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Prevalence Of Intestinal Parasites and Malaria Co infection Among Pregnant Women Attending Anti-natal Care Follow up at Batu General Hospital, Oromia, Ethiopia.

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This is to certify that the thesis prepared by Aschalew Deyasa entitled "**Prevalence of Intestinal Parasites and Malaria Co infection Among Pregnant Women Attending Anti Natal Care Follow up at Batu General Hospital, Oromia, Ethiopia** "and submitted in partial fulfillment of the requirements for Master of Science degree in Clinical Laboratory Sciences (diagnostic and Public Health Microbiology) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABBREVIATION

AAU	Addis Ababa University
ANC	Anti-natal Care
AOR	Adjusted Odds Ratio
CDC	Center for Disease Control
CI	Confidence Interval
COR	Crude Odds Ratio
IP	Intestinal Parasite
IPI	Intestinal Parasite Infection
WHO	World Health Organization

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ABSTRACT

Background: Intestinal parasitic infection occurs when a parasite affects the gastrointestinal system of human being and it constitutes a global health burden of causing clinical morbidity in reproductive age women. About 90.6% of peripheral and 92% of placental Plasmodium infections were caused by asymptomatic malaria, which was found in 11.4% and 10.3% of peripheral and placental blood specimens, respectively. Intestinal parasite and malarial co infection has an effect on birth outcome characterized, low birth weight, preterm deliveries and small for gestational age infants and the odds of having anemia is also increased after birth for the fetus.

Objective: To assess prevalence of intestinal parasite and malaria co infection among pregnant women in Batu primary hospital, Batu town, Oromia region, Ethiopia.

Methods:an institutional based cross-sectional study was conducted at Batu general hospital from February to April/2024.A standardized structured questionnaire,stool examination (direct and concentration methods), hemoglobin status andblood film was done. About 415 pregnant women wereincluded by systematic random sampling and data was entered by EPI Data Version 4.6.0.6 and exported to SPSS Version 25. Frequency Graphs and tableswere used to summarize the descriptive stastics. In a bivariate analysis variables with P-value of and less were entered to a multivariable regression analysis and finallyvariables having P-value $\leq$0.05 wereconsidered statically significant(CI: 95%).

Result: The overall prevalence of malarial and IP co infection is about 7% with 95% confidence interval of (CI: 4.73%, 9.88%) and the prevalence of malaria infection and intestinal parasite infection was 12.8% and 22.2% respectively. Being premigravid ((AOR: .02, CI: (.00, .24)), being multi gravid ((AOR: .01, CI: (.00, .06)), women in pregnancy who hada practice ofwashing vegetables prior to eating ((AOR: .01), CI (.00, .17)) wereidentified factors which affect malaria and intestinal parasite co infection.

Conclusion: Malaria and intestinal parasite co infection is moderately low and gravidity, washing vegetables before eating, practice of bed net utilization and availability of stagnant water were identified factors.

Key words: intestinal parasite, malarial infection, intestinal/malarial co infection, pregnancy, ANC and hospital.

1. INTRODUCTION

1.1. Background

Intestinal parasitic infection infects gastrointestinal tract of human being and it constitutes a worldwide health problem causing morbidity for about 450 million individuals, a large portion of whom were in reproductive age group. Intestinal parasite infection and anemia has a direct proportion in pregnant women. Some parasites (such as *Hook worm*, *Tape worm*, and *Schistosoma*) cause bleeding because they can suck blood and enter blood vessels (*Entamboa histolytica*). In pregnant mothers the infection of *Hook worm* and *Entamboa histolytica* is high. The summation two parasite results is 33% of the total infected women. This result increases the number of anemic pregnant women. More than 55% of infected mothers are anemic(1). In other study, parasite is organisms that rely on a host for food and nutrients. They live in or on the host at the host's expense. Intestinal parasites live in the digestive tract in the intestines(2).

About, 82% of placental, 88.2% of congenital malaria and 76.6% of peripheral malaria infections were caused by *Plasmodium falciparum*. Whereas, about 90.6% of peripheral and 92% of placental Plasmodium infections were caused by asymptomatic malaria, which was found in 11.4% and 10.3% of peripheral and placental blood specimens, respectively(3).

Maternal risk factors for malaria include low maternal age, low parity, and low gestational age. The main effects of MIP include maternal anemia, low birth weight , preterm delivery and increased infant and maternal mortality (4).

Intestinal parasite infections are more common in developing nations because of a lack of resources, extreme poverty, low literacy rates, improper food handling practices, shabby hygiene, and a hot, muggy tropical environment. Because of their poverty, many pregnant women in developing nations are especially susceptible to IPIs. They also lack the funds for proper nutrition, hygiene habits, shoes, and a clean water source (5,6). Up to 250 million persons in Sub-Saharan Africa were at least one IPI infection (2). The majority of parasite infections occur in developing nations with tropical or subtropical temperatures; they are almost universal and are becoming more common in industrialized nations(7).

1.2. Statement of the Problem

Globally parasites infections are burdensof human health. Most parasitic diseases have a concentrated disease burden that causes a considerable amount of morbidity and mortality in susceptible populations. It is very common in middle-class and impoverished societies. Humans are commonly exposed to intestinal parasites through tainted food and water. And it was transmitted by walking on bare feet(8).The prevention of IP in pregnant women is the one of world health organization program. WHO stated deworming program for the country which prevalence of intestinal parasite infection among pregnant women >20 %. By this program some countries are scored good achievement. But still the problem is not disappearing. It want a hard prevention policy and poverty reducing plan (9,10).

A meta-analysis and systematic review were conducted in Ethiopia, showed that, about 31.75% of pregnant women had parasite infection. According to this result the magnitude of the problem is very high. *Hookworm, A. lumbricoides, E. histolytica, G. lamblia and Schistosoma mansoni* are the most dominant intestinal pregnancy-related parasites women in Ethiopia (11).

A study done at Ghana showed that, intestinal helminthes were found in 1.3% pregnant women and 12.6% of them had malarial infection, but there was no case of co-infection recorded among pregnant women (12). In a study at Nigeria, the overall prevalence of co-infection was 43.1%(13).

As stated earlier, intestinal parasite infection pauses significant and devastating public health problem in developing countries in particular African Countries like Ethiopia, little is known about the prevalence of IPI among pregnant women. Furthermore health education, sanitation, hand washing orientation, and drinking water threating program strongly expected. The previous studies conducted in Ethiopia for IPI detection was determined from the total of parasite suspected specimen (11).A study at GilgelGibie, the prevalence of soil transmitted helminthiasis and malaria infection was 41% and 11.6%, respectively and the prevalence of co-infection was 7.7%(14).

Furthermore, the more specific and sensitive techniques of IP detection techniques (concentration test) in combination with direct microscopic/ wet mount/ test will be used for the detection and confirmation of the IP infection unlike the previous study.There is a high burden of parasite infection in Ethiopia; certain regional studies have revealed the prevalence ranging from 27% to 70.6%(15).. This is despite the absence of nationally representative and comprehensive data addressing the size of prevalence of IPIs among pregnant women in Ethiopia. *Ascaris lumbricoides, Hookworms, Trichuris trichiura, and Schistosoma mansoni* are the principal IPIs that have been identified(15).There is lack of data on the prevalence of intestinal parasites and malaria co-infection among pregnant women in our study area, hence, it is important to calculate the size of IPIs and malaria co-infection rate to lessen the strain and effects that these parasites have on expectant mothers and their unborn children.

1.3. Significance of the study

The study was going to show the prevalence of intestinal parasite and malarial co-infection among pregnant women in Batu town. After data dissemination, following the detection of theburden and identified factors among pregnant women, hospital managers will have a baseline data for infection control and epidemiological surveillance at the hospital and in the major community. The study's findings will be used to advocate the deployment forscreening and confirmatory testing. Taking into account everything mentioned above, this study will offer significant information contributions and attempt to address some of the primary gaps in the literature and problem statements of the earlier Ethiopian investigations.

Finally, the major findings of this study will provide a baseline data for future researchers which will be done by more preferable study design method.

2. LITERATURE REVIEW

2.1. Over view of intestinal parasites and malaria co-infectionin pregnancy

Intestinal parasite and malarial co infection has an effect on birth outcome characterized, low birth weight, preterm deliveries and small for gestational age infants. The odds of having anemia is also increased after birth for the fetus (12). Intestinal parasite were still the problem of health pregnant women who living in poverty. More than 500 million adolescent girls and women of reproductive age (including over 100 million pregnant and lactating women) are at risk of soil transmittedhelminthes require treatment (9).There was a high prevalence of disputed pathogenicity parasites, indicating fecal–oral contamination. The length of time since the last deworming and the presence of any parasite infection were found to be significantly associated (6).

