

**ADDIS ABABA UNIVERSITY**  
**COLLEGE OF HEALTH SCIENCES**  
**SCHOOL OF ALLIED HEALTH SCIENCES**  
**DEPARTEMET OF NURSNG AND MIDWIFERY**



**ASSESSMENT OF GESTATIONAL WEIGHT GAIN AND ASSOCIATED  
FACTORS AMONG HIV NEGATIVE AND HIV POSITIVE WOMEN IN  
ADDIS ABABA, ETHIOPIA, 2017**

**BY: Benyam Seifu (BSc)**

A Thesis Submitted To School Of Graduate Studies, Addis Ababa University College Of Health Science, School Of Allied Health Sciences, Department Of Nursing And Midwifery In Partial Fulfillment Of The Requirements For Degree Of Master Science In Maternity And Reproductive Health Nursing.

JUNE, 2017

ADDIS ABABA, ETHIOPIA

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**JUNE, 2017**

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Final approval and acceptance of the Thesis is contingent upon the submission of its final copy to the Council of Graduate Studies through the Candidate's Department or School Graduate Committee.

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## **Abstract**

**Background:** Gestational weight gain (GWG) is increase in weight of pregnant women from conception to delivery. It is an important factor that supports optimal outcome for mothers and their infant. The risk of inadequate GWG among HIV positive women is higher as HIV increases both energy requirements and the risk of under nutrition. Nonetheless, comparative data on gestational weight gain and its determinants among HIV negatives and HIVpositives are scarce.

**Objective:** The objective of this study was to assess and compare gestational weight gain and its associated factors among HIV positive and HIV negative women in Addis Ababa.2017

**Methods:** Institutional based comparative cross-sectional study wasemployed from April 2 – March 31, 2017 GC in Addis Ababa Ethiopia.558 study participants (372 HIV negative and 186 HIV positive women) were selected.Data was entered into Epi Data version 3.1 and exported to SPSS version 22 for analysis. Binary and multiple logistic regressions used to identify associated factors with the outcome variable. Texts, tables and graphs were used for descriptive statics.

**Results:** overall 549 eligible women participated in the study making 98.4% response rate. The study finding reviled that the prevalence of GWG among HIV negative and HIV positive women is low (30.7% and 26% respectively). This difference has no statically significance in chi-square analysis. Factors associated with GWG among HIV negative women are family monthlyincome in USD [AOR=4.35,95% CI(1.75-10.7)],Knowledge of fruits are main food type [AOR=2.84,95% CI(1.5-7.6)], hours engaged in typical activity for less than two hours and for three to four hours in typical day [AOR=1.32, 95% CI (1.06-3.49)],[AOR=4.65, 95% CI (1.76-12.29)] and early pregnancy BMI [AOR=13.9,CI 95% (4.26-45.87)] while women who had no formal education[AOR=3.16 95% CI=(1.25-8.86)] andwomen whose family monthly income was less than 50USD. [AOR=3.91, 95% CI=(1.02-15.2)] were the associated factors to GWG among HIV positive women.

**Conclusion and recommendations:** The prevalence of adequate GWG among HIV negative and HIV positive women is low, the probability of adequate GWG among HIV positive women is much lower. Associated factors among the two groups are different with the exception of monthly income. So the two groups should be treated differently and different measures should be taken in order to increase the prevalence of adequate GWG according to IOM.

**Key words:** Gestational weight gain, HIV, Pregnancy

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## **List of Abbreviation and Acronyms**

AAHB: Addis Ababa Health Bearue

AAU: Addis Ababa University

ANC: Antenatal Care

AOR: Adjusted Odds Ratio

BMI: Body Mass Index

CI: Confidence Interval

CVD: Cardiovascular Disease

GWG: Gestational Weight Gain

GA: Gestational Age

HIV: Human Immunodeficiency Virus

HC: Health Centers

IOM: United StatesInstitute of Medicine

IRBC: Institutional Review Board committee

KG: Kilogram

LBW: Low Birth Weight

OR: Odds Ratio

PNC: Postnatal Care

SGA: Small for Gestational Age

USA: united States of America

USD: United States Dollar

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## **CHAPTER 1: INTRODUCTION**

