



ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF PUBLIC HEALTH

**Malnutrition among HIV-positive pregnant women;
magnitude and determinants, in health centers of Addis
Ababa Ethiopia**

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Abbreviations and Acronyms

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal care
ART	Antiretroviral therapy
BMI	Body Mass Index
CSA	Central Statistics Agency
EDHS	EDHS
HAART	Highly Active Antiretroviral therapy
H/C	Health Center
HIV	Human Immunodeficiency virus
MDG	Millennium development goal
MTCT	Mother-to-Child Transmission of HIV
MUAC	Mid upper arm circumference
OI	Opportunistic Infection
PLHIVs	People living with Human Immunodeficiency virus
PMTCT	Prevention of Mother-to-Child Transmission of HIV
RUTF	Ready-to –Use Therapeutic Food
SDG	Sustainable development goal
TB	Tuberculosis
WHO	World Health Organization

Summary

Introduction: Good nutrition increases resistance to infection and disease, improves energy, and this makes a person generally stronger and more productive. Healthy nutrition is important throughout life but particularly so when a woman is pregnant. As pregnancy affects the metabolism of nutrients, maternal diet must provide sufficient energy and nutrients to meet the mother's usual requirements as well as the needs of the growing fetus. When an HIV-positive woman becomes pregnant, additional nutritional considerations are warranted. Though in Addis Ababa there is lack of study of HIV positive pregnant mothers on the prevalence of malnutrition, which is, dependent on them.

Objective: The objective of this study was to assess the prevalence and determinants of under nutrition among HIV positive pregnant women attending prevention of Mother-to-Child transmission of HIV clinics in health centers of Addis Ababa, Ethiopia.

Methodology: Cross-sectional study was conducted from 1 Nov 2017-Jun 2018 on prevention of Mother-to-Child transmission of HIV clients in Addis Ababa, a capital city of Ethiopia. Simple random sampling technique was used to get 342 prevention of Mother-to-Child transmission of HIV clients as a study population. Data was collected using pretested, structured, and semi-structured questionnaire, anthropometry measure, dietary assessment method and the data was analyzed using Epi.data version 3.1 and SPSS version 22. The study was provided information on Prevalence of under nutrition and its determinants in health centers was been measured.

Result: The overall prevalence of under nutrition among the study participant was found to be 34.2%, of those 33.6% was moderate malnutrition. Those who have experience for last one month of less than three frequency of serving including snacks were 3.2 times more likely to be undernourished than those more than and equal to three frequency of serving including snacks (AOR=3.2; 95% CI: 1.14-8.88). In addition, 350 cells/ μ l or below CD4 T-cell level of HIV positive pregnant mother were almost 3 times (AOR=2.50; 95% CI: 1.27-4.94) more likely to be undernourished than those who had above 350 cells/ μ l CD4 T-cell level.

Conclusion and recommendation: There was high prevalence of undernutrition among HIV positive pregnant mother. The finding indicates that higher level of CD4 count is associated with better nutritional status, while improved eating habit were associated with lower proportion of undernutrition during pregnancy. Thus, the factors associated with under nutrition are potentially modifiable through interventions targeting improved frequency of food serving and increasing ART clinical care and promotion of improved eating habit through prenatal dietary advice. To overcome this nutritional problem the government should ratify need to give special attention of economical and nutritional support HIV positive pregnant mothers and health professionals also give them special care and when they get under nutritious mother they have to put them in immediate nutritional therapy programme.

1. INTRODUCTION

1.1 Background

Physiological alterations occur in many organ systems during pregnancy. This change is necessary for the adaptation to pregnancy-specific physiological process in mother and fetus. For that reason, the anabolic condition affects the metabolism of all nutrients in order to support maternal homeostasis, fetal growth, and development and to prepare for lactation. In response to these new demands for nutrients, one or more of the following can occur: increased deposition of maternal stores and fetal tissue, redistribution of nutrients, and increase or decrease in nutrient absorption and rate of metabolism (1).

Associated to routine prenatal nutritional assessment and intervention, pregnant HIV-positive women have increased needs to promote a healthy outcome for herself and her child (2). Therefore, when HIV positive woman gets pregnant, there must be an extra nutritional consideration that should be ponder, which is necessary to maintain the expected healthy outcome.

In Africa malnutrition and food insecurity are endemic (3). HIV/AIDS and malnutrition are both highly prevalent in many parts of the world, especially in sub-Saharan Africa. Their effects are interrelated and exacerbated one another in a vicious cycle (4). HIV specifically affects nutritional status by increasing energy requirements, reducing food intake, and adversely affecting nutrient absorption and metabolism (4) and unfortunately, Ethiopia is part of such prevalence related to food insecurity and HIV impact on nutrition.

Because of HIV/AIDS leads to malnutrition, and malnutrition leads to immune impairment, worsening the effect of HIV, and contributing to more rapid progression to AIDS (5). Thus, anyone who is malnourished and infected by HIV can easily deteriorate from the disease as the body already weakened by the nutritional status and is unable to fight infection.

For optimal fetal growth and development adequate weight gain during pregnancy is important and on the other hand, for maternal fat store deposits inadequate weight gain is associated with intrauterine growth retardation and perinatal mortality (1). Moreover, maternal malnutrition is a risk for the baby acquiring HIV through vertical transmission from the mother (6).

1.2 Statement of problem

Nutrition is an important component of comprehensive care for HIV-infected women and it is particularly so in resource-limited settings where malnutrition and food insecurity are endemic. Malnutrition among women remains a major challenge to achieve the full impact of interventions aimed at improving their quality of life, productivity, and survival. Problems are related to HIV infection itself, food security and to the effects of anti-HIV therapy (7). This implies that many people living with HIV will face challenges in maintaining good nutrition, where nutritional issues are common in HIV infected ones.

Women who have a poor nutritional status at conception are at higher risk of disease and death; their health depends greatly on the availability of food, and therefore they are unlikely to be able to cope with their increased nutrient needs during pregnancy. Infections such as malaria and HIV and infestation with gastrointestinal parasites can exacerbate such women's under nutrition (9).

Undernourished mothers face greater risks during pregnancy and childbirth, and their children set off on a weaker developmental path, both physically and mentally. Malnutrition is one of the most serious health problems affecting both mothers and their children in Ethiopia (8). HIV-infected pregnant women, as for all HIV-infected adults, HIV increases both energy requirements and the risk of under nutrition. The increased energy needs as well the negative effects of common HIV-related infections increases the nutrition risk of HIV-infected pregnant and lactating woman (10).

In all women, under nutrition during pregnancy increases maternal morbidity, mortality, and affects birth outcomes. Studies in Africa have shown that an HIV-infected mother's nutritional status as measured by body mass index (BMI), mid-upper arm circumference (MUAC), and/or weight loss is a strong predictor of post-natal mortality (10).

The effects of under nutrition and HIV on pregnant women increase poor clinical and birth outcomes. The nutritional status of an HIV-infected woman before, during, and after pregnancy may influence her own health and transmission of HIV to her infant (10). Malnutrition contributes to immune system impairment, making the body vulnerable to frequent illness, and increasing its energy and nutrient demand, in that way accelerating disease progression (11).

When HIV positive women become pregnant she need additional nutrition more than healthier one. However, in this situation because of low socioeconomic status in our country, yet, there are

nutritional support programs for HIV infected people we cannot afford to promote maternal nutritional support and this lead to maternal malnutrition it is one of the cause of mother to child HIV transmission (20, 21). Then this will not allow us to meet goal to eliminate mother to child HIV transmission (22). If not intervened it can result in increased morbidity, poor quality of life, mortality, poor birth outcome and decrease productivity that burden for their.

Few studies assessed maternal nutritional status during pregnancy. Particularly, thus data on the Ethiopian situation regarding the nutritional status of HIV positive pregnant women are lacking. However, such data are important in designing evidence-based maternal nutrition interventions for this vulnerable group. In addition, such data employed in programs that aim to reduce maternal and child morbidity and mortality that prevails in Ethiopia.

Therefore, the goal of this study is to determine the prevalence and determinants of malnutrition during pregnancy of HIV-seropositive women in public health centers of Addis Ababa Ethiopia.

1.3 Significance of the study

Maternal survival is obvious importance to the mother and for the survival of their children. Preliminary evidence, though scanty, suggests that HIV-positive mothers who are well nourishing in both macro- and micro-nutrients are likely to have adequate health and immune function. Therefore, determining the best way to optimize the nutritional status of HIV-positive women is essential (1). Nutrition care and support of HIV-infected pregnant promotes adequate gestational weight gain and aims to improve or maintain nutritional status, reduce maternal mortality, and delay HIV disease progression improves birth outcome (10, 12). A good maternal nutrition helps us to get the above specification even though to get this done in a better way. First, we have to know about prevalence and associated factors of malnutrition. However, in Ethiopia the prevalence of malnutrition in pregnant women in HIV seropositive is not well studied yet. Therefore, the study aims at assessing the prevalence of malnutrition and its associated factors among HIV positive pregnant women attending PMTCT clinics.

2. LITERATURE REVIEW

2.1 Overview of nutrition in SDG and PMTCT service

Women who aged 15 and older make up 47 percent of the 36.1 million people who are living with HIV/AIDS. Over 90 percent of these women live in the developing world. Mother-to-child transmission (MTCT) is the primary cause of HIV infection in children under 10 years of age. Each year, more than 600,000 infants become infect with HIV. Since the beginning of the epidemic, an estimated 5.1 million children worldwide have been infecting. Of those, the irresistible majority have been born in Africa, due to high fertility rates and high HIV prevalence in pregnant women (20). In Ethiopia in 2010, PMTCT services were available in only 43% of all ANC facilities and the mother-to-child transmission rate, estimated at 30% in 2011 is still very high (22). The human immune deficiency virus can be transmitted during pregnancy, labor and delivery (perinatal transmission), or through breastfeeding. There are several conditions that make a mother more likely to transmit HIV to her baby one condition is maternal malnutrition (20). Another paper suggested Maternal nutritional status may influence risk of Mother-to-child transmission overall (21).

Maternal nutrition during pregnancy has a wide range of implications for many SDGS because of its effects both on woman's health and on that of her newborn babies. However, SDG 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture), SDG 3(Ensure healthy lives and promote well-being for all at all ages). SDG 3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100 000 live births. SDG 3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live births. SDG 3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases and SDG 3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being (36).

Since the creation of MDG, there have been historical accomplishments in reducing child mortality, improving maternal health, and tackling HIV/AIDS, TB, malaria and other disease. In 15 years, maternal mortality has fallen by almost 50% but maternal mortality ratio in developing country is still 14 times higher than in the developed country. Each day 17000 fewer children die

in 1990, but more than six million children still die before their fifth birthday each year (26). The number of people newly infected by HIV each year has dropped from 3.1 million to 2 million but AIDS is the leading cause of death among adolescent in sub-Sahara Africa, and 22 million people living with HIV are not accessing lifesaving ART. New HIV infection prevalence is continuously to rise in some location (26).

2.2 Malnutrition and HIV positive pregnancy

2.2.1. Nutrition overview

Proper nutrition intake for the period of both pregnancy and lactation is vital for the survival and well-being of the developing infant. Well-nourished mothers have healthier babies and a lower risk of maternal mortality and morbidity. Undernourished women have higher reproductive risks and subsequently poorer pregnancy outcomes (10). Maternal under nutrition is highly prevalent in resource-poor settings, ranging from 10% to 19% in these settings, but is particularly high (>20%) in sub-Saharan Africa, south central and southeastern Asia, and Yemen (13).