2.2. Prevalence of intestinal parasiteand malaria co-infection in pregnant women

In a study at Colombia, Bogota showed, high prevalence of intestinal parasite infection among pregnant women which is about 41%(6). Similar findings in a study done at India, Mumbai teaching hospital, the prevalence of intestinal parasites was about 42.67%, in which protozoa (88.65%) were predominant than the helminthes (11.34%) (16).

In the sub-Saharan region of Africa, 20% of pregnant women had co-infections with helminthes and malaria, according to the pooled data. Malaria and helminthes had pooled frequencies of 33% and 35%, respectively. Ascaris lumbricoides (37%), Hookworm (48%), and Trichuris trichiura (15%) were the most common helminthes. Pregnant women showed noticeably greater rates of co-infection with helminthes and malaria(17).

P. falciparum parasitaemia prevalence was 24.9%, whereas, the burden of IP was18.2%. The most common co-infections between expectant mothers were either P. falciparum/Entamoeba histolytica (16.7%) or P. falciparum/Ascaris lumbricoides (16.7%). Pregnancy status, gestational age and anemia correlated with the co-infection of P. falciparum/intestinal parasites(13).

According to study in Ghana, the prevalence of intestinal parasites among pregnant women was about 14.3%, in which, the most dominant parasites were *Entamoeba histolytica* (5.0%) and (5.77%) representatively*Ascaris lumbricoides* (4.3%), *Giardia lamblia* (2.3%), *Trichuris trichiura* (1.3%), *Schistosoma mansoni* (0.3%), *Hookworm* (0.3%), *Hymenolepis nana* (0.3%), and *Isospora belli* (0.3%) were the next in order of prevalence.. Similarly in Cameroon, the prevalence of intestinal parasite infection pregnant women was about 13.46%.were fund in Ghana(18,19).

In East Africa, a meta-analysis and comprehensive review, revealed the severity of IPI in pregnant women in which the prevalence of intestinal parasites among pregnant women was 38.54%(20).In Ethiopia, the calculated combined frequency of IPIs among expectant mothers was about, 27.32%. The regions with the highest prevalencewithin the smaller groups study were Oromia and Amhara, with 29.78% and 29.63%, respectively. Furthermore, investigations carried out in the community revealed a greater prevalence (49.93% Vs. 24.84% respectively) than studies conducted in institutions (11).

The proportion of anemia among pregnant women who had intestinal parasite infections during the current pregnancy was 33.33%. Intestinal parasite infections continued to be a major health risk to expectant mothers in the research region due to the prevalence of hematophagous worms, or hookworms. intestinal parasiteinfections were the cause of anemia in pregnant women (21).Pregnant women in the Amara region have a significant prevalence of IP in various districts (North Gonder zone (36.7%), Wereilu Health Center (43.5%), East Gojam zone (43.5%)andNorth Shewa zone (27.7%)). Different parasites are prevalent in the area. The most prevalent parasites are *Schistosoma mansoni, Ascaris lumbricoides, hookworm, Giardia lamblia,* and *Entamoeba histolytica/dispar*(22–25).

Similarly in southern Ethiopia the prevalence of IP in pregnant is high. In 2018 Wondo Geneton public health facility study on IP in pregnant.The study showed that high prevalence (38.7%) seen and in Yirgalem hospital, the prevalence IPI was 35.8%. In Hawassa at selected health centers the prevalence was 45.9%(26–28).In Oromia region, LaloKile district, in 2019;Intestinal parasite infection was present in 43.8% of cases, with *Hookworm* accounting for the majority (33.7%) and *Ascaris lumbricoides* (7.3%) (29).

2.3. Factors associated to intestinal parasite and malaria co infection in pregnancy

2.3.1. Socio demographic characteristics:-

As a factor, age > 30 years was separately linked to intestinal parasite infections in expectant mothers (18). IPIs were more common among the illiterate, lowest monthly income earners, primigravida (first-time mothers), those who ate soil, drank unboiled water from wells, streams, or rivers, and those who ate raw vegetables. Among the study participants, IPI prevalence was noticeably high(22).

Dwelling in rural area, being a farmer, eating raw vegetables, lack of proper use of latrine, Intestinal parasite infections were substantially correlated with inadequate environmental cleanliness, a soil-eating habit accompanied by irrigation practices, and a lack of health education (24). The IPIs were linked to women who did not complete their official educationorelementary school education, in contrast to those with a high school diploma or higher. less than 1920 Ethiopian Birr each month(28). Workplace and drinking water source were found to be important variables linked to intestinal parasite infection. Compared to other pregnant women, farmworker women had a 6.41-fold higher risk of intestinal parasite infection(30).

2.3.2. Maternal characteristics

Being in second trimester, third trimester, and using spring water for drinking were significantly associated with IPIs (23). Similarly, the prevalence of IPIs was more in the second trimester (42.86%) as compared to the first (28.57%) and the third trimester (28.57%) of pregnancy(19). and also from another study, multigravidity, and 2nd and 3rd trimesters were separately linked to intestinal parasite infections in pregnant women (18).

The prevalence of intestinal parasites was more in the first trimester in contrast to the second and third trimesters. Primigravida women had greater positivity of intestinal parasites than the multigravida(16). A study at Nigeria, pregnancy status, gestational age and anemiawere significant factors (12).

2.3.3. Hygienic and Environmental factors

Personal hygiene protection are had direct association with intestinal parasite infection. Women who practiced hand washing regularly and had knowledge about parasites had lesser infection. Being a farmer, walking barefooted and lack of hand washing with soap and water after restroomwere significantly associated with occurrence of the intestinal parasitic infection.Thus, maintaining good personal cleanliness and encouraging moms to wear shoes are crucial to meeting the needs of both mother and child and minimizing negative health effects in addition to spaced pregnancy. (20,23,24)**.**Increased odds of IPIs observed among pregnant women who ate unwashed fruits/vegetables, drank water from the unprotected source, drank untreated water, not washed hands by soap, and had a history of previous IPI (27).

Workplace and drinking water source were found to be important variables linked to intestinal parasite infection. Intestinal parasite infection was 0.52 times less common in expectant mothers who drank tape water (31).Additionally in other study, eating raw vegetables, lack of inadequate latrine use, unsanitary surroundings, soil-eating behavior, irrigation techniques, and a lack of health educationwere significantly associated with intestinal parasitic infections (24).Habit of eating soil, presence of stagnant water near study participants' house and habit of using human feces as a fertilizer were found to be significantly associated with malaria and soil transmitted helmentiasis co-infection among the pregnant women (14).

2.3.4. Other related factors

In a study done at Wondo genet, found that the anemia rate among pregnant women was 31.5%.The percentages of mild and moderate anemia were 21.5% and 10.0%, respectively and There was no significant anemia among the women.Almost all of the mothers who had hookworm infections were anemic.Individuals afflicted with at least one intestinal parasite had six times higher chances of anemia(26). A study in Benshagul-Gumuz, the prevalence of malarial infection during pregnancy was about 10.2% and in a study in north-west Ethiopia, the prevalence of malaria was 20.8%(32,33). Pregnant women's intestinal parasite infection has been linked to health education and water quality.In other studies, There was a strong correlation between the incidence of intestinal parasite infection and being barefoot. (29). In other study, being not dewormed was a predictor for parasitic infection (25).