### **1.1 Background**

Gestational weight gain (GWG) is increase in weight of pregnant women from conception to delivery. It is a unique and complex biological phenomenon that supports the functions of growth and development of the fetus. Gestational weight gain is influenced not only by changes in maternal physiology and metabolism, but also by placental metabolism. The placenta functions as an endocrine organ, a barrier, and a transporter of substances between maternal and fetal circulation. Changes in maternal homeostasis can modify placental structure and function and thus impact fetal growth rate. Conversely, placental function may influence maternal metabolism through alterations in insulin sensitivity and systemic inflammation and thus influence GWG. The total amount of weight gained in normal-term pregnancies varies considerably among women[1, 2]. Naturally, the urge to eat more is experienced by nearly all pregnant women[3]

Pregnancy is a critical period of growth, development and physiological change in the mother and child.[4]Achieving optimal weight gain during pregnancy is associated with improved outcomes for the mother and the baby regardless of the mother's existing body mass index (BMI). Optimizing a woman's nutritional status, fitness and weight before, during and between pregnancies (including while breastfeeding) has immediate and long-term benefits for the health of both the woman and her child/children. Weight gain is just one of many changes that a woman may experience during pregnancy. It is important to consider weight gain in the context of all factors in the woman's life.[5]

As pregnancy progresses, protein, fat, water, and minerals are deposited in the fetus, placenta, amniotic fluid, uterus, mammary gland, blood, and adipose tissue. The products of conception (placenta, fetus, amniotic fluid) comprise approximately 35 percent of the total GWG. These changes in body composition are critical for normal fetal development.[6]

Globally in developed countries, most of pregnant women gain more than the recommended gestational weight. This is evidenced by study conducted in Cork, Ireland, Auckland, New Zealand and Adelaide and Australia shows 74.3% of pregnant women had high GWG.[7]. In

middle income countries both insufficient and excess GWG are prevalent. The study conducted in Brazil is a good example. The incidence of insufficient and excessive weight gain were 25.8% and 44.8%. [8] Majority of studies conducted in sub Saharan countries revealed that majority of women gain insufficient gestational weight. Recent study conducted in Hariari region shows that 69.4% of women gain insufficient gestational weight. [2]

Nutrition and HIV (human immune deficiency virus) are strongly related to each other. Any immune impairment as a result of HIV/AIDS leads to malnutrition. Because maternal body composition is an important determinant of maternal health and reproductive success, determining the influence of HIV on body composition is important. There is a small but growing body of evidence on the effect of HIV infection on body weight and composition during pregnancy. [9]

## **1.2 Statement of the Problem**

It is normal for women to gain some weight during pregnancy. 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. [5] But different studies have indicated that inadequate weight gain and excess weight gain during pregnancy is prevalent.

Inadequate weight gain and excess weight gain during pregnancy results in both maternal and newborn complication. [1] In some countries like Bangladesh under nutrition still is widespread among pregnant women in rural Bangladesh but also that the proportion is decreasing. Instead, the prevalence of overweight is rapidly increasing, indicating a currently ongoing nutrition transition similar to what has been seen in many other low- and middle-income countries. This evident double burden of malnutrition among pregnant women should be addressed [10]. Study conducted in Hariari region shows that 71 % of the women gain out of the recommended weight gain during pregnancy. [2]. Evidences show that HIV positive women get even much lower gestational weight. Prospective cohort study conducted in Rwanda Kigali during 1992-1994, which follows 101 HTV+ and 106 HTV- women until 5 months after delivery. Weight and BMI during pregnancy were lower in HTV+ women than in HTV- women. After delivery, weight and

BMI gains were significantly lower in HTV+ women. Until 5 months after delivery, the mean weight variation was -2.2 kg (standard deviation [SD] = 5.9 kg) in HTV+ women and +0.2 kg (SD = 6.6 kg) in HTV- women (P = 0.007) in comparison to pre-pregnancy weight.[11]

Women who do not gain enough gestational weight were associated with SGA (small for gestational age) infants, preterm birth, low birth weight, and failure to initiate breastfeeding[7, 12], These adverse outcomes are potentially modifiable by achievement of normal GWG[7] And also girls who were born small are later more likely to give birth to small children themselves and in this way, under nutrition is transferred through generations.[13]