It is accept that, due to pregnancy and the effects of HIV on the body, pregnant women with HIV have greater nutrient needs. Even though, inadequate information and guidelines presently exist to provide ultimate standards for nutritional care for women with HIV during pregnancy. Advice regarding weight gain, adequate nutrient intake, vitamin supplements, management of HIV-related symptoms and ART side effects, and the risks associated with breastfeeding needs to be readily available to pregnant women with HIV, and a health care professional should provide proper personalized advice (6).

2.2.2 Maternal Underweight and Wasting

Maternal underweight and wasting are use as indicators of maternal protein-energy malnutrition. Maternal short stature (height <145 cm) is also well thought-out as general long-standing malnutrition at population level (14).

WHO defines underweight or chronic energy deficiency among pregnant women applying the same cut off points used for other adults as a BMI value of less than 18.5 kg/m^2 . Underweight derived from the value of body mass index (BMI) of the women, an index obtained by dividing maternal weight in kilogram (Kg) to her squared height in meter (m) (14).

Mid upper arm circumference (MUAC) is also used to define wasting or acute malnutrition in women of reproductive age using different cutoff points. WHO recommends MUAC of <23 cm to identify pregnant women with as moderately malnourished (14). Study done in 1994, A MUAC value less than 22 cm has been recommended to classify acute malnutrition or wasting among women in third world countries (23) and also studied done South Africa recommended wasting in pregnant women can be defined as a mid-upper arm circumference (MUAC) < 22cm (24). Additionally, by 2013 published paper based on review of evidences revealed that MUAC is a preferred anthropometric measurement during pregnancy (25).

According to a meta-analysis and meta-regression analysis of demographic health surveys done in 2003 to 2006, Prevalence of HIV-related malnutrition among women was 10.29% in sub-Saharan Africa; this study found increasing level of education has a strong pattern of decreasing level of proportion of women with malnutrition. Even more evident is the pattern of decreasing proportion of malnutrition with increasing wealth index (15). On this meta-analysis and meta-regression, analyses not consider HIV positive pregnant women nutritional status.

About 47% of the Ethiopian population is estimate to live below the poverty line. Malnutrition is one of the main health problems facing children and women in Ethiopia. The country has the second highest rate of malnutrition in Sub-Saharan Africa. Ethiopia faces the four major forms of malnutrition: Acute and chronic malnutrition, Iron deficiency Anemia, Vitamin A deficiency, and Iodine Deficiency Disorders (7).

The information of maternal nutritional status in Ethiopia is rare. Predominantly, it is nearly nonexistent for pregnant women especially HIV positive pregnant women. Nevertheless, the evidences from reproductive age women revealed that malnutrition in Ethiopian women is prevalent, the analysis of Ethiopian Demographic Health Surveys (EDHS) 2000 and 2005 data revealed 30.5% and 26.9% of chronic energy deficiency among non-pregnant and non-postpartum women. Similarly, a prevalence of 27% of women either thin or undernourished from EDHS 2011 confirmed that the problem remained unchanged (11). Similarly, the prevalence of anemia among women in the reproductive age group (15–49) has found to be 17 percent (16).

In Ethiopia, between August 11 and September 2012, a study done on the HIV positive women attending ART clinic at Humera hospital in Tigray, 42.3% were found to be under nutrition and also 12%, 10% and 20.3% were found Severe, moderate and mild under nutrition (7).

A cross-sectional study on malnutrition in adult people living with HIV/AIDS receiving anti-retroviral therapy at Butajira Hospital has done in southern Ethiopia and it studied prevalence and risk factors. The prevalence of malnutrition among male patients was 25.9% but 24.9% among females. Living in rural area, anemia, and intestinal parasitic co-infection were significantly associated with increased prevalence malnutrition in their subjects (17). A study done in Nekemte Referral Hospital and Health Center, East Wollega Zone, 27% of HIV/AIDS clients who attend ART clinic had malnutrition and the main causes for the malnutrition were report as ART interruption and presence of opportunistic infection that is tuberculosis (18).

A community-based study conducted on magnitude and determinants of malnutrition among pregnant women in eastern Ethiopia this study revealed that 23.7% and 19.8% of pregnant women had underweight and wasting, respectively (11). As mentioned earlier, in Ethiopia the prevalence of malnutrition in pregnant women in HIV seropositive was not well studying yet. This study assessed specifically the nutritional status of HIV positive pregnant women; unlike the earlier studies where nutritional status of pregnant women in general is assessed.

2.3 DETERMINANT FACTORS

2.3.1 Socioeconomic status

Economic issues leading to inadequate nutrient intake are a frequent contributor to malnutrition in many settings. These issues include a limited food supply, loss of household income or livelihood (such as farming) due to illness, and limited cooking and storage facilities (19). Low body mass index ($<18.5 \text{ kg/m}^2$) and/or short stature (height $<145 \text{ cm}$) are common in women in low-income countries. When we compare the prevalence of low BMI and short stature on some countries, there is a critical rate in Eritrea and Bangladesh. On the other side there is a series rate in Cambodia, Chad, Ethiopia, India, Madagascar, Mali, Nepal and Yemen; most other countries have a prevalence of between 10% and 19%. More than 10% of women are shorter than 145 cm in Bangladesh, India and Nepal and Bolivia, Guatemala and Peru (9).

2.3.2 Household food security

Food insecurity is well recognizing that household food insecurity is one of the three underlying causes of malnutrition (30). Food insecurity at the individual and child level was associated with poor diet quality, while household level food insecurity was associated with higher body weight (31). It is indirectly associated with poor health and nutritional status (32). The nutritional status

of each member of the household depends on several conditions being met: the food available to the household must be shared according to individual needs; the food must be of sufficient variety, quality, and safety and each family member must have good health status in order to benefit from the food consumed (33). Food insecurity leads to malnutrition, which can aggravate and accelerate the development of AIDS. Likewise, the disease itself can contribute to malnutrition by reducing appetite, interfering with nutrient absorption, and making additional demands on the body's nutritional status (34).

Food security is the state in which all people have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life at all times. Attaining this state is contingent on food being available, accessible, and utilized by the body. The relationship between HIV/AIDS, livelihoods, and food and nutrition security is complex and multidimensional (3).

2.3.3 Age of respondents

Aging process is relating with widespread and typical changes in human body. With increasing age, body composition is changing with a loss of muscle mass and bone mass and a reduction of physical capacity over years. Maximum of physical capacity is between 20th and 30th life years. Pronounced changes with aging process take place after 50th life year. For those aged between 30 and 50 life-years issued changes in muscle mass, power and strength are small (28).

2.3.4 Food handling

Pregnant, HIV-positive women can be particularly vulnerable to food-borne infections (10). In order to reduce environmental hazards, potential interventions include provision of sanitation and clean water, elimination of vectors, and improved housing to prevent crowding and control indoor pollution (9).

The combination of a compromised immune status attributed to HIV, coupled with further decreases in immune response during pregnancy mean that women with the infection are at high risk of developing food borne infections during pregnancy. Food poisoning can lead to weight loss and further compromise immunity to future infections (6).

2.3.5 Eating Patterns

There was a statistically significant positive association between nutritional status (BMI) and women's dietary diversity. Clients who were taking inadequate diversified food were 1.19 times more likely to be undernourished as compared to those who were taking adequate diversified food (7). Participants who had one or more eating difficulty were 2.69 times more likely to be malnourished as compared to those who were free of eating difficulty (17).

This study revealed that the risk of malnutrition was reducing by 53% among women who reported improved eating habits than those who did not (11).

2.3.6 Education status

Among the various determinants of nutritional status, parent's education is probably the next most important factor after the socio-economic status. A literate mother uses scarce resources in better manner for the child's welfare than an illiterate mother with higher resources does. The effect of women's education on the nutritional status of their children exerted through their roles as providers of household health and nutrition (37). The risk of malnutrition was double among women with illiterate husband compared with those with literate husbands (11).

2.3.7 Active Antiretroviral Therapy

Nutrition interventions can also help to optimize the benefits of antiretroviral drugs (ARVs) and may increase compliance with treatment regimens, both of which are essential to prolonging the lives of PLHIVs and to preventing the transmission of HIV from mother to child (12). Highly active antiretroviral therapy (HAART) improves nutritional status, independent of its effects on viral suppression and immune status, although wasting still develops in some patients (3). Further, some studies suggest that ART might play a role in improving micronutrient status (6).

2.3.8 Opportunist infection

Nutritional status is easily compromise during any type of infection. Generalized infections often result in reduced food intake and absorption of nutrients. Utilization and loss of nutrients are also increase during an acute infection. The infection can further contribute to poor nutrition (2). Severe oral candidiasis (yeast), esophageal candidiasis, herpes gingivostomatitis, viral

esophagitis, and gastritis can make eating difficult and painful, leading to decreased oral intake or feeding refusal (19).

In Humera hospital Respondents who were infect with oral candidiasis were 2.42 times more likely to be waste than who were free of oral candidiasis (7). Soil-transmitted helminthes are a major public health problem in much of the world, including all of Africa (6). Studied at Butajira Hospital Participants who had one or more intestinal parasites were 2.85 times more likely to be malnourished as compared to those who were free of intestinal parasites (17).

2.3.9 Gestational age

The increased risk of malnutrition among respondents in the second and third trimesters of pregnancy was also maintain in the adjusted analysis and the risk increased by 66% in second trimester and nearly doubled in the third trimester (11).