2.4. Conceptualframe work

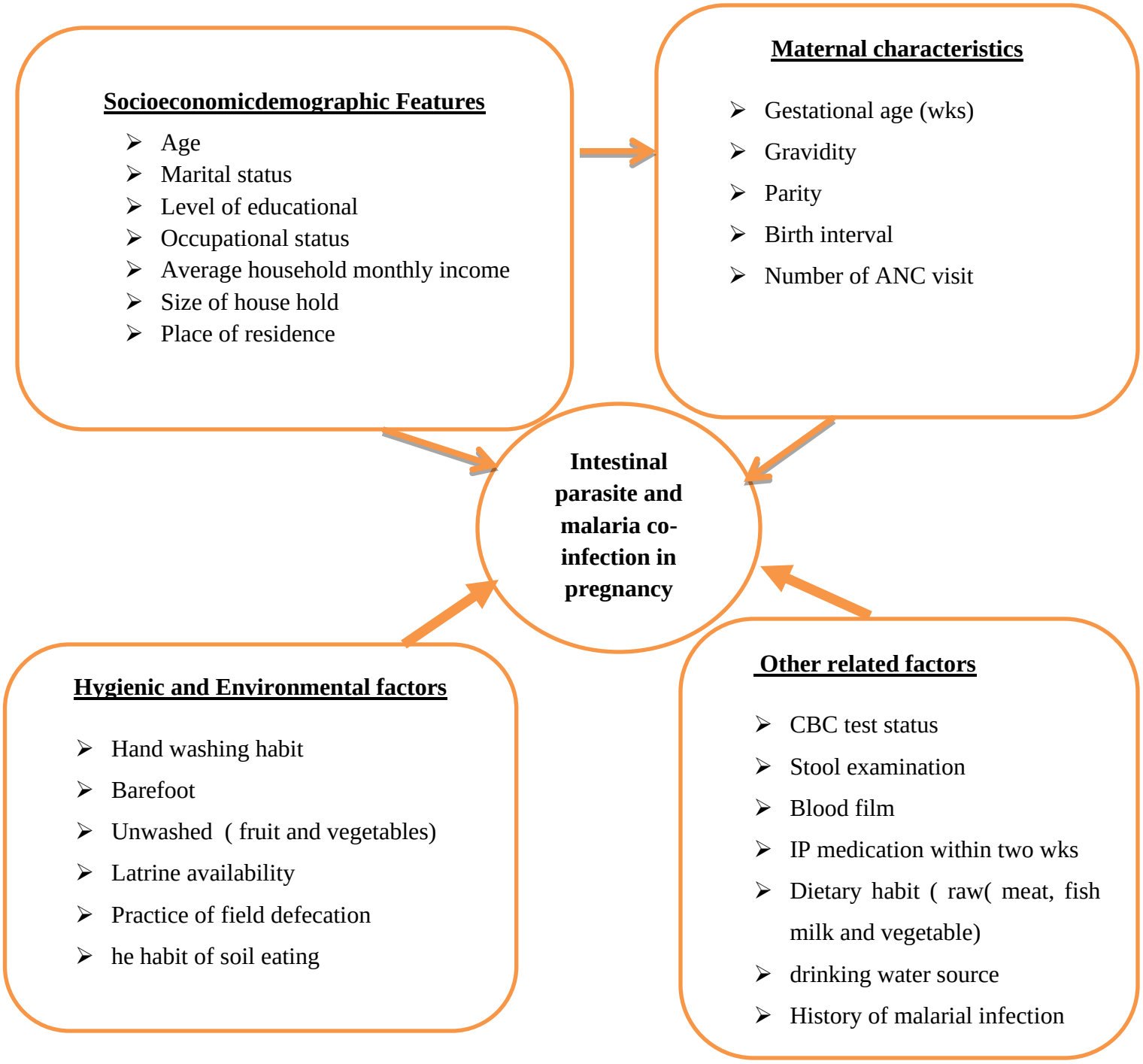

Figure 1: Conceptual framework adapted from related articles to assess the prevalence of intestinal parasites among pregnant women having ANC follow up Batu general hospital, Oromia region, Ethiopia, 2024(5,24,26,27,29,30).

3. OBJECTIVES

3.1. General Objective

- To assess prevalence of intestinal parasite and malarial co infection among pregnant women in Batu general hospital, Batu town, Oromia region, Ethiopia, 2024.

3.2. Specific Objectives

- To determinethe prevalence of malarial and intestinal parasite co infection amongpregnant women in Batu general hospital, Batu town, Oromia region, Ethiopia, 2024.
- To identifyfactors affecting intestinal parasite and malarial co infection among pregnant women in Batu general hospital, Batu town, Oromia region, Ethiopia, 2024.

4. METHOD AND MATERIALS

4.1. Study Area and Period

The study was conducted at BatuGeneral Hospital, Batu town from February 1/2024 to April 30/2024. Batu is the town of Adamitulu jido kombolcha Woreda in Oromia Region, East Shewa zone which it is 167 kilometers south of Addis Ababa. It is bordered in the north by dugda bora woreda, eastward by the lakeZiway/ haradambel, in to the west by south NNP regiondistrict, as well as in the south by west Arsi Zone. The town has a latitude and longitude of 7° 56′ N 38° 43′ E with a rise of 1643 m higher than sea level and the economy within the town is based on fishing and horticulture.

Total population of Batu townwas 90,649 (male 44,418 and female 46,231). There are twogovernmentalhealth facilities (one primary hospital and one health center) and seven private health sectors(one private hospital and 6 clinics) are found under maternal and child health, ANC unit is one of the service delivery point in which, DHIS 2 report of last annual ANC follow up to 4693 pregnant women (34).

4.2. Study Design

An institutionally based cross-sectional study design was used.

4.3. Source and study Population

4.3.1. Sourcepopulations

Women in reproductive age groupwho live at Batu Town, Oromia region, 2024.

4.3.2. Study population

Pregnant women who were selected randomlyat BatuGeneral Hospital, Oromia region, 2024.

4.4. Eligibility Criteria

4.4.1. Inclusion criteria

All pregnant women having ANC visit at Batu GeneralHospital whowere open to taking part in the research wereincluded.

4.4.2. Exclusion criteria

Pregnant women who were dewormedduring the last two weeksbefore data collectionand those who were gravely unwell at the time of the data gathering were not allowed to participate in the research.

4.5. Sample size determination

Sample size for the first objective

The calculation of sample size was done using a single proportion to equation to assessthe prevalence of intestinal parasite and malaria co infection among pregnant women in which, the prevalence of co infection is unknown in Ethiopia, so, 50% was used as a prevalence by considering level ofconfidence (95%), degree of margin 0.05.

$$n= \frac{(za/2)^2 0.5(1-0.5)}{0.05^2}$$

$$n=\frac{(1.96)^2(0.5)(0.5))}{0.05^2} \qquad \textbf{n=384}$$

So, adding ten percentnon-responses,, the overall number of samples was: **N= 422**

Where: N= total sample size, P= prevalence, d= margin of error, Zα/2=critical value for normal distribution at 95% confidence level..

4.6. Sampling Technique

The individuals involved in the research werechosen using an approach to systematic random sampling. Throughout the research, the mean quantity of pregnant women attending anti natal care within the last year was 4693 pregnant women making an average monthly follow up of 422 pregnant women. since the study period wastwo months , giving two months ANC follow up of 782 pregnant women, so, To obtain the sample interval, this numberwas split by the number of samples,.(K^{th} = 782/422) that is1.82 approaches to 2.The selection of every two pregnant women who used the lottery techniquewoman was enrolled).

4.7. Study Variables

4.7.1. Dependent Variables

Prevalence of intestinal parasite and malarial co infections among pregnant women

4.7.2. Independent Variables

Socio- demographic features: (age marital status, level of Education, Occupational status, Average household monthly income, Size of house hold and Place of residence**).**

Maternal characteristics:(Gestational age, Gravidity, Parity, Birth interval and Number of ANC visit).

Hygienic and Environmental factors:(Hand washing habit, Barefoot, Unwashed (fruit and vegetables), Latrine availability, Practice of field defecation and History of soil eating habit**)**

Other related factors:(IP medication within two weeks, Dietary habit (raw(meat, fish milk and vegetable), Source of drinking water , History of IP in previous pregnancy and Health education).

4.8. Data collection tools and procedures

Data collection tools include structured questionnaire, and laboratory finding (stool examination, blood film and Hemoglobin level), further discussed as below.

8.1. Questionnaire

A structured and standardized questionnaire was developed from different literatures(5,24,26,27,29,30)translated from English into Afan Oromo and Amharic, the native language. . The questionnaire includes,socio demographic characteristics (7 items), maternal characteristics(5items),personal hygiene and environmental factors (9 items), other related factors (8items) and laboratory findings (7 items).

8.2. Laboratory procedure

After obtaining informed consent, orientation was given to the women on how to collect sufficient amount and contamination free stool specimens. Each study participant was provided with a labeled disposable plastic cup and applicator stick to bring about 3-4 g of stool. Then unique code of the pregnant woman was labeled on the cup and then a stool sample was processed for parasite species identification.

8.2.1. DirectWet Mount Method

An about 2 milligram sample of stool was emulsified using a drop of regular saline (0.85% NaCl solution). Subsequently, a slide was coated with cover slip, A droplet of emulsified sample was applied it. And few drops of iodine were added. To specifically identify the parasites in each preparation, a 10× objective lens was used for the initial examination, followed by a 40× objective lens (35).

8.2.1. Formalin-Ether Concentration Method.

Seven milliliters of 10% formalin were added to a centrifuge tube along with one gram (1 g) of feces material. An applicator stick was used to suspend and completely mix the sample. The resultant suspension was poured back into the tube after being filtered through a cotton gauze sieve and placed into a beaker. After that, the mixture was added to 3 ml of diethyl ether, the tube was closed, and it was violently agitated. After that, it was centrifuged for two minutes at 1500 RPM. Following centrifugation, the sediment holding the parasites at the test tube's bottom was re-suspended, and the supernatantlayers of ether, detritus, and formalinwas disposed away. After that, the sediment was moved using a Pasteur pipette to a slide so that it could be studied under a microscope.