Obese women unequivocally have reproductive disadvantages. This translates into difficulty in achieving pregnancy, early and recurrent pregnancy loss, preterm delivery, and a myriad increased obstetrical, medical, and surgical complications with pregnancy, labor, delivery, and the puerperium [14]. Women who are overweight or gain too much weight during pregnancy have a higher risk of high blood pressure, gestational diabetes, a large baby (macrosomia), caesarean sections, birth defects and difficulty losing weight after their baby is born. This can also increase her long-term risk of diabetes, heart disease, pre rupture of membrane and some cancers [15, 16] Excess weight gain and failure to lose weight after pregnancy are important and identifiable predictors of long-term obesity for the mother. Childhood obesity is also long-term health outcomes related to high maternal weight gain[1]

HIV/AIDS affect the course of pregnancy. Under nutrition and HIV work in tandem, with under nutrition weakening the immune system and increasing vulnerability to infection and HIV compromising nutritional status and increasing vulnerability to infection. HIV-infected pregnant women, as for all HIV-infected adults, HIV n increases both energy requirements and the risk of under nutrition.

In Ethiopia estimated HIV positive women in 2016 was 26,644. From this 1,271 of them live in Addis Ababa.[17]. This number nearly increased by 1000 cases compared to 2012/13. 17,742 pregnant women were found to be HIV positive in 2012/13. This are 1.2% of the pregnant women tested for HIV.[18]HIV-positive mothers experienced a greater proportion of adverse outcomes

(combined fetal death, preterm delivery, LBW (low birth weight) and delivered babies with lower average birth weight and length) [19].

Knowledge about the current gestational weight gain of pregnant women and its determinant factor plays great role in adapting different strategies and methods to achieve the desired goal, but there is little known about it. This knowledge is not only useful for enabling women's to achieve desired GWG, but with proper measures it's possible to reduce the aftermath consequences for the mother and the newborn that comes with having inadequate and excess GWG than recommended. Even though it's known that pregnancy and HIV affect each other, the effect of HIV on GWG is not studied well in our country. In general this study also tries to assess GWG and try to outline different underling factors which affect GWG among HIV positive and negative women in Addis Ababa.

### **1.3 Significance of the Study**

Gaining recommended weight during pregnancy is important for the health of the mother and the new born. It's known that HIV/AIDS is affecting pregnancy and maternal weight. But there is no study conducted to assess the GWG among pregnant women, comparing with HIV positive pregnant women and investigate the underlying factors affecting GWG and compares it with factors affecting GWG among HIV positive women in Ethiopia so far.

This study tries to fill research gaps on the two population of interest and include the variable which is neglected in the previous studies which is HIV positive women. It also informs the health authorities, health professionals and other stakeholders about the current GWG characteristics and the different underlying factors among HIV positive and negative women, if there is one. So that there will prioritization and adapting of different protocols to achieve the desired and recommended GWG. And this study was good resource for future researches on GWG. In general the aim of this study is to assess GWG according to IOM classification and to identify and compare the associated factors among HIV positive and negative women in health facilities found in Addis Ababa.2017

## CHAPTER 2: LITERATURE REVIEW

### 2.1 Gestational Weight Gain

#### 2.1.1 IOM Recommended GWG

IOM revised the pregnancy weight gain guidelines in 2009 by including four BMI in kg/m<sup>2</sup> categories such as underweight (< 18.5), normal(18.5 – 24.9), overweight (25 – 29.9) and obese (≥ 30). The recommended weight gain (kg) for the four categories are; underweight (12.5 – 18 kg), normal (11.5 – 16 kg), overweight (7 – 11.5 kg), and obese (5 – 9 kg)[1].

Table 1: Recommendations for total and average rate of weight gain during pregnancy, by pre-pregnancy BMI

Prepregnancy BMI Category	Total weight gain (kg)	Rate of weight gain 2nd and 3rd trimester(kg/wk)
Underweight(< 18.5 kg/m <sup>2</sup> )	12.5-18	0.51 (0.44-0.58)
Normal-weight(18.5-24.9 kg/m <sup>2</sup> )	11.5-16	0.42 (0.35-0.50)
Overweight(25.0-29.9 kg/m <sup>2</sup> )	7-11.5	0.28 (0.23-0.33)
Obese(≥ 30.0 kg/m <sup>2</sup> )	5-9	0.22 (0.17-0.27)

Calculations assume a 0.5–2 kg weight gain in the first trimester (based on Siega-Riz et al 1994; Abrams et al 1995; Carmichael et al 1997).