Conceptual framework

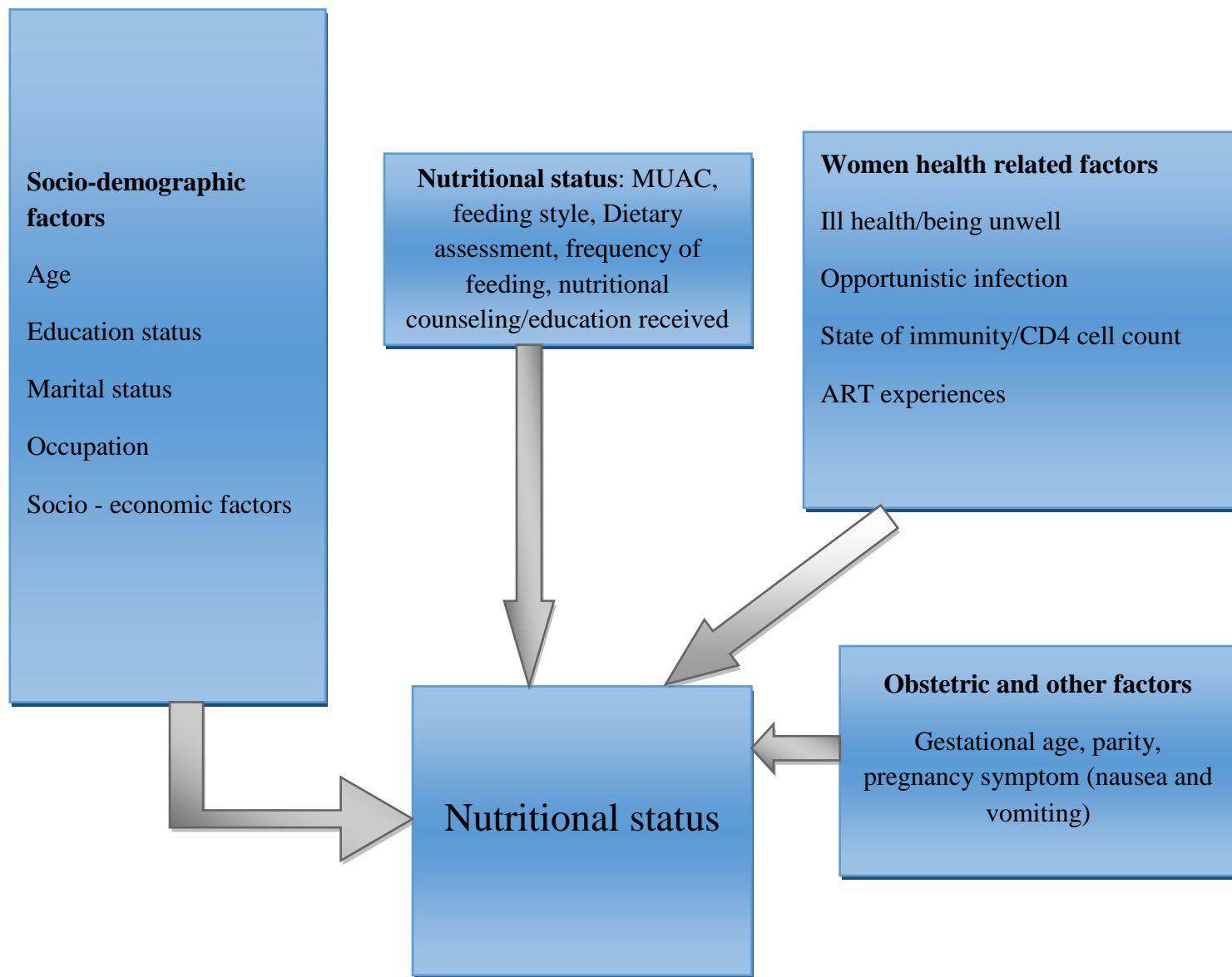


Figure 1: Conceptual framework on associated factors among HIV positive pregnant women at Addis Ababa. (adapted from Gemed D. et al, Assessment of Knowledge of Pregnant Mothers on Maternal Nutrition and Associated Factors: A simple frame work, January to June of the year 2013),

3. OBJECTIVES

3.1 General Objective

- To assess prevalence and determinants of under nutrition among HIV positive pregnant women attending PMTCT clinics in health centers of Addis Ababa, Ethiopia.

3.2 Specific objectives

- To assess the prevalence of under nutrition among HIV positive pregnant women in Addis Ababa, Ethiopia.
- To identify the determinant of under nutrition among HIV positive pregnant women in Addis Ababa, Ethiopia.

4. METHODS

4.1 Study area and period

The study was conducted from Nov 2017 to June 2018 on PMTCT clients in Addis Ababa, which is the capital city of Ethiopia. According to the 2007, Census the Addis Ababa City has a total population of 2,738,248, where 48% are males and 52% are females. The City is divided into 10 Sub-cities and 99 Kebles (the smallest administrative unit). The majority of the city population lives in Kolfe Keranyo (15.6%), Yeka (12.6%), Nefas Silk Lafto (11.5%), Bole (11.2%), Gullele (9.76%), Addis Ketema (9.3%), Qirikos (8%), Lideta (7.4%), Arada (7.7%), and Akaki Kality Sub City (6.7%), Arada and Akaki Kality have the smallest share from the City's total population. As of 2014, Addis Ababa had 52 hospitals, 12 of them state run, and more than 40 private.

Finding of EDHS 2016 report on HIV prevalence of among women and men age 15-49 in Ethiopia, 0.9% are living with HIV; HIV prevalence is higher among women than men (1.2% versus 0.6%). The prevalence of HIV positive in Addis Ababa is 3.4% (39). Based on a HIV related estimation and projection for Ethiopia–2017 estimate of 2016, there are 718,500 people living with HIV/AIDS and Mothers needing PMTCT in Ethiopia are 29,630 people. Estimation of people living with HIV in Addis Ababa is 130,040 and Mothers needing PMTCT is 1473 (40).

4.2 Study design

- A facility based cross sectional study was carried out as we mentioned it on general objective.

4.3 Populations

4.3.1 Target population

The target population of this study was all HIV positive pregnant women of Addis Ababa.

4.3.2 Study population

The study population was all HIV positive pregnant women is who are attending PMTCT clinics in selected health centers of Addis Ababa health office.

4.4 Inclusion and Exclusion

4.4.1 Inclusion criteria

- All newly enrolled or refereed, currently on ART pregnant women who were visiting the selected health facilities during time of data collection.

- A pregnant woman who were willing to give consent.

4.4.2 Exclusion criteria

- HIV positive pregnant women patients who were seriously ill.

4.5 Sample size and sampling strategy

To estimate a sample size for the study the following statistical assumption was be considered. A single population proportion with a proportion of 50% of under nutrition (since there is no previous study conducted in Addis Ababa to yield a minimum sample size specifically on HIV positive pregnant women. It is a great benefit to use 50% proportion of under nutrition of largest sample size for more representation), a margin of error of 5% and non-response rate of 15% and with a 95% confidence interval

$$n = \frac{z^2 p(1-p)}{d^2}$$

n: estimated sample size.

Z: desired 95% confidence, Z=1.96.

P: proportion of prevalence of under nutrition of HIV positive pregnant women.

d: margin of error (0.05).

$$= (1.96)^2 [0.5(1-0.5)]$$

$$(0.05)^2$$

= 384.16 ~ 384 pregnant women. Adding a 15% for non-response rate, the total number is estimated be 442.

The actual sample size is used Correction formula

$$n = \frac{n}{1 + \frac{n}{N}} = \frac{442}{1 + \frac{442}{1809}} = 342$$

4.6 Sampling procedures

Simple random sampling method was used. There were total of 93 health centers providing health services in 2017/18. From these health centers, 88 of them were giving PMTCT service. Out of this health centers 31 health centers selected by lottery method in order to use it for data collection. The total numbers of HIV positive pregnant women users of PMTCT service are

1809. Sample size was allocated proportionately for each health center according to HIV positive pregnant women load of each health center's PMTCT by used this formula=

$$\frac{\text{Number of HIV positive pregnant women in the PMTCT per month (average)}}{\text{Total number of HIV +ve pregnant women/month in 31 health centers, in the year 2016}} \times \text{total number of sample size}$$

Table 1: Proportionate sample allocated of HIV positive pregnant women per health center

SN	Sub city	Health Centers	Total number of HIV positive pregnant women in the PMTCT of each HC per month in the year 2016	proportionally sample allocated for each health center
1	A.ketema	A.Ketema HC	57	17
		Addis Raey HC	21	6
		Woreda 7 HC	36	10
2	Arada	Gulele HC	45	13
3	Yeka	Kotebe HC	73	21
		Yeka HC	66	19
		Woreda 10 HC	12	4
		Woreda 12 HC	21	6
		Woreda 13 HC	39	14
4	kirkos	Kirkos HC	45	13
5	A.kalty	Saris HC	45	13
		Kality HC	64	19
		Akaki HC	58	17
6	N.lafto	Nifassilk no 1 HC	44	13
		Nifassilk no 2 HC	66	19
		Woreda 11 HC	48	14
7	Kolfe	Kolfe HC	44	12
		Mikililamd HC	27	8
		Woreda 9 HC	40	12
		Alem Bank	26	8
		Woreda 3 HC	10	3
8	Bole	Dilfre HC	29	8
		Woreda 17 HC	53	15
		Woreda 8 HC	18	5
		Gerji HC	23	7
9	Gulale	Selam HC	39	11
		Addisu Gebeya HC	20	6
		Shiromeda HC	26	8
10	Lideta	Beletshachew HC	16	5
		Lideta HC	18	5
		Teklehaymanot HC	39	11
TOTAL			1168	342

Respondents were taken for interview, respectively. The interval of the respondents for the interview is determined by dividing the average total number of patients per month received PMTCT services at 31 health centers during the year 2016 by the required sample size for the study. Simple random sampling technique was been employed to select the first patient. The sampling interval was determined as three. Of the three subjects, one patient was randomly select by lottery method; and then every three patient was selected to participate in the study. Finally, we used systematic random sampling method to identify participants of the study.

$$k = \frac{\text{Total number of patients per month}}{\text{Minimum required sample size}}$$

Where, k is the sampling interval

$$= 1168/342$$

$$= 3$$

Sampling Chart

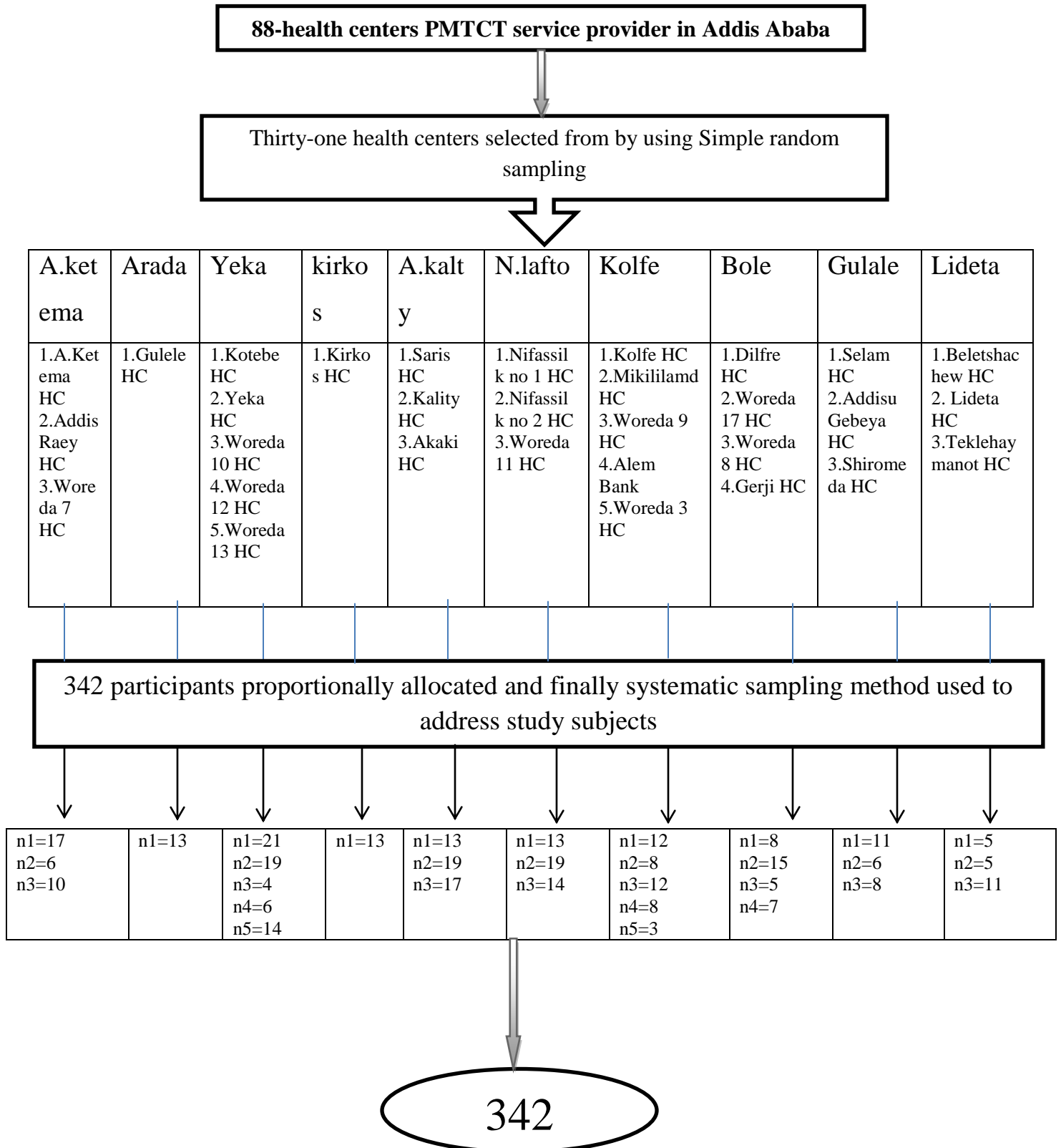


Fig 2: Schematic representation of the sampling procedure, Addis Ababa, Ethiopia, 2018, (n=342)