8.2.2. Blood film

For malaria diagnosis blood film were performed. On forested microscopic slide thick and thin blood smeared. After dried and fixed the thin smear by methanol absolute. It was stained with Giemsa stain following standard procedures. Then the presence of Plasmodium spps was examined on thick film. To identify the species checked the thin smear. On high field, oil immersion objective.

8.2.3. CBCtest procedure

Complete blood count was determined for each pregnant women using automated hematology (mindrayBC 30s CBC analyzer), following the SOP of the laboratory.

4.9. Operational Definition

Intestinal parasite and malarial co infection among pregnancy: Co existence of plasmodium species and intestinal parasite at a time in designated client.

Low RBC: Pregnant women having RBC count less than 2.72×10^{12} /L

High RBC: Pregnant women having WBC count greater than 4.43×10^{12} /L

High WBC: pregnant women having WBC countgreater than 15,000 per 1µl of blood.

Low platelet: pregnant women having platelet count less than 150,000 per 1µl of blood.

Anemia in pregnancy: Pregnant women having hemoglobin levelless than11g/dl**.**

4.10. Data Quality Assurance

Three data collectors (Laboratoryprofessionalsat Batu hospital for lab procedures) received one day of training from an expert to ensure the quality of the data. They were also informed about the objectives of the study, the sensitivity of the issue, confidentiality of responses, and contents of questionnaires and laboratory procedures and how to approach the study participants. Similarly pretest of 5% (21 pregnant women) was done at Batu health center. Every variables and laboratory findings were strictly followedand checked as per standards. After data has been collected data cleaning was done by monitoring errors and checking the missing variables to give pertinent feedback to the data collectors.

After stool examination done by direct microscopy, negative results were retested from the same sample under concentration method through centrifugation.

4.11. Data Processing, Analysis and Presentation

EPI Data Version 4.6.0.6 was used as well as exported to (SPSS) Version 25 in order to analyze. Frequency and cross-tabulation was used to summarize descriptive statistics. Graphs and tables wasutilized for presenting facts.The variables' associations with the dependent variable were examined using bivariate logistic regression analysis.t variables(p-value not exceeding 0.2)wereentered in to multivariable logistic regression models to control confounders and finally variables havingP-value below 0.05 was regarded as statistically significant.

4.12. Ethical Considerations

Department research and the ethical committee provided their approval ofMedical laboratory Sciences, College of Health Sciences, AddisAbabaUniversity. Formal letter was submitted to Batu General HospitalandThe study's goal was elucidatedto administrative bodies. After all pregnant womenwereconsented. Details on the goal, approach, possible dangers, and advantages of the research were given.Additionally they were assure of absolute confidentiality about any data obtain from them. After outlining the restrictions, consent was obtained without the use of any personal information.

5. RESULTS

5.1. Socio-demographic features

A total of 415 respondents were participated in the study making a response rate of 98.34 %. From all respondents, almost half (48.9%) of them were in age range between 21 to 29 years with mean age of 27.33years. The majority of those surveyed 333(80.2%) in marriage and about 326(78.6%) were from urban areas. About 113(27.2%) of the respondents can read and write and only 9.9% had 1st degree and above. Of all respondents about 245(59%) had medium household income and about 369(88.9%)number of family of five or less(Table 1).

Table 1: Socio economy demographic features of Pregnant Women Attending Anti Natal Care Follow up at Batu General Hospital, Oromia, Ethiopia, 2024 (n=415)

Variable		Frequency	Percent
Age	Younger than 20 yrs	53	12.8
	21 to 29 yrs	203	48.9
	30 to 39yrs	153	36.9
	40 yrs and above	6	1.4
Residence	Urban	326	78.6
	Rural	89	21.4
Family size	5 and less	369	88.9
	6 and more	46	11.1
Occupational status	Governmental employee	55	13.3
	Privateemployee	56	13.5
	Housewife	140	33.7
	Ownbusiness	112	27.0
	Other	52	12.5

5.2. Maternal characteristics

Of all respondents about 245(59.0%) were in second trimester pregnancy followed by third trimester pregnancy 143(34.5%). More than half 235(56.6%) were multigravida and about 242(58.3%) were nullypara. About 365(88%) of respondents had birth interval of 2 years and less and only 9(2.2%) had ANC visit of eight and more.

5.3. Hygienic and environmental factors

About 411(99%) were washing their hands before meal and before food preparation. More than half 230(55.4%) of them were washed their hands after toilet with soap and wore their shoe properly. Toilet coverage of the study was 371(89.4%), in which 279(67.2%) of it was private.

Table 2: Hygienic and environmental factors of Pregnant Women Attending Anti Natal Care Follow up at Batu General Hospital, Oromia, Ethiopia, 2024 (n=415).

Variable		Frequency	Percent
Washing hand before meal	Yes	413	99.5
	No	2	.5
Washing hand before food prepare	Yes	411	99.0
	No	4	1.0
Washing hand after toilet with soap	Yes	230	55.4
	No	185	44.6
Wearing shoe properly	Yes	230	55.4
	No	185	44.6
Washing fruit before eat	Yes	197	47.5
	No	218	52.5
Washing vegetables before eat	Yes	310	74.7
	No	105	25.3
Have toilet	Yes	371	89.4
	No	44	10.6
Type of toilet	Private	279	67.2
	Communal	92	22.2
History of soil eating	Yes	6	1.4
	No	409	98.6

5.4. Laboratory findings and other related factors

Of all respondents about 35(8.4%) and 63(15.2%) of them ate row meat and raw fish in the current pregnancy respectively. But 333(80.2%) of the respondents were ate uncooked vegetables. Of all respondents about 372(89.4%) were using tap water for drink. About 152(36.6%) of them respond that there was a mosquito breeding site and similarly about 155(37.3%) of them were using mosquito repellent technique. Only 86(20.7%) of them utilize bed net and 172(41.4%) of them respond there is stagnant water in the community. About 223(53.7%) of them had history of malaria infection in previous pregnancy and most of them 339(81.7%) had awareness about IP and malaria infection.

CBC profile showed that, about 34(8.2%) of them had low RBC, 16(3.9%)of them had high WBC count and 87(21%) of them had low hemoglobin level.From all pregnant women who were co infected with malaria and IP, about 13(44.8%) had anemia. Three fourth of the stool sample was semi formed and wet mount was done for all samples andconcentration method was done forabout 329(79.3%)samples. After concentration method about 6 samples (1.8%) were positive for IP and as total cases of IP were 92(22.2%) with a predominant parasite of *E. histolotica*43(10.4%), mixed parasite 19(4.6%),*G. lamblia*16(3.9%)*A. lumbiriciodes* 11(2.7%), *Tienia spp* 4(1%). From all prevalence of malarial infection 53(12.8%), the commonly seen hemo-parasite were *P. Falciparum*33(8%), P *vivax*15(3.6%) and mixed hemo-parasite5(1.2%)