Source: IOM and NRC 2009.

**Weight gain during pregnancy** is increase in weight of pregnant women from conception to delivery. [1]

**Total gestational weight gain** is the difference between last measured weight recorded before delivery and first measured weight in early pregnancy (before or at first trimester) which is categorized in to within recommendation and out of recommendation (below and above recommendation) by IOM.[1]

**Within recommendation** is a normal weight gain for each woman's early pregnancy BMI category recommended by IOM .That is 12.5 – 18 kg for under weight , 11.5 – 16 kg for normal, 7 – 11.5 kg for overweight , and 5 – 9 kg for obese.[1]

**Below recommendation** is inadequate weight gain for each woman's early pregnancy BMI category recommended by IOM .That is < 12.5kg for under weight,<11.5 kg for normal weight, <7 kg for overweight, <5 kg for obese.[1]

**Above recommendation** is excessive weight gain for each woman's early pregnancy BMI category recommended by IOM. That is >18 kg for underweight >16 kg for normal weight,>11.5 kg for overweight >9 kg for obese.[1]

### **2.1.2 Prevalence of adequate GWG**

An examination of studies published in the United States from 1985 to 2008 indicate that the mean total GWG of normal weight adult women giving birth to term infants ranged from a low of 10.0 to a high of 16.7 kg . GWG for well-nourished women with uncomplicated singleton pregnancies were reported as approximately 0.45 kg per week during the second trimester and 0.40 kg per week during the third trimester. Several studies, published since then indicate higher rates of weight gain in the second and third trimesters among American women with BMI values in the normal range[1] A result of study conducted in Austria in 2011 revealed; on average each mother gained 14.8 kg during her pregnancy with an average of 0.4 kg per week weight gain. Accordingly, 25% of women gained inadequate gestational weight, 39% of women gained adequate and 36% gained excessive weight during pregnancy according to IOM categories.[1]

Study conduct in Brazil Rio de Janeiro to identify factors associated with gestational weight gain in pregnant women shows 23.1%, 27.5% and 48.9% of women gain insufficient, adequate and excessive gestational weight respectively.[20] Another study conducted in same country eight years later shows 31.6% had a healthy gestational weight gain; 31.8% had inadequate gestational weight gain; and 36.6% had excessive gestational weight gain.[21]

A population-based study in Bangladesh to assess maternal factors, early pregnancy Anthropometry and gestational weight gain 15% of women were underweight in early pregnancy. The prevalence of overweight was higher than expected, 17%. The mean GWG was low (0.34 kg/week), with 120/207 women (58%) gaining less than IOM recommendations.[10]. Another study conducted in Vietnam shows that 20.7%, 11.5% and 8.8% of pregnant women gain less than 10kg, between 10-15 kg and grater than 15kg respectively through their pregnancy. [22]

A cross-sectional study conducted in Morocco in 2011 on pregnant women showed 55% of women gained gestational weight according to recommended by IOM. Whereas, 37.6% of women and only 7.2% of them were gained below and above recommendation and other study in Ghana showed higher proportion of women (78.8) gained gestation weight according to IOM recommendation. Whereas, 14.7% gained below recommendation and only 6.3% gained above recommendation.[23, 24]

Recent study conducted in Hariari region shows that 71 %, 28 %, and 2.7 % of the women gained inadequate, adequate and excess gestational weight, respective this shows that majority of the pregnant women's gain out of the recommended weight gain during pregnancy[2].