4.7 Study Variables

4.7.1 Dependent variable

- ❖ Nutritional Status among HIV positive pregnant women

4.7.2 Independent Variable

- Socio demographic factors (age, sex, marital status, occupation, educational level, income)
- Gynecological/obstetric and other factors (number of pregnancy, number of children, Gestational week,)
- Women health related factors especially HIV related factors(CD4 level, Current or past Opportunistic, ART Clinical stage, Adherence, Viral load)
- Nutritional status (feeding style, Household food insecurity status, Dietary assessment, dietary counseling, affordability of nutritious food, MUAC...)

4.8 Operational Definition

- ❖ **changing feeding style:** To change the feeding style they have to change the frequency, quantity, and quality of food
- ❖ **Eating problem:** The main problem eating are difficulty of swallowing or loose of appetite, nausea, vomiting and heartburn
- ❖ **Nutritional recommendation:** Consume a healthy eating pattern that accounts for all foods and beverages within an appropriate calorie level.
- ❖ **Categorized of nutritional intake:** below the recommendation and recommended food intake by the reference of dietary guideline and food pyramid (35, 41); Cereals (recommended intake once per day: 3 oz-eq/day), Dark green leafy vegetables (recommended intake once per week :1½ c-eq/day), White tubers and roots (recommended intake 2-4 times per week: 4c-eq/day), Yellow-orange vegetable (recommended intake 2-4 times per week: 4c-eq/day), Fruits (recommended intake once per day: 1½ c-eq), Organ meat (iron-rich) (recommended intake once per week), Flesh meat (recommended intake once per week), Egg (recommended intake 2-4 times per week : 23 oz-eq/day), Fish (recommended intake 2-4 times per week: 8 oz-eq/day), Legumes, nuts and seeds (recommended intake once per week: 1c-eq), Dairy food (milk

and milk product) (recommended intake 2 & more per day: 3 c-eq/day), Oils and fats (recommended intake 2 & more per day :22gm)

- ❖ **Under nutrition:** less than 23 MUAC has considered as under nutrition among selected HIV positive pregnant mother.

4.9 Standard definition

- ❖ **Adherence of ART:** if adherence use G^{*} (good) it indicate equal to greater than 95% or < 3 doses missed per month, F^{*} (fair) for 85–94% or 4-8 doses missed per month ,or P^{*} (poor) for less than 85% or > 9 doses missed per month (38).

4.10 Data collection instrument

For quantitative data collection, we used multiple measurement tools in the form of structured questionnaires, an anthropometric measurement and dietary assessment tool of English version was adapted from Harvard College (29). After a review of different literatures and modified depend on the local situation and the research objective. It was initially developed in English then translated in to Amharic and back translated in to English by another individual who have good knowledge of both languages to check its consistency. The study instrument consists of basic socio-demographic variables including age, sex, income, education, and occupational status. The second included questions their households, food intake and dietary habit, food dislike and craving habit and dietary assessment. Also gynecological/obstetric and health history of women, and prenatal health seeking behavior and Opportunistic Infection history, Current condition, Clinical stage, Adherence, ART experience.

4.11 Data collection method and quality control

Six female nurses were recruited to work as data collectors, they are supposed to be those who work in Addis Ababa government health centers and who are those can speak and understand Amharic fluently was recruited. The data collection supervised by one senior health officers. Training to the field staff was give on the purposes of the study, principles, and ethical consideration of the data collection process. A point-by-point discussion was made on the content of the questionnaire. The female students who have been select for the study they have been asking the informant of consent while they collect data from the respondent's. The data collector filled questionnaires and all data collectors were assigned on various health center. The time for filling questionnaires was each data collector filled take 20 to 30 minutes on average and only 10 questioners per day. To assure the data quality high emphasis was given in designed data

collection instrument (tool). Also 5% of the questionnaire was pre-test on PMTCT service users in the mikililand and health center rather than the one selected for the study before the actual data collection. Some skip pattern and questions were modified based on the result of pretest. During data collection the questionnaires was review for completeness, accuracy, and consistency by supervisors every day. A consistency check in Epi.data software was use to ensure quality during data entry.

4.11.1 Anthropometric Measurement

Mid Upper Arm Circumference (MUAC):-was measured to the nearest 0.1 cm at the midpoint between the tip of the acromion and the olecranon process on the back of the arm while the subject holding the forearm in horizontal position. The measurement was performed on the subject's arm hanging freely along the trunk using inextensible MUAC tape.

4.12 Data processing and analysis

Data consistency and completeness was checking throughout the data collection, data entry, and analysis. A code has given for each questionnaire using a unique identifier for each questioner and has entered into computer using Epi.data version 3.1. Missing value and outliers checked by running frequencies and cross tabulation data. The entered data cleaned by anomalies prior for data analysis purpose. Erroneous data was crosscheck with the hard copies of completed questionnaire. The number of missing value for each important variable was check and managed. The data after being ready for analysis, it has been exported and analyzed using SPSS version 22 statistical software.

Univariate analysis

Descriptive analysis has done for each variable in the study by running frequencies. Prevalence of under nutrition among HIV positive pregnant women was determined (estimated) by running frequencies with their 95% Confidence Interval (CI) estimates (29.17-39.23). Moreover, a more over prevalence on under nutrition has computed considering MUAC less than 23 cm as under nutrition among selected HIV positive pregnant mother.

Bivariate analysis

Then the dependent variables (under nutrition of HIV positive pregnant women) have cross-tabulated with in each independent variable. Each independent variable, which is associated with

under nutrition binary logistic regression, employed to measure the association, strength, direction and significance of each independent variable which are associated with under nutrition.

Multivariate analysis

To exclude cofounding variable multivariate analysis was done using binary logistic regression analysis of all independent variable with dependent variable and express using adjusted odds ratio (AOR) and 95% CI was used as an indicator to measure strength, direction and significance of association.

4.13 Ethical consideration

Before the start of the data collection, ethical clearance was secured from Addis Ababa University, Department of Public Health Research and Ethics Committee. Support letter was obtained from the sub cities Health Bureau also Addis Ababa public health research and emergency management care process. Permission has obtained from study health centers. The selected participants in the health center were been inform about the study and the possibility of being recruited into the study afterward they have to give their consent to participate in the study also we have adolescents in this study, we also had an assent from their parents. The data collectors will provide information to the selected participants on the purpose of the study; potential benefits and harm (even though we did not anticipate any harm resulting from the study apart from the additional time the respondents had to wait in order to answer questions). Each of the respondents will thereafter, give the informed consent to agree or not for being involved in the study. The data collectors will inform the participants about their right to withdraw from the study at any point, without any consequence to them.

4.14 Data presentation and dissemination of results

The finding of the research will submitted to the Addis Ababa University, School of Public Health and will distributed to different organizations that have helped the project to be carried out, and those who have concern on malnutrition status of HIV positive pregnant women also Addis Ababa public health research and emergency management care process. The main findings of the study will be present in an open defense at the School of Public Health of Addis Ababa University. The findings will be present in different seminars, meetings, and workshops. An attempt will also be make to publish main findings of the study.

5. RESULT

5.1 Socio – Demographic characteristics of HIV positive pregnant women respondents

Table 2: Socio – Demographic characteristics of HIV positive pregnant women respondents, Addis Ababa, Ethiopia, 2018, (n=342)

Variables		frequency	Percent (%)
Age	15-24 year	43	12.6
	25-34 year	244	71.3
	35-42 years	55	16.1
Occupation	Government employee	40	11.7
	Private employee	80	23.4
	Merchant	20	5.8
	Housewife	137	40.1
	Unemployed	22	6.4
	Student	1	0.3
	Daily laborer	42	12.3
Educational level	Illiterate	46	13.5
	Read & Write	57	16.7
	Primary school (1-8)	87	25.4
	Secondary school or above	152	44.4
Marital status	Single	44	12.9
	Married and live together	247	72.2
	Separated/divorced or widowed	51	14.9
Monthly salary	500-1650 ETB	87	25.4
	>1650 ETB	255	74.6

5.2 Maternal health related question for HIV positive pregnant women respondents

Out of 342 study participants about 245 (71.6%) participants have history of previous pregnancy and 160 (65.3%) of them had less than three pregnancies. In addition, out of 245 participants about 212 (86.5%) have less than three alive children. From these (342) study participants about 173 (50.6%) participants gestational age is 13-24 in weeks. The majority of participants (i.e. 203 (59.4%)) answered that they do not have nausea and vomiting. According to ARV treatment status of study participants about 267 (78.1%) of them are refill (table 3).

Table 3: Maternal health related question for HIV positive pregnant women respondents, Addis Ababa, Ethiopia, 2018, (n=342)

Variables		Frequency	Percent (%)
Previous pregnancy	Yes	245	71.6
Number of previous pregnancy n=245	Less than three pregnancy	160	65.3
	Three & above pregnancy	85	34.7
Number of alive children n=245	Less than three children	212	86.5
	Three & above	33	13.5
Gestational age in weeks	Less than 12 weeks	20	5.8
	13-24 weeks	173	50.6
	Above 24 weeks	149	43.6
Pregnancy symptom (nausea and vomiting)	Yes	139	40.6
ARV treatment status	Newly enrolled	75	21.9
	refill	267	78.1

5.3 Nutrition-related characteristics of HIV positive pregnant women respondents

All respondents were asked about changing feeding style after knowing the pregnancy status; almost quartered 252 (73.3%) respondents changed feeding style. 164 (65.1%) of them have increased frequency change of feeding style but 203 and 168 of study participant have not changed the quantity and quality of feeding style respectively. The majority participants (i.e. 234 (68.4%)) were used 3 to 4 times of feeding include snacks. 214 (62.6%) participants have changed the amount of food intake compared to before pregnancy period with a lot of a little more food intake. 190 (55.6%) participants have no eating problem at all. Although 316 (92.4%) participants had ever get dieting counsel and the nutritional affordability of almost all participants hadn't get organizational support 334 (97.7%), almost half participants (i.e. 160 (46.8%)) can be considered as a good and very good affordability. 299 (87.4%), 311 (90.9%) and 342 (100%) participants have not get prenatal vitamin, Multivitamin and herbal remedies respectively. On the other hand, almost all participants (i.e. 316 (92.4%)) have get iron supplementation (table 4).