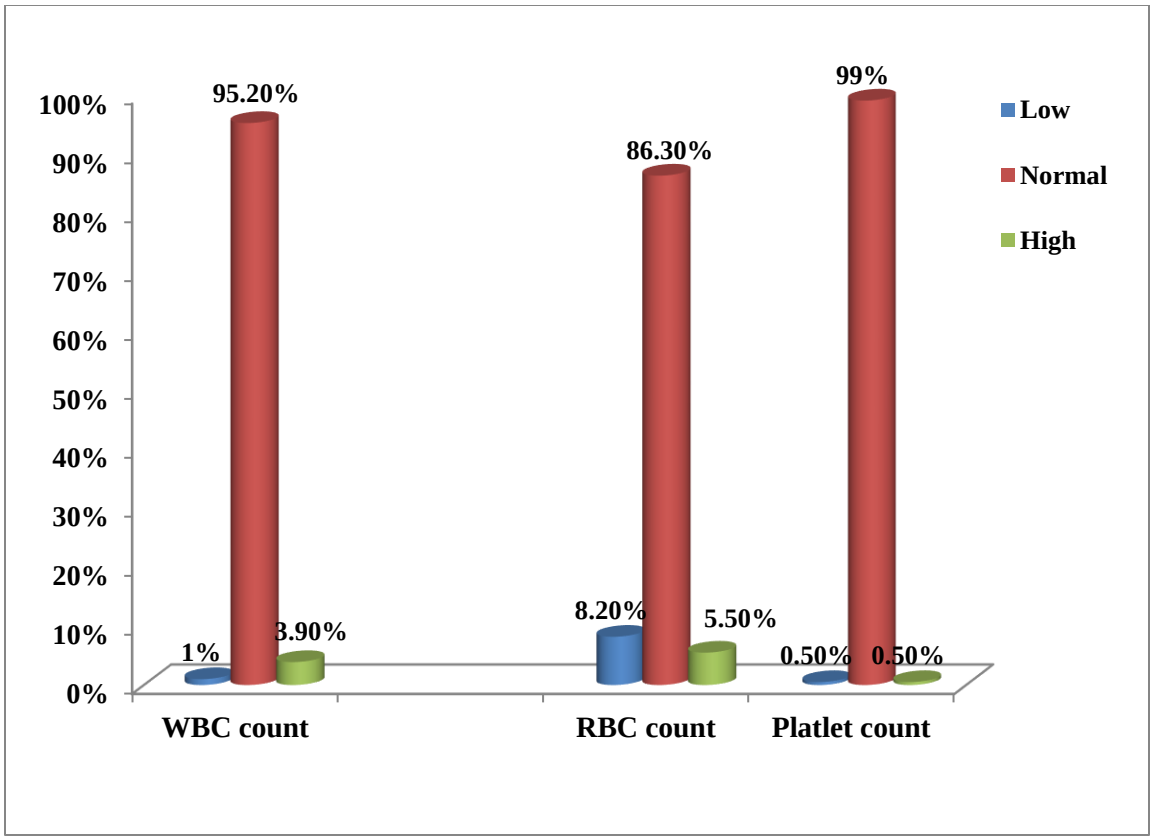

Figure 2: CBC count profile for pregnant women attending Anti Natal Care follow up at Batu Hospital, Oromia, Ethiopia, 2024.

5.5. Prevalence of malarial, IP and co infection

The overall prevalence of malarial and IP co infection is about 29 (7%) with 95% confidence interval of (CI: 4.73%, 9.88%) and the prevalence of malaria infection and intestinal parasite infection was 12.8% and 22.2% respectively.

6. Factors affecting IP and malarial co infection

In bivariate analysis, all variables were assessed for their association with dependent variable, giving about thirteen variables having association (P-value <0.2) with malarial and IP co infection, in which those variables were entered to multivariable regression analysis, which showed that, gravidity, washing vegetables before eating, practice of bed net utilization and availability of stagnant water were identified factors which are statically significant.

Being null gravid women were .02 times less likely ((AOR: .02, CI: (.00, .24)) and being multi gravid women were .01 times less likely ((AOR: .01, CI: (.00, .06)) to have malarial and intestinal parasite co infection than grand multigravid women. Pregnant mothers who had a practice of washing vegetables prior to eatingwere.01 time ((AOR: .01), CI (.00, .17)) less likely to have malarial and intestinal parasite co infection than those had not (Table 3).

Pregnant women who did not practice bed net were 13.99 times ((AOR: 13.99), CI: (1.55, 125.68)) more likely than those who utilized bed net and availability of stagnant waterat the community was 7.97((AOR: 7.97), CI: (1.26, 50.40)) more likely to have malarial and intestinal parasite co infection (Table 4).

Table 3: Factors affecting IP and malarial co infection Among Pregnant Women Attending Anti Natal Care Follow up at Batu Hospital, Oromia, Ethiopia, 2024 (n=415).

Variables (n = 415)		IP and malarial co infection		COR with 95% CI	AOR with 95.% CI
		Yes	No		
Family size	Less than five	17	352	.13(.06, .31)	.29(.02, 3.70)
	Six and more	12	34	1	1
Residence	Urban	15	311	.25(.12, .55)	.41(.05,2 .90)
	Rural	14	75	1	1
	Primigravida	7	134	.09(.03, .25)	**.02(.00, .24)**
Gravidity	Multi gravida	8	227	.06(.20, .16)	**.01(.00, .06)**
	Grand multigravida	14	25	1	1
Washing hand with soap	Yes	2	228	.05(.01, .21)	.31(.06, 1.59)
	No	27	158	1	1
Wearing shoe	Yes	17	323	.27(.12,.60)	1.14(.01, 99.15)
	No	12	63	1	1
Washing vegetables	Yes	4	306	.04(.01,.12)	**.01(.00, .17)**
before eating	No	25	80	1	1
Hemoglobin level	Anemic	13	74	3.42(1.57, 7.43)	.61(.04, 8.28)
	Non anemic	16	312	1	1

Statically significant (*P- Value < 0.05)

Table 4: Factors affecting IP and malarial co infection Among Pregnant Women Attending Anti Natal Care Follow up at Batu Hospital, Oromia, Ethiopia, 2024 (n=415),

Variables (n = 415)		IP and malarial co infection		COR with 95% CI	AOR with 95.% CI
		Yes	No		
History of malarial infection	Yes	20	172	2.76(1.22, 6.22)	2.78(.07, 99.76)
	No	9	214	1	1
Received awareness on IP and malarial infection	Yes	18	321	.33(.14, .73)	.00(.00, .)
	No	11	65	1	1
Procedure of test performed	Direct microscope	27	59	74.82(17.32, 323.09)	23.43(4.45, 123.27)
	Concentration	2	327	1	1
Bed net utilization	Yes	12	74	1	1
	No	17	312	.33(.15, .73)	**13.99(1.55, 125.68)**
Availability of stagnant water	Yes	27	145	22.43(5.25, 95.75	**7.97(1.26, 50.40)**
	No	2	241	1	1
Appropriate toilet distance from the kitchen	< 5 Mrs.	17	282	.52(.24, 1.13)	24.31(2.86, 206.45)
	>=5 Mrs.	12	104	1	1

Statically significant (*P- Value < 0.05)

6. DISCUSSIONS

This study is in line with in a study done at GilgelGibie,in which the prevalence of co-infection was 7.7%. Even though the prevalence of co infection was nearly similar, the proportion ofmalarial illness inside the research areawas lowand prevalence of intestinal parasite was high (14).

But, this study is less comparable when comparing other studies in which the pooled analysis in Sub Saharan Africa revealed that,about 20% of them were co-infected(17).Similarly in a study at Nigeria showed that, 43.1% was the overall frequency of co-infection along withmalarial infection having a prevalence of 24.9% and 18.2% for intestinal parasitic infection (13).Even though, both sub-Saharan Africa and Ethiopia face malaria challenges, the higher prevalence in sub-Saharan Africa can be attributed to a combination of environmental, socioeconomic, and epidemiological such as climate, mosquito vector abundance, and human behavior contribute to higher transmission rates.

But, this study is more comparable than in a study done at Ghana which showed thatintestinal helminthes were found in 1.3% pregnant women and 12.6% of them had malarial infection, but there was no case of co-infection recorded among pregnant women (12). This might be due to the difference in sanitation, hygiene practices, and socioeconomic conditions.

In this study the prevalence of malaria infection is 12.8% which is a little more than in a study at Benshagul-Gumuz (10.2%), and relatively less in a study in north-west Ethiopia(20.8%)(32,33). Also in this study, the prevalence of intestinal parasite is 22.2%, which is less comparable to other many studies in which, at Colombia, Bogota(41%)(6) and at India, Mumbai (42.67%)(16).This quite differencepotentially as a result of variations in socio economic demographic traits, personal hygiene factors and some other environmental conditions.

Similarly other studies showed that pregnant women in the Amara region have a significant prevalence of IP in various districts (North Gonder zone (36.7%), Wereilu Health Center (43.5%), East Gojam zone (43.5%) and North Shewa zone (27.7%)) (22–25). This quite difference might be due to many factors which includes latrine availability status, open defecation, maternal education level, rural residence, non-pipe source of drinking water, irregular hand washing practices, and not washing fruits and vegetables before eating.

Under this study, some factors like being primigravid, being multi gravid pregnant women who had a practice of washing vegetables before eating are statically significant which affects malaria and intestinal parasite co infectionwhich is supported by other studies, in which the odds of IPIs were higher among primigravida and consumed raw vegetables (22,24). A study at Nigeria, also showed that, pregnancy status was a significant factor(12). Similarly other study support this finding in which increased odds of IPIs observed among pregnant women who ate unwashed fruits/vegetables(27).

7. LIMITATIONS OF THE STUDY

Since, cross sectional study design was used, so, it is unlikely to have temporal association between associated variables and malaria and intestinal parasite co infection in pregnancy.

8. CONCLUSION AND RECOMMENDATIONS

8.1. Conclusion

Malaria and intestinal parasite co infection is moderately low when comparing to some other studies and gravidity, washing vegetables before eating, practice of bed net utilization and availability of stagnant water were identified factors which affects malaria and intestinal parasite co infection.

8.2. Recommendations

Pregnant women are recommended to wash vegetables before they consume and woreda health office staffs and community leaders are also recommended to distribute bed net at the household level and utilization practice should be followed by community health workers. Apart from this, any stagnant water, which favor for mosquito breeding should be avoided by health extension workers in collaboration with other stake holders.