When we see the comparison of GWG among HIV positive and HIV negative women, relatively old Prospective prospective cohort study conducted in Rwanda Kigaly during 1992-1994, which follows 101 HTV+ and 106 HTV- women until 5 months after delivery. Weight and BMI during pregnancy were lower in HTV+ women than in HTV- women. After delivery, weight and BMI gains were significantly lower in HTV+ women. Until 5 months after delivery, the mean weight variation was -2.2 kg (standard deviation [SD] = 5.9 kg) in HTV+ women and +0.2 kg (SD = 6.6 kg) in HTV- women (P = 0.007) in comparison to pre-pregnancy weight.[11]

## **2.2 Factors Affecting Gestational Weight Gain**

### **2.2.1 Social/Built/Natural and Life-Stage Environment**

#### **I. Knowledge about Proper Gestational Weight Gain**

According to study conducted in Houston, Texas in USA shows Knowledge about GWG is determined by age and was knowledge of pre-pregnancy weight Status. The strongest predictor of GWG recommendation knowledge was knowledge of pre-pregnancy weight status (p = .03), with an odds ratio of 1.90 (95% CI 1.06, 3.4). Women who knew their pre-pregnancy weight status were 90% more likely to know their personal GWG recommendation. The odds ratio for age was .93 (95% C .87, 1.0) indicating that for every 1 year increase in age, it would reduce women's knowledge of GWG recommendations by 7% (p = .05).[19]

Qualitative study conducted in Egypt shows pregnant women have little to no knowledge of optimal weight gain during pregnancy, likely due to lack of counseling by health care providers. One six month pregnant participant says “A pregnant woman should gain weight. I was 50 kilos before pregnancy and now I am 59 kilos which is appropriate, so it is normal to gain a kilo per month. I might have heard that on TV or from someone, but the doctor did not tell me. He doesn’t weigh me unless I ask him.”[25]

Study conducted in east Wollega Ethiopia to assess the knowledge of pregnant mothers on maternal nutrition and associated factors shows 64.4% of the respondents were found to be knowledgeable about nutrition during pregnancy. Monthly Income and educational status of woman showed statically significance during multivariate analysis.[26]

## **2.2.2MATERNAL FACTORS**

### **I. Sociodemographic Factors**

The relationship between maternal BMI may differ by race. Whether the more decisive influence on prenatal risks comes from genes or the environment is still a matter of controversy.[3] study from Bangladesh revealed that Younger women tended not to be overweight when entering pregnancy (AOR 0.21). Older age and higher parity were both significantly associated with a lower GWG. 58% of the women in our study had a GWG below IOM Recommendations and the percentage was even higher when only looking at the already underweight women (75%).[10]

In contrast study from USA shows that younger mothers tended to gain more weight during pregnancy than their older counterparts. Also African-American mothers tended to gain excess weight and too little weight more than white women, although the differences were not substantial. Similarly, unmarried mothers and women having their first birth also had higher rates of excess weight gain during pregnancy.[27]

Education level and monthly income shows association with GWG. The IOM committee found few studies that have reported GWG by socioeconomic status (SES), and even fewer that considered the influence of the many possible determinants of GWG among different SES

groups found that women with less than 12 years of education were more likely to gain less than 15 pounds, and less likely to gain more than 34 pounds, compared to women with more than 12 years of education. Evidence for a role of social support as a determinant of GWG is mixed and inconclusive.[1]

## **II. Anthropometric and Physiological**

### **Pre pregnancy BMI**

Many literatures show that pre-pregnancy is the dominant factor affecting GWG. The higher pre-pregnancy BMI, the excess GWG. This is supported by Study conducted in Bangladesh to evaluate maternal factors, early pregnancy anthropometry and gestational weight gain shows, Pre-pregnancy BMI was significantly associated with being below, within or above these guidelines. Among underweight women 75.0% exhibited an inadequate GWG and among overweight women 34.3% exhibited an excessive GWG (p-value 0.007).[10] This is also supported by two similar studies conducted in different parts of Brazil in 2008 and 2009. Excessive GWG is related to pre-pregnancy BMI, with odds ratios (OR) of 1.88 (95%CI: 1.02-3.48) for underweight, 4.06 (95%CI: 1.95-8.43) for overweight, and 5.86 (95%CI: 2.45-14.02) for obesity and overweight and obese had a significant increased risk of excessive weight gain in pregnancy(RR.1.75;95% CI: 1.48-2.07, RR;1.55;95% CI: 1.23-1.96, respectively.[8, 20]