Table 4: Nutrition-related characteristics of HIV positive pregnant women respondents, Addis Ababa, Ethiopia, 2018, (n=342)

Variable		Frequency	Percent (%)
Feeding style change status	Yes	252	73.7
Change in frequency (n=252)	Yes	164	65.1
Change in quantity of food (n=252)	Yes	49	19.4
Change in quality of food (n=252)	Yes	84	33.3
Feeding frequency including snacks	Less than three	33	9.6)
	3-4	234	68.4
	5-6 and above	75	21.9
Change compared with before pregnancy	A lot or a little more	214	62.6
	About the same/little less	128	37.4
Eating problem status	Yes	152	44.4
Type of eating problem n=152	Swallowing difficulty/ appetite loss	34	22.4
	Nausea, vomiting/heart burn	118	77.6
Ever get dietary counseling	Yes	316	92.4
Organizational support (Economic & RUTF)	Yes	8	2.3
Affordability of nutritious food	Good and very good	160	46.8
	Some off	118	34.5
	Poor	64	18.7
Prenatal vitamin additional supplement	Yes	43	12.6
Multi vitamin additional supplement	Yes	31	9.1
Iron additional supplement	Yes	316	92.4

5.4 Dietary Assessment in relation to the recommended intake for HIV positive pregnant women respondents

All respondents were ask about food frequency intake for the last one month in structure questioner method then we classified it as below the recommendation and recommended food intake by the reference of dietary guideline and food pyramid (35, 41). Two hundred fifty two (73.7%), 241 (70.5%) and 206 (60.2%) participants just used recommended intake of dark green leafy vegetables, legumes, nut also seed and sweet respectively. The majority participants used below the recommendation intake in the list of most of dietary assessment (table 5).

Table 5: Dietary Assessment for HIV positive pregnant women respondents, Addis Ababa, Ethiopia, 2018, (n=342)

Variables	Frequency	Percent (%)
Cereal	342	100
Dark green leafy vegetables	252	73.7
White tubers and roots	155	45.3
Yellow-orange vegetable	56	16.4
Fruits	13	3.8
Organ meat (iron-rich)	22	6.4
Flesh meat	58	17.0
Egg	105	30.7
Fish	5	1.5
Legumes, nuts and seeds	241	70.5
Dairy food	12	3.5
Oils and fats	126	36.8
Sweets	206	60.2
Coffee/ Tea	311	90.9

5.5 Anthropometry status, clinical profiles and ART status of HIV positive pregnant women

Table 6: Anthropometric measurement, clinical profiles and ART status of HIV positive pregnant women, Addis Ababa, Ethiopia, 2018, (n=342)

Variables		Frequency	Percent (%)
MUAC	> 23 cm	225	65.8
	19-23 cm	115	33.6
	< 19 cm	2	0.6
CD4 level n=274	< 200 cells/ μ l	3	1.1
	200-350 cells/ μ l	56	20.4
	>350 cells/ μ l	215	74.5
Current OI status n=16	TB	1	6.3
	Candidiasis	5	31.3
	Diarrhea	10	62.5
Current condition n=16	Improved	13	81.3
	Some	2	12.5
	Deteriorate	1	6.3
Clinical stage	Stage-I	327	95.6
	Stage-II	13	3.8
	Stage-III	2	0.6
Adherence	Good	333	97.4
	Poor	8	2.3
	Fair	1	0.3
Viral load n=16	<1000 viral load	15	93.7
	>1000 viral load	1	6.3

The majority of 225 (65.8%) HIV positive pregnant mothers had >23 cm MUAC followed by 115 (33.6%) respondents were 19-23 cm. Two hundred fifteen (65.8%) participants had >350 CD4 T-cell level and 327 (95.6%) participants were in RVI clinical stage-I. out of 342 study participants only 16 participants occurred OI within for the past six months and 10 of them had diarrhea from these participants and about 13 of them had improvement (table 6).

5.6 Factors associated with malnutrition

On the binary logistic regression analysis sociodemographic characteristics : age, educational level and house hold income of HIV positive pregnant women were significantly associated with nutritional status. On the other hand among Nutrition- related factors; Frequency of feeding including snacks and affordability of nutritious food were significantly associated with nutritional status. Besides, among clinical profiles and ART status CD4 T-cell level, were found to be significantly associated with nutritional status and also among dietary assessment; Fat, Fruit and vegetables, Meat, fish and egg, legume, nut and seed were significantly associated with nutritional status.

Nevertheless, in the multivariate analysis only frequency of feeding include snacks, and CD4 level were found to be statistically significantly associated with nutritional status of HIV positive pregnant women in Addis Ababa (table 10). Accordingly, after controlling the variables mentioned above. Those who have experience for last one month of less than three frequency of serving including snacks were 3.2 times more likely to be undernourished than those more than and equal to three frequency of serving including snacks (AOR=3.18; 95% CI: 1.14-8.88). In addition, 350 cells/ μ l or below CD4 level of HIV positive pregnant mother were 2.5 times (AOR=2.50; 95% CI: 1.27-4.94) more likely to be undernourished than those who had Above 350 cells/ μ l cd4 level.

Table 7: Anthropometry status, clinical profiles and ART status of HIV positive pregnant women, Addis Ababa, Ethiopia, 2018, (n=342)

Variable	Nutritional status		Crude Odds Ratio (COR) [95%CI]	Adjusted Odds Ratio (AOR) [95%CI]
	MUAC > 23cm (%)	MUAC < 23cm (%)		
Age of respondent				
15-29 year	115(51.1%)	44(37.6%)	1.00	1.00
30-45 years	110 (48.9%)	73(62.4%)	1.74 (1.1- 2.74) *	1.71(0.95-3.07)
Level of education				
Illiterate/ read and write	54(24.0%)	49(41.9%)	1.00	1.00
Elementary and above	171(76%)	68(58.1%)	2.28(1.4-3.68) *	1.83(0.96-3.50)
House hold income				
500-1650EBR	49(21.8%)	38(32.5%)	1.00	1.00
>1650EBR	176(78.2%)	79(67.5%)	1.73(1.05-2.85) *	0.92(0.46-1.85)
Frequency of feeding including snacks				
Less than three	13(5.8%)	20(17.1%)	1.00	1.00
Three and above	212(94.2%)	97(82.9%)	3.36(1.61-7.04) *	3.18(1.14-8.88) *
Affordability of nutritious food				
Good or very good	121(53.8%)	39(33.3%)	1.00	1.00
poor	104(46.2%)	78(66.7%)	2.33(1.46-3.71) **	1.67(0.86-3.20)
CD4 level				
350 cells/μl or below cd4 level	28(15.2%)	31(34.4%)	1.00	1.00
Above 350 cells/μl cd4 level	156(84.8%)	59(65.6%)	2.93(1.62-5.29) **	2.50(1.27-4.94) *
Fat				
Below the recommended	130(57.8%)	86(73.5%)	1.00	1.00
Recommended intake	95(42.2%)	31(26.5%)	2.03(1.24-3.30) *	1.61(0.87-2.99)
Fruit and vegetables				
Below the recommended	42(18.7%)	35(29.9%)	1.00	1.00
Recommended intake	183(81.3%)	82(70.1%)	1.86(1.11-3.12) *	1.43(0.71-2.86)
Meat, fish and egg				
Below the recommended	120(53.3%)	87(74.4%)	1.00	1.00
Recommended intake	105(46.7%)	30(25.6%)	2.54(1.55-4.14) **	1.68(0.86-3.27)
Legumes, nuts and seeds				
Below the recommended	55(24.4%)	46(39.3%)	1.00	1.00
Recommended intake	170(75.6%)	71(60.7%)	2.00(1.24-3.26) *	1.70(0.89-3.26)

where * indicats significant associetion at p-value < 0.05 , ** at p-value <0.001

6. Discussion

During pregnancy, a woman needs good nutritional status for a healthy outcome. Nutrition care and support of HIV-infected pregnant promotes adequate gestational weight gain and aims to improve or maintain nutritional status, reduce maternal mortality, and delay HIV disease progression improves birth outcome (10, 12). Malnutrition among women remains a major challenge to achieve the full impact of interventions aimed at improving their quality of life, productivity, and survival (7). In addition, this will not allow us to meet goal of plan to eliminate mother to child HIV transmission (22). To address this problem, to reduce mortality and morbidity, to maintain good quality of life, better birth outcome, increase productivity of the mother and to fulfill our goal then we should have to do enough researches around that area but in our country, there is inadequate information. Therefore, the study has assessed the prevalence and associated factors of malnutrition among HIV positive pregnant women attending PMTCT clinics in health centers of Addis Ababa.

This study revealed that the overall prevalence of malnutrition among the study participant was found to be 34.2%; of those, 33.6% was moderate malnutrition. This implies that malnutrition is highly prevalent in this group. This finding higher than study done with the meta-analysis and meta-regression analysis of demographic health surveys showed that Prevalence of HIV-related malnutrition among women was 10.29% in sub-Saharan Africa (15). However, on this study both meta-analysis and meta-regression analyses show less prevalence that this study is may be the study did not consider HIV positive pregnant women. The possible reason might be the occurrence of pregnancy and it needs additional nutritional requirement. This high rate of under nutrition in this study could be due to HIV and pregnancy status of the mother because based on scientific evidence as explained before pregnancy itself additional nutrition but when it comes to HIV infection, they need to have extra nutrition. When both occur at the same time the requirement for additional nutrition will highly increase. Because of our country poor economic status, this problem will make it worth and the prevalence of under nutrition will be high on the HIV positive pregnant women. In addition, the occurrence of pregnancy with HIV infection increases both energy requirements and the risk of under nutrition (10). It may contribute to the pathogenesis of HIV through increasing oxidative stress and compromised immunity and indirectly result in under nutrition.

The overall prevalence was less than the study on under nutrition of the HIV positive women attending ART clinic at Humera hospital in Tigray 42.3% (7). This implies the result of the present study is less than the results of previous study. This high rate of under nutrition in previous study could be due to high prevalence of household food insecurity (40.4%) leading to lack of access to adequate, safe, and nutritious food resulting to under nutrition (7). Other possible reason for less prevalence of under nutrition in this study than previous study could be, better ART follow up and monitoring that help better health condition for the mother.

In other hand, the magnitude of under nutrition in adult people living with HIV/AIDS receiving anti-retroviral therapy at Butajira Hospital in 25.9% and 24.9% females and male respectively (17) and Nekemte Referral Hospital and Health Center in Wollega Zone 27% (18). This both studies were less prevalence of under nutrition compared to present study. Possible reason for less prevalence of under nutrition in Butajira Hospital and Nekemte Referral Hospital and Health Center could be pregnancy status of respondents. The second Possible reason for the high prevalence of under nutrition in the present study could be due to high sample size compared to Butajira Hospital (342 subjects).

On other HIV unrelated study shows Prevalence of Malnutrition in pregnant women at eastern Ethiopia was 23.7% and 19.8% of pregnant women had underweight and wasting, respectively (11). This high rate of under nutrition in this study could be due to pregnant women were more prone to malnutrition against non-pregnant women and males. The other reasons might be due to HIV infection compare with eastern Ethiopia study. In general, a prevalence of under nutrition of HIV infected pregnant women were high prevalence than other population group.