Since, the prevalence of intestinal parasite infection among pregnant women >20 % in which , WHO stated deworming program for that community, so, deworming program by regional health office should be implemented at the community level for this specific populations. Future researchers are also recommended to conduct research with otherobservational study designs like cohort study design.

REFERENCES

1. World Health Organization. Nutrition for Health and Development, World Health Organization. Department of Control of Neglected Tropical Diseases, World Health Organization. Preventive chemotherapy to control soil-transmitted helminth infections in at-risk population groups : guideline. 2017-75.
2. William C. Lloyd III, MD F. intestinal parasite review. 2020;
3. Tamir Z, Animut A, Dugassa S, Belachew M, Abera A, Tsegaye A, et al. Plasmodium infections and associated risk factors among parturients in Jawi district, northwest Ethiopia: a cross-sectional study.. 2023;22(1):1–12.
4. Takem EN, D'Alessandro U. Malaria in pregnancy. Mediterr J Hematol Infect Dis. 2013;5(1).
5. Derso A, Nibret E, Munshea A. Prevalence of intestinal parasitic infections and associated risk factors among pregnant women attending antenatal care center at Felege Hiwot Referral Hospital, northwest Ethiopia. BMC Infect Dis. 2016;16(1):1–7.
6. Espinosa Aranzales AF, Radon K, Froeschl G, Pinzón Rondón ÁM, Delius M. Prevalence and risk factors for intestinal parasitic infections in pregnant women residing in three districts of Bogotá, Colombia. BMC Public Health. 2018;18(1):1–15.
7. Ahmed M. Intestinal Parasitic Infections in 2023. 2023;16(3):127–40.
8. Al-Taei AHO. The prevalence of intestinal parasite among the attending peoples to Al-Hashimyah hospitals for seven years, Babylon province, Iraq. J Phys Conf Ser. 2019;1294(6).
9. Guideline: WHO. Preventive Chemotherapy to Control SoilTransmitted Helminth Infections in At-Risk Population Groups. 2017;
10. Nyambura AW, Muita Gicheru M. Intestinal Parasites Infection among Pregnant Women in Nyeri County, Kenya. Int J Heal Sci Res. 2022;12(7):172–80.
11. Animaw Z, Melese A, Demelash H, Seyoum G, Abebe A. Intestinal parasitic infections and associated factors among pregnant women in Ethiopia: a systematic review and meta-

analysis. BMC Pregnancy Childbirth. 2021;21(1):1–13.

12. Yatich NJ, Jolly PE, Funkhouser E, Agbenyega T, Rayner JC, Ehiri JE, et al. The effect of malaria and intestinal helminth coinfection on birth outcomes in Kumasi, Ghana. Am J Trop Med Hyg. 2010;82(1):28–34.

13. Akinbo F, Olowookere T, Okaka C, Oriakhi M. Co-infection of malaria and intestinal parasites among pregnant women in Edo State, Nigeria. J Med Trop. 2017;19(1):43.

14. Getachew M, Tafess K, Zeynudin A, Yewhalaw D. Prevalence Soil Transmitted Helminthiasis and malaria co-infection among pregnant women and risk factors in Gilgel Gibe dam Area, Southwest Ethiopia. BMC Res Notes [Internet]. 2013;6(1):1. Available from: BMC Research Notes

15. Center for Disease Control and Prevention, Center for Global Health Division of Parasitic Diseases and Malaria. Neglected Parasitic Infections in the United States. . 2017;1–2.

16. Roopal N, Paranjpe S, Avani K, Gita N, Preeti M. Prevalence of intestinal parasites in pregnant women. Indian J Microbiol Res. 2020;7(4):350–7.

17. Boltena MT, El-Khatib Z, Kebede AS, Asamoah BO, Yaw ASC, Kamara K, et al. Malaria and Helminthic Co-Infection during Pregnancy in Sub-Saharan Africa: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2022;19(9):1–22.

18. Abaka-Yawson A, Sosu SQ, Kwadzokpui PK, Afari S, Adusei S, Arko-Mensah J. Prevalence and Determinants of Intestinal Parasitic Infections among Pregnant Women Receiving Antenatal Care in Kasoa Polyclinic, Ghana. J Environ Public Health. 2020:1–7.

19. Cherry Suzanne Kengne, Christian Ngounouh Taheu, Julienne Louise Ngo Likeng, Lucien Koumdji Kouakam, Martinobrie Hermione Weladji Cheubou, Edouard Francky Nganti Mebenga, et al. Intestinal parasitic infections among pregnant woman at Bafang district hospaital, west region of Cameroon: Prevalence and associated factors. World J Adv Res Rev. 2022;16(3):178–86.

20. Mosisa G, Diriba DC, Tsegaye R, Kejela G, Bayisa D, Oluma A, et al. Burden of intestinal parasitic infections and associated factors among pregnant women in East Africa: a systematic review and meta-analysis. Matern Heal Neonatol Perinatol . 2023;9(1):1–15.

21. Tegegne KT, Tegegne ET, Tessema MK, Assef AA. Association of Parasitic Infection and Anemia in Pregnant Women in Ethiopia- A Systemic Review and Meta-analysis. J Trop Dis Public Heal. 2021;9(8).

22. Alula GA, Munshea A, Nibret E. Prevalence of Intestinal Parasitic Infections and Associated Risk Factors among aPregnant Women Attending Prenatal Care in the Northwestern Ethiopia. Biomed Res Int. 2021.

23. Kebede E, Asefa N, Daba C, Gebretsadik D. Prevalence of Intestinal Parasitic Infections and Their Associated Risk Factors among Pregnant Women Attending Antenatal Care Center at Woreilu Health Center, Woreilu, Northeast Ethiopia. J Parasitol Res. 2022;2022.

24. Hailu T, Abera B, Mulu W, Kassa S, Genanew A, Amor A. Prevalence and Factors Associated with Intestinal Parasitic Infections among Pregnant Women in West Gojjam Zone, Northwest Ethiopia. J Parasitol Res. 2020.

25. Dagnaw A, Sahlie M, Mulugeta H, Shine S, Bediru W, Zebene A, et al. Magnitude of Intestinal Parasite Infection and Associated Factors Among Pregnant Women Attending Antenatal Care Service in Shewarobit Town Health Facilities, North Shoa Zone, Amhara Region, Ethiopia. Infect Drug Resist. 2021:14--30.

26. Bolka A, Gebremedhin S. Prevalence of intestinal parasitic infection and its association with aneamia among pregnant women in Wondo Genet district, Southern Ethiopia: A cross-sectional study. BMC Infect Dis. 2019;19(1):1–8.

27. Buchala AD, Mengistu ST, Mue AD, Gujo AB. Prevalence of intestinal parasitic infections and associated factors among pregnant women attending antenatal care at Yirgalem General Hospital, Sidama, Ethiopia. Clin Epidemiol Glob Heal . 2022;15(January):101032.

28. Wachamo D, Bonja F, Tadege B, Hussen S. Magnitude of parasitic infections and associated factors among pregnant women at health facilities in Hawassa, Southern Ethiopia: 2021;10.

29. Yesuf DA, Abdissa LT, Gerbi EA, Tola EK. Prevalence of intestinal parasitic infection and associated factors among pregnant women attending antenatal care at public health facilities in Lalo Kile district, Oromia, Western Ethiopia. BMC Res Notes. 2019;12(1):1–

13.

30. Aschale Y, Minwuyelet A, Akalu TY, Talie A. Prevalence of Intestinal Parasite Infections and Associated Factors among Pregnant Women in Northwest Ethiopia. J Parasitol Res. 2022.

31. Abere A, Aschale Y, Tegegne B, Eshetu T, Derso A. A 10-year trend analysis of intestinal parasitic infections at grarigy health center, northwest ethiopia: Implication for epidemic preparedness. Infect Drug Resist. 2023;16(May):3183–90.

32. Gontie GB, Wolde HF, Baraki AG. Prevalence and associated factors of malaria among pregnant women in Sherkole district, Benishangul Gumuz regional state, West Ethiopia. BMC Infect Dis. 2020;20(1):1–8.

33. Almaw A, Yimer M, Alemu M, Tegegne B. Prevalence of malaria and associated factors among symptomatic pregnant women attending antenatal care at three health centers in north-west Ethiopia. PLoS One. 2022;17(4 April):1–10.

34. FDRE. Population Size of Towns by Sex, Region, Zone and Weredas as of July 2021. Natl Stat Press. 2021;1–118.

35. WHO. Bench aids. 2019. 32 p.

36. Microscopy M, Operating S. collection of blood by venipuncture and preparation of blood films from venous blood collected in tubes containing. 2016;1–4.

ANNEXS

Annex-1: Informed consent sheet

My name is ——————. I am here on behalf of AschalewDeyasa a student at Addis Ababa University, who is researching on the prevalence of intestinal parasite and malaria c0-infection among pregnant women at Batu primary hospital, Batu town, Oromia region, Ethiopia, 2023.