Missouri department of health and senior services bureau of health informatics conducted a survey to see the trends and outcomes of gestational weight gain in Missouri, USA. The result shows women's who were obese before pregnancy gain excess than IOM recommendation (58.9%). But 41.6% of women who were under weight before pregnancy gain adequate GW according to IOM recommendation.[27]

In Ethiopia study conducted in Hariari region shows that body mass index  $\geq 25\text{Kg/m}^2$  at early pregnancy significantly associated with GWG (AOR = 3.2, 95 % CI 1.6,6.3). From those women with pre-pregnancy underweight BMI, 89.7% of them gain inadequate weight gain.[2]

### **III. Medical Factor**

Study conducted to evaluate pregnancy outcomes and relationship between maternal weight gain and fetal birth weight in Korean pregnant women at risk for gestational diabetes shows that

Women with family diabetes history and past gestational diabetics (GDM) history tend to get more weight during pregnancy. The GDM group has higher chance of family history of diabetes (OR, 1.74; 95% CI, 1.15-2.63;  $P=0.013$ ) and especially history of GDM (OR, 12.74; 95% CI, 2.82-57.5;  $P=0.000$ ) with significance.[28]

An observational study conducted in Irish Atlantic seaboard to examine excessive gestational weight gain and pregnancy outcomes in women with gestational or presentational diabetes mellitus excessive GWG was noted in 59% of women. In all women, excessive GWG resulted in higher odds for LGA [adjusted odds ratio (AOR) 2.01, 95% confidence intervals 1.24–3.25 in GDM; AOR 3.97, CI 1.85–8.53 in presentational diabetes mellitus (PGDM)] and macrosomia (AOR 2.17, CI 1.32–3.55 in GDM; AOR 3.58, CI 1.77–7.24 in PGDM). Excessive GWG was also associated with an increased odds for gestational hypertension (AOR 1.72, CI 1.04–2.85) in women with GDM, and treatment with insulin further increased the odds for LGA (AOR 2.80, CI 1.23–6.38) and macrosomia (AOR 5.63, CI 2.16–14.69) in this group.[29]

#### **IV. Psychological Factor**

GWG is also related to perception about one's self, according to study conducted in Amsterdam, the Netherlands, judging yourself to be less physically active than others, and a perceived elevated food intake during pregnancy were significantly associated with excessive weight gain (odds ratio [OR] = 6.33, 95% confidence interval [CI]: 2.01- 19.32; OR=3.96, 95% CI: 1.551-10.15; and OR= 3.14, 95% CI: 1.18, 8.36, respectively).[30]

#### **V. Behavioral**

A study conducted in Hamilton Ontario USA, with basic question of what psychological, physical, lifestyle, and knowledge factors are associated with excess or inadequate weight gain during pregnancy, revealed that gaining weight above the amount recommended in guidelines was associated with planning to do so (adjusted OR [AOR] 11.18; 95% CI 4.45 to 28.06), bedtime television (AOR 2.38; 95% CI 1.08 to 5.23), and higher emotional instability scores (AOR 1.26; 95% CI 1.10 to 1.44). Inadequate weight gain was associated with less satisfaction with body weight (AOR 4.84; 95% CI 1.56 to 15.02) and bedtime television (AOR 3.92; 95% CI 1.50 to 10.30), while self-efficacy towards healthy weight was protective (AOR 0.91; 95% CI 0.83 to 0.99).[31]