In this study, many indicators of socio economic factors, Maternal health related factors, Nutrition-related factors, clinical profiles and ART status factors, for the HIV positive pregnant women were examine, however, frequency of feeding and CD4 of study participants were independently associated with malnutrition in HIV positive pregnant women. Those who have expriance for last one month of Less than three Frequency of feeding including snacks were 3 times more likely to be undernourished than those more than and equal to three Frequency of serving including snacks. On this study showed a Less than three Frequency of eating was significantly associated with under nutrition of HIV positive pregnant women. The occurrence of this finding could be pregnant women were recommended to improve their feeding during

pregnancy in order to maintain the increased demand for nutrients (27). This recommendation was supported by the finding of reduced risk of malnutrition among women who improved their eating habit. This study finding on the increasing frequency of feeding per day was at lower risk of malnutrition. Such results emphasize the importance of improving the frequency of feeding during pregnancy as a key intervention.

Other associated factor was CD4 T-cell of study participants were independently associated with malnutrition in pregnant women. 350 cells/ μ l or below CD4 level of HIV positive pregnant mother were almost 3 times more likely to be undernourished than those who had above 350 cells/ μ l CD4 level. The effects of malnutrition on the immune system are a well-known fact and include decreases in CD4 T-cells, suppression of delayed hypersensitivity, and abnormal B-cell responses. The immune suppression caused by protein-energy malnutrition is similar in many ways to the effects of HIV infection (3). In addition, Less CD4 T-cell prone to recurrent occurrence of infection and that lead to loss of appetite and increase energy expenditure all this could affect nutritional status of women. Other possibility reason was Antiretroviral therapy improves nutritional status, but ARVs may also have side effects and metabolic complications, for that reason wasting still develops in some patients (3).

6.1 Strength of the study

- Strength of this study was use of standard and validated data collection instrument, which has been adapted from Harvard college dietary assessment tool. Since the issue of malnutrition pregnant women was sensitive in now a day.
- Data collected by principal investigator that assures the quality of data.
- Additional strength of this study was using dietary assessment method.

6.2. Limitation of the study

In addition to the significant contribution of our findings, the study has limitations:

- The study design, the cross-sectional, which was affected by social desirability, and recall bias. As a short period to examine the relationship, temporal relations could not be assessed.
- This study is done only on health centers.

6.3. Conclusion

- There was high prevalence of under nutrition among HIV positive pregnant mother in A.A.
- Based on the findings of this study, it can be concluding that one third of HIV positive pregnant women were affect by under nutrition.
- The finding indicates that higher level of CD4 count is associated with better nutritional status, and while improved eating habit were associated with lower proportion of under nutrition during pregnancy. Thus, most of the factors associated with under nutrition are potentially modifiable through interventions targeting improved frequency of food serving and raising ART clinical care and promotion of improved eating habit through prenatal dietary advice.

6.4 Recommendation

For program managers

In this study, we found that most of under nutritious HIV positive women were poor pregnant mothers on socioeconomically status. For that reason, they need special attention of economical and nutritional support.

For better ART management and care, it needs more trained manpower in order to maintain a good ART service.

For health care professionals

In this study, mostly under nutritious HIV positive pregnant women did not get nutritional supplement. So they need to give them special care and when they get under nutritious mother, they have to put them in immediate nutritional therapy program.

To reduce prevalence of under nutrition giving them continues nutritional education and awareness for HIV positive pregnant women about how to maintain nutritious foods, etc.

For researchers

For future study on nutritional assessment is required against physician clinical assessment accompanied by laboratory diagnosis of nutritional status to assess micronutrient.

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Appendices

ANNEX I- Consent form (English version)

Addis Ababa University, School of Public Health, a Study prevalence and associated factors of malnutrition among HIV-positive pregnancy of women in public health centers of Addis Ababa Ethiopia, 2018

Good morning/Good afternoon, my name is _____. I am working with Miss Zinet Behailu who is doing a research as partial fulfillment for the requirement of MPH at Addis Ababa University College of health science school of public health.

We are conducting a study about prevalence and determinants of malnutrition among HIV-positive pregnancy of women in Public health facilities. The study is aimed to fulfill the information gap and provide evidence for programplanners, implementers and decisionmakers. It also assists in the development of a system for improving the quality life for HIV positive pregnant women.

There are no risks or direct benefits to you from participating in the study but your participation will contribute to improving family planning service in this and other facilities. Please be assured that the information will be confidential and you may choose to stop your participation at any time or refrain from answering any questions. This will not have any impact on the service you are getting now and the future. Your name will not be used or made public. And this question will take about 20-30 minutes.

Do I have your agreement to participate? 1. YES 2. No. Stop

For any information you can contact:

1.Mr. Robel Yirgu (BSC, MPH): Addis Ababa University, College of Health Sciences, School of Public Health.Tel:0924407180 Email: yirgurob@yahoo.com

2. Zinet Behailu: Yeka sub city France area health center Tel 0910699867, E-mail: zinbehailu@gmail.com

Consent form

I have read/listen the information sheet above and clearly understood the purpose and anticipated benefit of the research. I hereby need to assure with my signature below that without any coercion or forceful act by the research team, have decided to voluntarily participate in the study to contribute my part in the effort being made.

Client unique ID No _____ Signature _____ Date _____

Interviewer's name _____ Signature _____ Date _____

Date of interview _____ Time started _____ Time finished _____

Supervisor's Name _____ Signature _____ Date _____

For any information you can contact:

Miss Zinet Behailu E-mail:zinbehailu@gmail.com Tel: +251910699867

I thank you for your cooperation!

ANNEX II- Consent form (Amharic version)



አዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና ት/ቤት

የጥናቱ አጠቃላይ መረጃ፡ የፈቃደኝነት መጠየቂያ እና ቃለ መጠይቅ (የአማርኛ ትርጉም)

ይህ መጠይቅ በአዲስ አበባ የመንግስት ጤና ጣቢያዎች ከእናት ወደ ልጅ ኤች አይ ቪ ቫይረስ እንዳይተላለፍ ለመከላከል የሚሰጠውን አገልግሎት ለማግኘት ከሚመጡ እናቶች የተመጣጠነ የምግብ እጥረት ያለውን ስርጭት እንዲሁም ከሱ ጋር ተያያዥ ሰለሆኑ ነገሮች ለማጥናት የተዘጋጀ ነው።

እንደምን አደሩ ስሜ _____ ይባላል። በአሁኑ ሰአት በአዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ ህብረተሰብ ጤና ትምህርት ክፍል የማስተርስ ዲግሪ የመመረቂያ ፅሁፋቸውን ከሚያዘጋጁት ከወ/ት ዜነት በኃይሉ ጋር በመሆን ከእናት ወደ ልጅ ኤች አይ ቪ ቫይረስ እንዳይተላለፍ ለመከላከል የሚሰጠውን አገልግሎት ለማግኘት ለመጡ እናቶች በተመጣጠነ የምግብ እጥረት ያለው ስርጭት እንዲሁም ከሱ ጋር ተያያዥ ሰለሆኑ ነገሮች ለሚደረገው ጥናት መረጃ በመሰብሰብ ላይ እገኛለሁ።

የዚህ ጥናት አላማ በዚህ ጤና ጣቢያ ከእናት ወደ ልጅ ኤች አይ ቪ ቫይረስ እንዳይተላለፍ ለመከላከል የሚሰጠውን አገልግሎት ለማግኘት ለሚመጡ እናቶች የተመጣጠነ ምግብ አወሳሰድ ጋር በተያያዘ ያለውን የመረጃ ክፍተት ማወቅ እና ጥናቱ ለፕሮግራም አውጭዎች ፣ አስፈጻሚዎች እንዲሁም ለውሳኔ ሰጪዎች መረጃ በመስጠት የአገልግሎት ጥራቱን ለማሻሻል ጉልህ አስተዋፆ ያደርጋል።

በዚህ ቃለ-መጠይቅ የእርስዎ በፈቃደኝነት መሳተፍ እና ትብብር ምንም አይነት ጉዳትም ሆነ ቀጥተኛ ጥቅም የሌለው ሲሆን በአገልግሎቱ ዙሪያ ያሉትን ችግሮች ለመለየት እና ለማሻሻል ግን ከፍተኛ የሆነ ጠቀሜታ አለው። በተጨማሪም የሚሰጡት መረጃ ከተባለለት ጉዳይ ውጪ የማይውል እና ሚስጥራዊቱ የተጠበቀ እንደሚሆን፣ ስምዎትም ሆነ ሌላ የእርሶን ማንነት የሚገልፅ በዚህ ጥናት ሂደት ውስጥ የማንጠቀም መሆኑን አረጋግጣለሁ። በዚህ ጥናት ላይ መሳተፍ በእርሶ ፍቃደኝነት ላይ የተመሰረተ ሲሆን መመለስ የማይፈልጉትን ማንኛውም ጥያቄ አለመመለስ ይችላሉ። በቃለ-መጠይቁ ምቹት ካልተሰማዎት በማንኛውም ጊዜ መጠይቁን ማቋረጥ ይችላሉ። ይህም በመሆኑ ዛሬም ሆነ ለወደፊት በሚያገኙት አገልግሎት ላይ ምንም አይነት ተፅእኖ እንደሌለው ልገልፅልዎት እወዳለሁ። ቃለ-ምልልሱ ከ 20 እስከ 30 ደቂቃ ሊወስድ ይችላል።

ወደ መጠይቁ መቀጠል እንድንችል ፈቃደኛ ነዎት?

- 1. አዎን 2. አይደለሁም

መረጃ ካስፈለግዎ

ወ/ት ዚነት በኃይሉ፣የካ ክ/ከተማ ፈረንሳይ አካባቢ ጤና ጣቢያ፣ኢ. ሜይል: zinbehailu@gmail.com ስልክቁጥር: +251910699867

ሮቤል ይርጉ፣አዲስ አበባ ዩኒቨርሲቲ ህክምና ፋኩሊቲ፣የህብረተሰብ ጤና ትምህርት ክፍል፣ ኢ. ሜይል: yirgurob@gmail.com ስልክ ቁጥር: +251 924407180

የስምምነት ቅጽ

ከላይ የተጻፈውን የመረጃ ቅፅ አንብቤ የጥናቱን አላማና ጥቅም በግልፅ ተረድቻለሁ። በዚህም መሰረት ያለጥናት ቡድኑ አባላት ተፅእኖ በሙሉ ፈቃደኝነት በዚህ ጥናት በመሳተፍ የአገልግሎት ጥራቱን ለማሻሻል በሚደረገው ጥረት ውስጥ የሚጠበቅብኝን አስተዋፅኦ ለማበርከት መወሰኔን በፊርማዬ አረጋግጣለሁ።

የታካሚው መለያ ቁጥር _____ ፊርማ _____
ቀን _____

የመረጃ ሰብሳቢ ሥም _____ ፊርማ _____
ቀን _____

መረጃ የተሰበሰበበት ቀን _____ የተጀመረበት ሠዓት _____ ያለቀበት ሰዓት _____

የተቆጣጣሪ ሥም _____ ፊርማ _____ ቀን _____

መረጃ ካስፈለግዎ:- ዚነት በኃይሉ፣ኢ. ሜይል: zinbehailu@gmail.com ስልክ ቁጥር: +251910699867

ስለትብብርዎ ከፍተኛ ምስጋና አቀርባለሁ

ANNEX III- Questionnaire (English Version)