The Addis Ababa University granted approval for the investigation and you are chosen to take part in this study using a method of systematic random sampling, and your desire to do so is the sole criteria that will determine whether you take part. You have the option to decline taking part in this study. You have the right to withdraw at any time if you decide to participate.

The questionnaire will take around 20 minutes, and for stool examination30 min is required and neither your name nor any other identifying information will be written on the questionnaire. Your readiness and active involvement are crucial to the outcome of this study.

So, are you willing to participate in this study?

A) Yes B) No

If yes, data collector Name_____ Signature_____Date of data collected_____

Result of data collected

A) Completed

B) Not completed

Checked by principal investigator: Name _____Signature_____

Annex 2: English version data collection tool

Code:---------- mobile phone no. ._____			
Section 1: Socio-demographic characteristics			
S.no	Variables	Response	Remark
101	Age of respondent (in yrs.)	----------	
102	Marital status	1. Single 2. Married 3. Divorced 4. Widowed	
103	Educational status	1. Can nor read and write 2. Read and write 3. Primary school 4. Secondary school 5. Diploma/ certificate 6. Degree and above	
104	Occupational status	1. Government employed 2. Private employed 3. House wife 4. Own business 5. Other (specify……..)	
105	House hold average monthly income (ETB)	----------	
106	Family size	----------	
107	Residence	1. Urban 2. Rural	
Section 2:Maternal characteristics			
201	Gestational age in weeks	----------wks	

202	Gravidity	----------	
203	Parity	----------	
204	Birth interval in years	----------	
205	Number of ANC visit	----------	
Section 3: Hygienic and Environmental factors			
301	Do you wash your hand before meal?	1. Yes 2. No	
302	Do you wash your hand before prepare food?	1. Yes 2. No	
303	Do you wash your hand with soap after toilet?	1. Yes 2. No	
304	Do you wear shoe properly?	1. Yes 2. No	
305	Do you wash fruits before eat?	1. Yes 2. No	
306	Do you wash vegetables before eat?	1. Yes 2. No	
307	Do you have toilet?	1. Yes 2. No	
308	If yes for Q 307, which one?	1. Private 2. Community	
309	Do you have history of eating soil in current pregnancy?	1. Yes 2. No	
Section 4: Other related factors			
401	CBC test	1. WBC---------- 2. RBC---------- 3. Platlet---------- 4. HGB---------- (g/dl)	

402	Do you took any deworming medication within two weeks?	1. Yes 2. No	
403	Have you ate raw meat within current pregnancy?	1. Yes 2. No	
404	Have you ate raw fish within current pregnancy?	1. Yes 2. No	
405	Have you ate uncooked vegetable within current pregnancy	1. Yes 2. No	
406	What is your drinking water source?	1. Tap water 2. Pond (lake) 3. Bottled water	
407	Do have history of malarial infection	1. Yes 2. No	
408	Have you received awareness on malaria and IP infection	1. Yes 2. No	
Section 5: laboratory findings			
501	Consistency of stool sample	1. Formed 2. Semi-formed 3. Diarrhea	
502	Procedure of test performed	1. Wet mount/direct microscopic ex 2. Concentration technique	
503	Result of test	1. No O/P seen 2. O/P seen	
504	If the ‘Q 503’ which spp of parasite seen	1. E. histolytica 2. G. lamblia 3. A. lumbricoides 4. Tieniassp 5. Mixed 6. Others	
505	Blood Film result	1.Positive	

		2. Negative	
506	If positive, which parasite is seen in blood film?	1. P. Falciparum 2. P.vivax 3. P.ovale 4. P.malariae 5. Mixed	
507	Is there Malaria and intestinal parasite co infection?	1. Yes 2. No	
Section 6: **Ecosystem analysis check list**			
601	It there mosquito breeding site	1. Yes 2. No	
602	Is there mosquito Repellent technique	1. Yes 2. No	
603	Is there practice bed net uses	1. Yes 2. No	
604	Is there stagnant water	1. Yes 2. No	
605	Is there waste materials in the house	1. Yes 2. No	
606	Toilet availability?	1. Yes 2. No	
607	the distance between the toilet and the kitchen?	1. ----------Mtr	

Annex-3: Afanoromoo :hayyama al serummaa

Maqankoo _____ jedhama.Kanasitttiargamebaratayunivarsiti Addis Ababa kanta'e fi qorrannoisahadholliulfairrattidhukubagaraakanfidanramollegarachairratti fidhukubabusabara 2016 hospitalaBatutikanhojatajiruhoganetti.

Qorannonkunyuniversittiaddisababairraxaliyaamirkannessakanqabudha.Gaffileqorannondebbisu fi samuudasagaraaulagallegutani wan argamtani fi fillannoaakkacarratinfilatamtanirtu. Yeroofetanittiqorrannokananallata'udandessu.

Gaffiiledebbisu fi samuudasagaraa fi dhigakenuufdaqiqqa 50 nifudhata.Qorannokanirrattihirmachunkessanargannooqorannichaffayidaguddaqaba.

Kannafuhirmachuffedhaqabdu ?

A) Eyyen B) Lakki

Yooeyyenta'e, maqaoddefannosasabdu_____ malatto_____

guyyaodeffannonittisasabame_____

Bu'anodeffannosasabame

A) gutumatti

B) kanhingutamne

Qoratadhankanmirkanefame :maqa _____malatto_____

Annex 4:gaffileoddeffannosasabufollan

Code:----------lakkobsabilbilla _____			
Kuta1: Oddefannohawassuma			
T lak	Gaffile	Debbi	Qoranno
101	Umriigafatamtamtu	----------	
102	Halaaga'ela	1. Kanhinherumte 2. Kanherumte 3. Kanhikte 4. Kanadda bate	
103	Halaabarnota	1. Kandubisu fi barresuhindandenye 2. Kan b 3. arresu fi dubisudandessu 4. Sadarka 1ffaa 5. Sadarkaa 2ffaa 6. Diploma/sertatiketi 7. Digrii fi isaol	
104	Halaahojii	1. Kanmotumanqacaramte 2. Kandhunfaqacaramte 3. Hadhawarra/kanhojiihinqabne 4. Hojiidhunfa 5. Kan biro----------	
105	Gallimatiiji'a,(ETB)	_____	
106	Ba'inamatii	_____	
107	Bakkajirenya	1. Magala 2. Baddiya	
Section 2: Offannohadholli			
201	Umriulfa (torbedhan)	Torbe _____	
202	Ba'inaulfa	_____	
203	Ba'inadhahumsa	_____	
204	Walirrafagenyadahumsawaggan	_____	
205	Ba'inadawannamanayala, hordofiulfaf	_____	
Kuta 3<u>qulqullina dhunfa fi kannannoo</u>			
301	Nyataduraharkakeessannidhiqatu?	1. Eyyen 2. Lakkii	
302	Nyataqophesunduraharkakeessannidhiqatu?	1. Eyyen 2. Lakkii	

303	Manafincaniergafayadamtaniboodaharkakeessannidhiqatu?	1. Eyyen 2. Lakkii	
304	Kophemillasirrankewattu /ufattu?	1. Eyyen 2. Lakkii	
305	Kudurraleosohinnyatiniduranidhiqdhu?	1. Eyyen 2. Lakkii	
306	Mudurraleosohinnyatiniduranidhiqdhu?	1. Eyyen 2. Lakkii	
307	Manafincaniqabdu?	1. Eyyen 2. Lakkii	
308	G 307Yoo ‘eyyenta’e, isakam?	1. Kandhunfa 2. Kanhawassa	
309	Ergaulfatateboodadara/biyyenyatebekta?	1. Eyyen 2. Lakki	
Kutat 4 : sababotawalittidhufenyaqabangaragaraa			
401	Qoranoselidhiga CBC	1. WBC _____ 2. RBC _____ 3. PLT _____ 4. Hgb _____	
402	Torbeelamankankessaqoricharammolegarachafudhatanijirtu?	1. Eyyen 2. Lakki	
403	Ulfa kana kessafoondhedhinyatanibektu?	1. Eyyen 2. Lakkii	
404	Ulfa kana kessafoonqurxummihinbilchanenyatanibektu?	1. Eyyen 2. Lakkii	
405	Ulfa kana kessaMuduralehinbilchanenyatanibektu?	1. Eyyen 2. Lakkii	
406	Bishandhugatiessaargatu?	1. Bomba 2. Bolla/harro 3. Jarri/hilandi	
407	Ulfakanandurairrattidhukubabusasiqonameture ?	1. Eyyen 2. Lakkii	
408	Wa’eedhukubaramollegaracha fi busaodefannoqabdu?	1. Eyyen 2. Lakkii	
Kuta 5 : Arganowwanlaboratoorii			
501	Consistency of stool sample	1. Formed 2. Semi-formed 3. Diarrhea	
502	Procedure of test performed	1. Wet mount/direct microscopic ex	