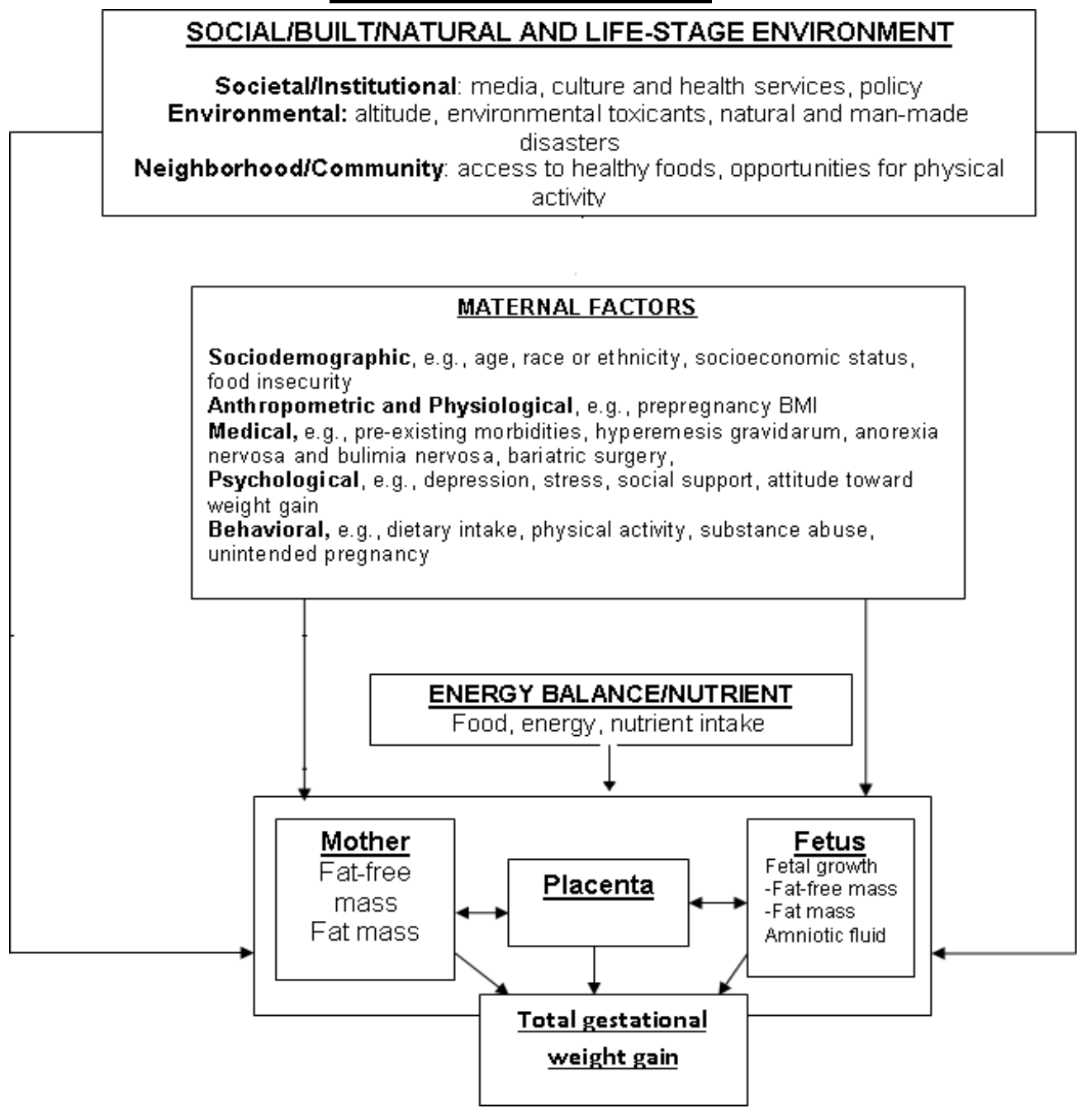
Cigarette smoking taken together, early studies examining associations between decreasing GWG and amount of reported smoking show inconclusive results.[1] This is supported by study conducted in USA. Over one-third (34.3%) of pregnant former smokers had a history of at least one diagnosable psychiatric disorder. History of psychiatric disorder was unrelated to GWG, with one exception; lifetime history of alcohol use disorder was associated with significantly larger GWG. The researchers conclude that, Women who quit smoking during pregnancy gain a considerable amount of gestational weight, and a previous history of alcohol use disorder is related to GWG. However, the benefits of smoking cessation to maternal and fetal health likely outweigh the disadvantage of weight gain, and other psychiatric disorders are not linked to GWG.[32]

### **2.3 Conceptual Framework**

Since 1990, the last time the Institute of Medicine (IOM) released guidelines for weight gain during pregnancy; many key aspects of the health of women of childbearing age have changed. Due to this, there is a need to in revising the IOM classification in 2009. The new guidelines differ from those issued in 1990 in two ways. First, they are based on the World Health Organization (WHO) cutoff points for the BMI categories Second, and more importantly, the new guidelines include a specific, relatively narrow range of recommended gain for obese women. The committee also revised the conceptual frame work.[1]