Part I: Socio – Demographic characteristics of HIV positive pregnant women respondents

No	Questions & filter	Coding category	Skip to
101	How old are you?	1.Age in years ----- 88. Don't Know 99. No answer	
102	What is your level of educational?	1.Illiterate 2. Read & Write 3. Primary school (1-8) 4. Secondary school completed (9-10) 5.Preparatory school (11-12) 5.10 +1& above	
103	What is your occupation?	1.Government employee 2.Private employee 3. Merchant 4. Un employed 5. House wife 6. Student 7.Daily laborer	
104	What is your monthly in come?	----- Eth.birr	
105	Current marital status?	1.Single 2.Married & live together 3. Divorced 4. Widowed 99. No answer	

Part II: maternal health related Question for HIV positive pregnant women respondents

201	Have you ever been pregnant before?	1.yes 2.No	If no Q 204
202	For how many times dose your pregnancy happen?	<u>Number_____</u>	
203	How many of your children is alive?	<u>Number_____</u>	
204	Gestational week	1. _____	
205	Do you have Nausea and vomiting?	1.yes 2.No	
206	What is your status of ARV treatment?	1.newly enrolled 2.refill	

Part III sections I. Nutrition-related characteristics of HIV positive pregnant women respondents

No	Questionnaire and filter	Coding category	Skip to
301	Did you Change your feeding style after knowing pregnancy status?	1.yes 2.no	If no Q205
302	What Type of changed feeding style?	1.Frequency 2.Quality of food 3.Quantity	
303	How many times a day do you eat? NB: This includes meals and snacks of all kinds.	1.less than 3 2.3-4 3.5-6 4.More than 6 77.not sure	
304	How does the amount of food you eat now compare with before you were pregnant?	1.A lot more 2. a little more 3.about the same 4.a little less 5. a lot less 77.not sure	
305	Do you have eating problem?	1.Yes 2.no	If no Q207
306	If yes, What type of eating problem?	1.Difficulty of swallowing 2.Loss of appetite 3.Vomiting 4.Nausea 5.Heart burn	
307	Did you get dietary counseling?	1.Yes 2.no	
308	Did you get Organizational support other than medication?	1.Yes 2.no	
309	If yes, What type of Organizational support	1.Economical support (money, material, food....) 2.RUTF 3.Economical and RUTF	
310	How can you afford nutritious food? Eg.Vegetable, Fruit,Milk Products.....	1.very good 2.good 3.some of 4.poor	
311	Do you take additional nutritional supplement?	1.Prenatal vitamin 2.Multi vitamin 3.Iron 4.Herbs or herbal remedies 5. None of these	

Part III Sections II: Dietary assessment for HIV positive pregnant women respondents

Please, tell me in your average total use, during the past one month, of each specific food and drink.

Question number	Food groups	Coding category
312	<p>CEREALS</p> <p>(bread, pasta, macaroni, biscuits, cookies or any other foods made from millet, sorghum, maize, rice, wheat + insert local foods e.g. porridge or pastes or other locally available grains)</p>	<ol style="list-style-type: none"> 1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day 8. 2 or more serving per day
313	<p>DARK GREENLEAFYVEGETABLES</p> <p>(sweet pepper, dark green/leafy vegetables, locally available vitamin-A rich leaves)</p>	<ol style="list-style-type: none"> 1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day 8. 2 or more serving per day
314	<p>WHITE TUBERSAND ROOTS</p> <p>(Potatoes or foods made from roots.)</p>	<ol style="list-style-type: none"> 1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day 8. 2 or more serving per day
315	<p>Yellow-Orange vegetable</p> <p>(pumpkin, carrots, or sweet potatoes that are yellow or orange inside + other locally available vitamin-A rich vegetables)</p>	<ol style="list-style-type: none"> 1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day 8. 2 or more serving per day

316	FRUITS (Mangoes, papayas...)	1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day 8. 2 or more serving per day
317	ORGAN MEAT(IRON-RICH) (liver, kidney, heart or other organ meats or blood-based foods)	1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day 8. 2 or more serving per day
318	FLESH MEATS (beef, lamb, goat, chicken)	1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day 8. 2 or more serving per day
319	EGGS	1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day 8. 2 or more serving per day
320	FISH	1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day

		8. 2 or more serving per day
321	LEGUMES, NUTS AND SEEDS (beans, peas, lentils, nuts, seeds or foods made from these)	1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day 8. 2 or more serving per day
322	DAIRY FOOD (MILK AND MILK PRODUCTS) (milk, cheese, yogurt or other milk products)	1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day 8. 2 or more serving per day
323	OILS AND FATS (oil, fats or butter added to food or used for cooking)	1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day 8. 2 or more serving per day
324	SWEETS (sugar, honey, sweetened soda or sugary foods such as chocolates, sweets or candies)	1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week 6. 5-6 per week 7. Once per day 8. 2 or more serving per day
325	COFFEE/TEA (tea (black, green) or coffee)	1. Never 2. Once per month or less 3. 2-3 per month 4. Once per week 5. 2-4 per week

		6. 5-6 per week 7. Once per day 8. 2 or more serving per day
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Part III Sections III: Anthropometry status of HIV positive pregnant women respondents it measured and administered by Data collectors

No	Questionnaire and filter	Coding category	Skip to
326	MUAC	1.>23cm 2.19-23cm 3.<19cmS	

Part IV: Clinical profiles and ART status of HIV positive pregnant women data will be collect from client follow up chart

No	Questionnaire and filter	Coding category	Skip to
401	CD4 level	1.< 200 cells/μl 2. 200-350 cells/μl 3. >350 cells/μl 4.not done	
402	Current or past Opportunistic Infection in the past 6 months	1.TB 2.Candidiasis 3.Toxoplasmosis 4.Diarrhea 5.no	
403	What is Current condition?	1.Improved 2.Same 3.Deteriorated	
404	Clinical stage	1.Stage-I 2.Stage-II 3.Stage-III 4.Stage-IV	
405	Adherence	1.Good 2.Poor 3.Fair	
406	Viral load	1.>1000 2.<1000 3.not done	

ANNEX IV- Questionnaire (Amharic version)

ክፍል 1: ማህበራዊ መረጃዎችን በተመለከተ

ተ.ቁ	ጥያቄና ማጣሪያ	የመልስ አማራጭና መለያ ኮድ ቁጥር	ይዘት
101	እድሜዎ ስንት ነው?	1. እድሜ በአመት----- 88. አላውቀውም 99. መልስ አልሰጡም	
102	የትምህርት ደረጃዎ ምን ያህል ነው?	1. ማንበብና መጻፍ የማይችሉ 2. ማንበብና መጻፍ ብቻ 3. አንደኛ ደረጃ የጨረሱ (1-8ኛ) 4. ሁለተኛ ደረጃ የጨረሱ (9-10ኛ) 5. መሰናዶ የጨረሱ (11-12ኛ) 5.10+1 እና በላይ	
103	ሥራዎ ምን ያህል ነው?	1. የመንግስት ስራ ተኛ 2. የግል መስሪያ ቤት ተቀጣሪ 3. ነጋዴ 4. ሥራ ሌላ 5. የቤት እመቤት 6. ተማሪ 7. የቀንሰራ ተኛ 8. ሌላ/ ይገለጹ/-----	
104	የወር ገቢዎ ምን ያህል ነው?	_____ ብር	
105	የጋብቻዎ ሁኔታ	1. ያላገባች 2. ያገባችና አብራሃም ትኖር/ከእሙኛ ጋር 3. ከባላ የተፋታች 4. ባላ የሞተባት 99. መልስ አልተሰጠባትም	

ክፍል 2: የእናቶች የጤና ሁኔታ በተመለከተ

201	ከዚህ በፊት አርግዘው ያውቃሉ?	1. አዎ 2. አይ	አይ ከሆነ ወደ 204
202	ስንት ጊዜ አርግዘው ያውቃሉ?	መልስ _____	
203	ስንት ልጆች በሂወት አሉት?	መልስ _____	
204	እርግዝናዎ ስንተኛው ሳምንት ነው?	መልስ _____	
205	ማቅለሽለሽ እና ማስመለስ አሉት?	1. አዎ 2. አይ	
206	የኤች አይ ቪ ህክምናዎ ሁኔታ እንዴት ነው?	1. አዲስ የገቡ 2. በድጋሚ የመጡ	

ክፍል 3:- ንዑስ ክፍል 1 ምግብ እና ከሱ ጋር ተያያዥ የሆኑ ነገሮች

ተ.ቁ	ጥያቄና ማጣሪያ	የመልስአማራጭናመለያኮድቁጥር	ይዘለል
301	ስለ እርግዝያ ካወቁ በኋላ የአመጋገብ ዘይቤዎን ቀይረዋል?	1.አዎ 2.አይ መልስዎ አይ ከሆነ →	ወደተ.ቁ 205
302	በምን አይነት ሁኔታ ነው የቀየሩት?	1.ድግግሞሹን 2. የምግብ ጥራቱን 3.የምግብ ብዛቱን	
303	በቀን ስንት ጊዜ ይበላሉ? ይህ ማንኛውም አይነት አንዴም የሚበላ ይሁን መቆያ ብለን የምንበላውም ይሁን	1.ከ 3በታች 2.3-4 3.5-6 4.6 በላይ 77.አላስታውስም	
304	ከእርግዝና በፊት ካለው ሲወዳደር አሁን ምን ያክል ይበላሉ?	1. በጣም ብዙ2.ትንሽ የጨመረ 3.ተቀራራቢ.4.ትንሽ ያነሰ 5. በጣም ያነሰ77.አላስታውስም	
305	የአመጋገብ ችግር አለቦት?	1.አዎ 2.አይ መልስዎ አይ ከሆነ →	ወደተ.ቁ 207
306	መልሶአዎከሆነምን አይነት ችግር ነው?	1.የመዋጥ ችግር 2.የምግብ ፍላጎት አለመኖር 3.ማስመለስ 4.ማቅለሽለሽ 5.ልብን ማቃጠል	
307	የአመጋገብ ምክር ይወስዳሉ?	1.አዎ 2.አይ	
308	ከመደሃኒት በተጨማሪ የድርጅት እርዳታ ያገኛሉ?	1.አዎ 2.አይመልስዎአይከሆነ→	ወደተ.ቁ 310
309	መልሶአዎከሆነምን አይነት እርዳታ ያገኛሉ	1.የኢኮኖሚ እርዳታ (የገንዘብ፣የምግብ፣ቁሳቁስ...) 2.ለህክምና አገልግሎት የሚውል የተዘጋጀ ምግብ እንደ ፕላፒኔት 3.ሁለቱንም	
310	ተመጣጣኝ ምግብ የማግኘት አቅጥ ምን ይመስላል ? ለምሳሌ ከአትክገልቱ፣ከፍራፍሬው፣ከወተቱ...	1.በጣም ጥሩ 2.ጥሩ የሆነ 3. በመጠነ-የሆነ 4.አነስተኛ የሆነ	
311	ተጨማሪ የሆነ የምግብ አጋዥ ይወስዳሉ?	1.የቅድመ ወለድ ሺታሚን 2.ቫይታሚኖች 3.አይረን 4.የዕጽዋት ተዋዕጺ 5. የለም	