		2. Concentration technique	
503	Result of test	1. No O/P seen 2. O/P seen	
504	If the 'Q 503' which spp of parasite seen	1. E. histolytica 2. G. lamblia 3. A. lumbricoides 4. Tieniassp 5. Mixed 6. Others	
506.	Blood Film result	1. Positive 2. Negative	
507	If positive, which parasite is seen in blood film?	1. P. Falciparum 2. P.vivax 3. p. ovale 4. p.malariae 5. mixed	
508	Is there Malaria and intestinal parasite co infection?	3. Yes 4. No	
Section 6: **Ecosystem analysis check list**			
601	Iddowanbokenbusaittiwalhoranjira ?	1. Eyyen 2. Lakkii	
602	Mala bokebusaittinballessuffayadanjirra	1. Eyyen 2. Lakkii	
603	Agobarra sire nifayadamu	1. Eyyen 2. Lakkii	
604	Bishankufamenannooirrattijira	1. Eyyen 2. Lakkii	
605	Balfikufamenannooirrattijira	1. Eyyen 2. lakki	
606	Halamanafincani	1. Eyyen2. 2. Lakkii	
607	Mannifinchanimananyanniittiqopha'rrahangamfagata	_____m	

Annex-5: አማርኛ፣ኢመደበኛሰምምነት

ስሜ_____

ይባላል።እዚየተገኘሁትየአዲስአበባዩኒቨርሲቲተማሪየሆነውእናየሆድህመምበሚያመጡየአንጀትትላትሎችእ
ናየወባበሽታላይበ 2016
ዓ.ምየምርምርስራውንበባቱሆስፒታልእየሰራሚገኘውንአስቻለውደያሳንወክዬነው።
ለዚህየምርምርስራከአዲስአበባዩኒቨርሲቲየድጋፍደብዳቤተሰጥቶታል።

እዚህየምርምርስራላይለመሳተፍብቁሆነውሰለተገኙየመጠየቅመረጀእናየሰገራእናየደምናሙናእንዲሰጡንበ
አጋጠሚናሙናተመርጠዋል።በማንኛውምሰአትስምምነቶንማቁዋረጥይችላሉ።

ይሄንመጠይቅለሞምላትእናየሰገራእናየደምናሙናውንለመስጠትበአማካይ 50
ደቂቃይወስዳል።የእርሶተሳትፎለምርምሩትልቅፋይዳአለው።ስለሆነምለመሳተፍፍቃደኛከሆኑከዚህበታችፊሪ
ማዎንያስቀምጡልን።

ስለዚህለመሳተፍፍቃደኛነዎት?

ሀ) አዎ ለ) አይ

አዎከሆነ፡የመረጃሰብሳቢውስም _____ ፊሪማ_____ መረጃውየተሰበሰበበትቀን_____

የተሰበሰበውመረጃዉጤት

ሀ) የተሟላ ለ) ያተሟላ

በተመራማሪውየተረጋጠ : ስም _____ፊሪማ _____

Annex 6: የአማርኛመረጃለመሰብሰብየሚዉሉግባቶች

Code:----------ስልክቁጥር----------			
ክፍል 1 የስነህዝብመረጃ			
ተ.ቁ	**መጠይቅ**	**ምላሽ**	**ምርመራ**
101	እድሜ (በአመት.)	----------	
102	የጋብቻሁኔታ	1. የላገባች 2. የገባች 3. የፈታች 4. የተለያየች	
103	የትምርትደረጀ	1. መጻፍማንበብየማትችል 2. መጻፍማንበብየምትችል 3. አንደኛደረጃ 4. ሁለተኛደረጃ 5. ዲፕሎማ/ሰርተፍኬት 6. ዲገሪእናከዛበላይ	
104	የስራሁኔታ	1. የመንግስትተቀጣሪ 2. የግልተቀጣሪ 3. የቤትእመቤት 4. የግልስራ 5. ሌላ----------	
105	የብተሰቡገቢበወር (ETB)		
106	የቤተሰብብዛት	_____	
107	የመኖርያቦታ	1. ከተማ 2. ገጠር	
ክፍል 2 ከእናቶችጋርየተያያዘመረጃ			
201	እርግዝናእድሜ (በሳምነት)	_____ሳምንት	
202	የእግዝናበዛት	_____	
203	የወሊዲብዛት	_____	
204	የወሊድቆይታ (በአመት)	_____	
205	ለክትትልወደጤናተቋምየመጡበትቀንበዛት	_____	
ክፍል 3 የግልንጽህናእናየአከባቢምክንያቶች			

301	ከምግብበፊትእጆንይታጠባሉ?	1. አዎ 2. አይ	
302	ምግብከማዘጋጀቶበፊትእጆንየታጠባሉ?	1. አዎ 2. አይ	
303	ከሽንትቤትበዋላእጆንበሳሙናይታጠባሉ?	1. አዎ 2. አይ	
304	ጫማባግባቡያረጋሉ?	1. አዎ 2. አይ	
305	ፍራፍሬከመብላቶበፊትየጥባሉ?	1. አዎ 2. አይ	
306	አትክልትከመብላቶበፊትየጥባሉ?	1. አዎ 2. አይ	
307	ሽንትቤትአለዎ?	1. አዎ 2. አይ	
308	አዎከሆነመልሶ307, የቱ?	1. የግል 2. የማበረሰብ	
309	አፈር/ ኩይሳየመብላትአጋጣሚነበረዎትበዚእርግዝና?	1. አዎ 2. አይ	
ክፍል 4 ሌሎችመክንያቶች			
401	በደምምርመራ	1. WBC _____ 2. RBC _____ 3. PLT _____ 4. Hgb _____	
402	በዚህሁለትሳምንትዉስጥየሆድህመምመዳኒትወስደዋል	1. አዎ 2. አይ	
403	በዚህእርግዝናዉስጥጥሬስጋበልተውየውቃሉ?	1. አዎ 2. አይ	
404	በዚህእርግዝናዉስጥያልበሰለአሳበልተውየውቃሉ?	1. አዎ 2. አይ	
405	በዚህእርግዝናዉስጥያልበሰለአትክልትበልተውየውቃሉ?	1. አዎ 2. አይ	
406	የመጠጥዉሃከየትነውሚያገኙት?	1. የቧንቧ 2. የ	
407	ከዚህበፊትበነበረእርግዝናየሆድህመምአጋጥሞትነበር	1. አዎ 2. አይ	
408	ስለየሆድህመምእናወባየሚያመጡተዋሲያንእውቀቱአ	1. አዎ	

	ለዎት	2. አይ	
ክፍል 5 የላቦራቶሪዉጤቶች			
501	Consistency of stool sample	1. Formed 2. Semi-formed 3. Diarrhea	
502	Procedure of test performed	1. Wet mount/direct microscopic examination 2. Concentration technique	
503	Result of test	1. No O/P seen 2. O/P seen	
504	If the 'Q 503' which spp of parasite seen	1 E. histolytica 2 G. lamblia 3. A. lumbricoides 4. Tieniassp 5. Mixed 6. Others	
505	Do you seen more than one parasite	1. Yes 2. No	
506.	Blood Film result	1. Positive 2. Negative	
507	If positive, which parasite is seen in blood film?	1. P. Falciparum 2. P.vivax 3. P.ovale 4. malariae 5. Mix	
508	Is there intestinal parasite and malaria co infection?	1. Yes 2. No	
Section 6: **Ecosystem analysis check list**			
601	ለትንኝማራባተየሚሆንቦታዎችአሉ?	1. አዎ 2. አይ	
602	የትንኝማጥፍያዘዴዎችአሉ ?	1. አዎ 2. አይ	
603	አጎበርይጣቀማሉ ?	1. አዎ 2. .አይ	
604	የቆረቆሻሻውሃአከባቢላይአለ?	1. አዎ 2. አይ	
605	የተከማቸቆሻሻበአከባቢዉላይአለ?	1. አዎ 2. አይ	

606	መጸዳጃቤትኣለ ?	1. አዎ 2. አይ	
607	ሽንትብቱከምግብማብሰያውምነያህልይረቃል ;	➢ ---------- ሜትር	

DECLARATION SHEET

I declare that this research paperis my original work and that it satisfies a requirement for the Master of public health degree. I further declare that all sources and materials utilized in the thesis have been properly acknowledged and that it has never been presented in this university or any other.

Student Name: _____ Signature: _____

Place of submission:_____ Date of submission: _____

This thesis has been submitted with my approval as a College/university advisor.

Advisor Name: _____ Signature: _____

Date of submission: _____