. አይ		

041	ባለፈው 1ወር ውስጥበወባበሽታተይዘውነበር?	1. አዎ 2. አይ	
042	በዚህእርግዝናወቅትየቂጥኝበሽታእንዳለብዎትተነግሮዎታል?	1 አዎ 2 አይ	
047 043	በዚህእርግዝናወቅትበሽንትቧንቧኢንፌክሽንመያዝዎንአዉቀ ቁልየፈያልሆኑበሽታዎችአለቦት?	አዎ 3 አዎ አይ 4 አይ	
044 048	ለጥያቄቁጥር 038 መልሱአዎከሆነ ም ን አይነት? ለጥያቄቁጥር 047መልሱአዎከሆነ፣እናትየዋታክማለች?	አዎ 1. ደምግፊት 2. የስኪ ር በሽታ 3. ኩ ላሊትበሽታ 4. የአጥንትበሽታ አይ	
045	ኤችአይቪ/ኤድስ በደምዎትዉስጥአለ?	1. አዎ 2. አይ	
049 046	ከምግብበኋላበአንድሰአትውስጥቡናናሻይይጠቀማሉ? ለጥያቄቁጥር 045 መልሱአዎከሆነ፣ እናትየዋመድሃኒትእናክትትልጀምራለች?	1. አዎ 2. 1.አዱአዎ 2. አይ	

ክፍልአራት፡- ከአመጋገብእናከአነስተኛንጥረ-ምግብአወሳሰድጋርየተያያዙምክክያቶች

050	በትላንትናውእለትቀንእናምሽትጠጠርእናለስለስያሉምግቦች ስለመመገብዎይጠቁሙን	የምግብዝርያዎች	የምግብዝርዝሮች
		ቡድን 1 የእልምግቦችማንኛው ምስርያላቸውተክሎች	በቆሎ፤ሩዝ፤ማሽላ፤ገብስ፤ስንዴ፤አጃ፤ጤፍከመሳሰሉትእህልየተሰራዳቦ፤እንጀራ፤ፓስታ፤ገንፈፎ፤ቆጮ፤ድንች፤ቦዬ፤ጎደሬ፤ቀይስር
		ቡድን 2 የብርተክሎች	ምስር፤ባቄላ፤ድፍንምስር

ቡድን 3 የለውዝእናየጥራጥሬ	በኦቾሎኒየሚዘጋጁማንኛውምምግቦች ሽንብራ፤ባቄላ፤አተር
ቡድን 4 የወተትተዋፅኦምግቦች	የጣሳወተት፤የተናጠበፓውደርመልክወይ ምትኩስየእንስሳትወተት፤እርጎ፤አይብወይ ምሌሎችየእንስሳትተዋኦ
ቡድን 5 በስጋየሚዘጋጁምግቦች ቡድን 6 እንቁላል	ጉበት፤ኩላሊት፤ልብ፤ወይምሌሎችየሰውነ ትክፍሎች፤ማንኛውምስጋ፤የፍየል፤የበግ፤ የዶሮ፤ትኩስወይምየደረቀአሳ እንቁላል
ቡድን 7 ጠቆርያለቅጠላቅጠል	ቆስጣ፤ጎመን፤ሰላጣ፤
ቡድን 8 ቫይታሚንኤፍራርሬዎ ችእናቅጠላቅጠሎች	ዱባ፤ካሮት፤ስኪርድንች፤አቦካዶ፤ማንጎ፤ፓ ፓያ፤ሀባብ፤
ቡድን 9	ጥቅልጎመን፤ቲማቲም

		ተጨማሪአትክልቶች	
		ቡድንአስር 10 ሌሎችፍራፍሬዎች	ሽኩረት፤ቡርትካን፤ሙዝ፤
051	የመሃልየላይኛውክንድክብልኬት	_____(በሴ.ሜ)	
052	የተሳታፊዋከወሊድበኋላየሄሞግሎቢንመጠን	_____(በግ/ዴ.ሊትር)	