ክፍል3:- ንዑስክፍል2.አዘውትረው የሚመጡትን የምግብ ዝርዝር መጠይቅ

አባክሆትን ባለፍው አንድ ወር የበሉትን እና የጠጡትን የምግብ አይነት በአማካይ የንገሩኝ

ተ.ቁ	የምግብመደብ	መልስ አማራጭና መለያ ኮድ ቁጥር
312	<p>የእህል ዘር</p> <p>(ዳቦ፣ ፓስታ፣ መኮረኒ፣ ብስኩት፣ ወይም ሌላ ቤት ውስጥ የተሰራ ከማሽላ፣ ከቆሎ፣ ከሩዝ፣ ከስንዴ በተጨማሪም ባህላዊ ምግቦች ለምሳሌ፡- ገንፎ እንዲሁም ከጥራጥሬ የተሰሩ ባህላዊ ምግቦች)</p>	<ol style="list-style-type: none"> 1.አልበላሁም 2. በወር አንዴ እና ከዛ በታች 3.እበወር ከ2-3 ጊዜ 4.በሳምንት አንድ ጊዜ 5.በሳምንት ከ2-4 ጊዜ 6.በሳምንት ከ5-6 ጊዜ 7.በቀን አንዴ 8.በቀን ሁለቴ እና ከዛ በላይ
313	<p>ቅጠላቸው ጥቁር አረንጋዴ የሆኑ አትክልቶች</p> <p>(ቃሪያ፣ ጥቁር አረንጋዴ አትክልቶች , እንደ ጥቁር ጎመን)</p>	<ol style="list-style-type: none"> 1.አልበላሁም 2. በወር አንዴ እና ከዛ በታች 3.እበወር ከ2-3 ጊዜ 4.በሳምንት አንድ ጊዜ 5.በሳምንት ከ2-4 ጊዜ 6.በሳምንት ከ5-6 ጊዜ 7.በቀን አንዴ 8.በቀን ሁለቴ እና ከዛ በላይ
314	<p>ስራስሮች ተክሎች</p> <p>(ድንች እንዲሁም በስራስሮች የሚሰሩ ምግቦች.)</p>	<ol style="list-style-type: none"> 1.አልበላሁም 2. በወር አንዴ እና ከዛ በታች 3.እበወር ከ2-3 ጊዜ 4.በሳምንት አንድ ጊዜ 5.በሳምንት ከ2-4 ጊዜ 6.በሳምንት ከ5-6 ጊዜ 7.በቀን አንዴ 8.በቀን ሁለቴ እና ከዛ በላይ

315	<p>ቢጫ-በርቱካናማ የሆኑ አትክልቶች</p> <p>(ዱባ፣ ካሮት፣ ድንች ስኳር እንዲሁም ውስታቸው ቢጫ የሆኑ እንደ ብርቱካን)</p>	<ol style="list-style-type: none"> 1.አልበላሁም 2. በወር አንዴ እና ከዛ በታች 3.እበወር ከ2-3 ጊዜ 4.በሳምንት አንድ ጊዜ 5.በሳምንት ከ2-4 ጊዜ 6.በሳምንት ከ5-6 ጊዜ 7.በቀን አንዴ 8.በቀን ሁለቴ እና ከዛ በላይ
316	<p>ፍራፍሬ</p> <p>(ማንጎ፣ ፓፓያ...)</p>	<ol style="list-style-type: none"> 1.አልበላሁም 2. በወር አንዴ እና ከዛ በታች 3.እበወር ከ2-3 ጊዜ 4.በሳምንት አንድ ጊዜ 5.በሳምንት ከ2-4 ጊዜ 6.በሳምንት ከ5-6 ጊዜ 7.በቀን አንዴ 8.በቀን ሁለቴ እና ከዛ በላይ
317	<p>ብልት አካላት (በአይረን የበለጸገ)</p> <p>(ጉበት፣ ኩላሊት፣ ልብ እና ሌሎች ብልት አካላት)</p>	<ol style="list-style-type: none"> 1.አልበላሁም 2. በወር አንዴ እና ከዛ በታች 3.እበወር ከ2-3 ጊዜ 4.በሳምንት አንድ ጊዜ 5.በሳምንት ከ2-4 ጊዜ 6.በሳምንት ከ5-6 ጊዜ 7.በቀን አንዴ 8.በቀን ሁለቴ እና ከዛ በላይ
318	<p>ስጋ</p> <p>(የበሬ ስጋ ፣ የበግ ስጋ፣ የፍየል ስጋ፣ ደፎ)</p>	<ol style="list-style-type: none"> 1.አልበላሁም 2. በወር አንዴ እና ከዛ በታች 3.እበወር ከ2-3 ጊዜ

		<p>4.በሳምንት አንድ ጊዜ</p> <p>5.በሳምንት ከ2-4 ጊዜ</p> <p>6.በሳምንት ከ5-6 ጊዜ</p> <p>7.በቀን አንዴ</p> <p>8.በቀን ሁለቴ እና ከዛ በላይ</p>
319	እንቁላል	<p>1.አልበላሁም</p> <p>2. በወር አንዴ እና ከዛ በታች</p> <p>3.እበወር ከ2-3 ጊዜ</p> <p>4.በሳምንት አንድ ጊዜ</p> <p>5.በሳምንት ከ2-4 ጊዜ</p> <p>6.በሳምንት ከ5-6 ጊዜ</p> <p>7.በቀን አንዴ</p> <p>8.በቀን ሁለቴ እና ከዛ በላይ</p>
320	አሳ	<p>1.አልበላሁም</p> <p>2. በወር አንዴ እና ከዛ በታች</p> <p>3.እበወር ከ2-3 ጊዜ</p> <p>4.በሳምንት አንድ ጊዜ</p> <p>5.በሳምንት ከ2-4 ጊዜ</p> <p>6.በሳምንት ከ5-6 ጊዜ</p> <p>7.በቀን አንዴ</p> <p>8.በቀን ሁለቴ እና ከዛ በላይ</p>
321	ጥራጥሬ፣ የዘር ፍሬ (ባቁላ፣ አተር፣ ምስር፣ ለውዝ፣ የዘር ፍሬ እና ከእነዚህ የተሰሩ ምግቦች)	<p>1.አልበላሁም</p> <p>2. በወር አንዴ እና ከዛ በታች</p> <p>3.እበወር ከ2-3 ጊዜ</p> <p>4.በሳምንት አንድ ጊዜ</p> <p>5.በሳምንት ከ2-4 ጊዜ</p> <p>6.በሳምንት ከ5-6 ጊዜ</p>

		<p>7.በቀን አንዴ</p> <p>8.በቀን ሁለቱ እና ከዛ በላይ</p>
322	<p>ወተት እና የወተት ምርት</p> <p>(ወተት፣ አይቤ፣ እርጎ ወይም ሌሎች የወተት ምርቶች)</p>	<p>1.አልበላሁም</p> <p>2. በወር አንዴ እና ከዛ በታች</p> <p>3.እበወር ከ2-3 ጊዜ</p> <p>4.በሳምንት አንድ ጊዜ</p> <p>5.በሳምንት ከ2-4 ጊዜ</p> <p>6.በሳምንት ከ5-6 ጊዜ</p> <p>7.በቀን አንዴ</p> <p>8.በቀን ሁለቱ እና ከዛ በላይ</p>
323	<p>ዘይት እና ቅባት ነገሮች</p> <p>(ዘይት, ቅባትወይም ቂቤ የተጨመረበት ምግቦች)</p>	<p>1.አልበላሁም</p> <p>2. በወር አንዴ እና ከዛ በታች</p> <p>3.እበወር ከ2-3 ጊዜ</p> <p>4.በሳምንት አንድ ጊዜ</p> <p>5.በሳምንት ከ2-4 ጊዜ</p> <p>6.በሳምንት ከ5-6 ጊዜ</p> <p>7.በቀን አንዴ</p> <p>8.በቀን ሁለቱ እና ከዛ በላይ</p>
324	<p>ጣፋጭ</p> <p>(ስኳር፣ ማር፣ ለስላሳ መጠጦች ወይም ጣፋጭ ምግቦች እንደ ቸኮሌት ፣ ከረመኔላ)</p>	<p>1.አልበላሁም</p> <p>2. በወር አንዴ እና ከዛ በታች</p> <p>3.እበወር ከ2-3 ጊዜ</p> <p>4.በሳምንት አንድ ጊዜ</p> <p>5.በሳምንት ከ2-4 ጊዜ</p> <p>6.በሳምንት ከ5-6 ጊዜ</p> <p>7.በቀን አንዴ</p> <p>8.በቀን ሁለቱ እና ከዛ በላይ</p>
325	<p>ቡና/ሻይ</p>	<p>1.አልበላሁም</p>

	(ሻይ (ጥቁረ፣ አረነጋዴ) ወይም ቡና)	2. በወር አንዴ እና ከዛ በታች 3. እበወር ከ2-3 ጊዜ 4. በሳምንት አንድ ጊዜ 5. በሳምንት ከ2-4 ጊዜ 6. በሳምንት ከ5-6 ጊዜ 7. በቀን አንዴ 8. በቀን ሁለቱ እና ከዛ በላይ
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ክፍል 2:- ንዑስክፍል4: የሰውነት ክብደትን መለካት (ይህ የሚሰራው በመረጃ ሰብሳቢው ነው)

ተ.ቁ	ጥያቄና ማጣሪያ	የመልስአማራጭናመለያኮድቁጥር	ይዘለል
326	የክንድ መሀከል ዙሪያ	1.>23ሴሜ 2.19-23ሴሜ 3.<19ሴሜ	

ክፍል4: የህክምና ሁኔታ እና የኤች አይ ቪ ህክምና መግለጫ (ይህንን የሚሰራው መረጃ ሰብሳቢው የታካሚዎን የህክምና ካርድ በማየት ነው)

ተ.ቁ	ጥያቄና ማጣሪያ	የመልስአማራጭናመለያኮድቁጥር	ይዘለል
401	የ ሲዲ4(CD4) ደረጃ	1.< 200 ሴል/ማይክሮሊትር (cells/μl) 2. 200-350 ሴል/ማይክሮሊትር (cells/μl) 3. >350 ሴል/ማይክሮሊትር (cells/μl) 4. አልተሰራም	
402	አሁን ላይ ወይንም ባለፉት 6 ወራት ውስጥ የነበረ ተጋዳኝ በሽታ	1. ሳንባ ነቀርሳ (TB) 2. የፈፍንገስ በሽታ (Candidiasis) 3. ቶክሶፕላስሞሲስ (Toxoplasmosis) 4. ተቅማጥ 5. የለም	
403	አሁን ያለው ሁኔታ ምንድን ነው?	1. የተሻሻለ 2. ተመሳሳይ 3. የባሰበት	
404	የህክምና ደረጃዎ	1. ደረጃ 1 (Stage-I) 2. ደረጃ 2 (Stage-II) 3. ደረጃ 3 (Stage-III)	

		4..ደረጃ 4 (Stage-IV)	
405	ከመድሀኒት ጋር ያላቸው ቁርኝት	1.ጥሩ 2.ደካማ 3.መጠነኛ 4.አልተሰራም	