The 2009 IOM conceptual frame work for GWG has eight themes that are related to GWG. But for this particular study we use only the first four themes. The rest four were help to assess weight of the mother and the outcome; which is not the objective of this study. The conceptual frame work starts with identifying distant variable which are social, natural and life-stage Environment. It continues with intermediate variables which are maternal factors such as sociodemographic, early pregnancy BMI and others. The last proximal variable was energy balance nutrient. The conceptual frame work also explains total GWG is the composition of maternal, placental and fetal physiological changes.

## CONCEPTUAL FRAME WORK



→ Indicates possible causal influences

**Figure 1: conceptual framework**

SOURCE: Modified from IOM, 2009[1]

## **CHAPTER 3: OBJECTIVE**

### **3.1 General objective**

The aim of this study is to assess gestational weight gain and its associated factors and make comparison among HIV positive and HIV negative women in the health care facilities in Addis Ababa.2017

### **3.2 Specific objective**

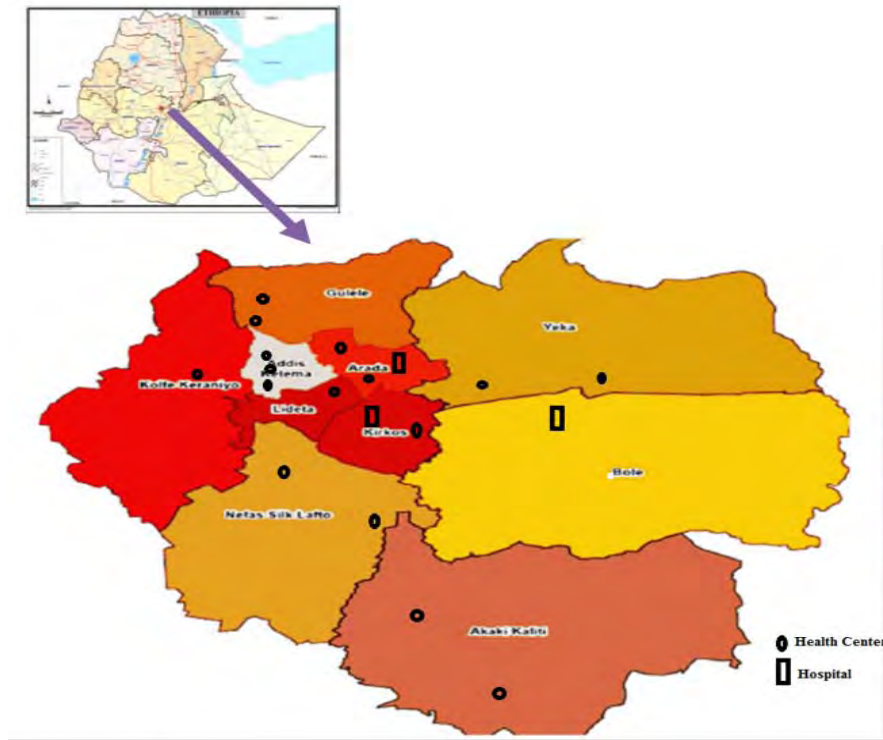
- To assess gestational weight gain among HIV positive and HIV negative women in the health facilities.
- To identify associated factors towards gestational weight gain among HIV positive and HIV negative women in the health facilities.
- To compare GWG and associated factors among HIV positive and HIV negative women in the health facilities.

## CHAPTER 4: METHODS

### 4.1. Study Area and Period

This study was conducted in Addis Ababa, which is a capital city of Ethiopia located in coordinates  $9^{\circ}1'48''\text{N}$   $38^{\circ}44'24''\text{E}$  /  $9.03000^{\circ}\text{N}$   $98.74000^{\circ}\text{E}$ . Addis Ababa has a total population of 3,352,000 (1,588,436 male and 1,763,564 female), with population growth rate of nearly 2.4% per year. The city situated at the heartland of the country and divided in to 10 administrative sub cities (SC) (Addis Ketema, Akaki Kaliti, Arada, Bole, Gullele, Kirkos, Kolfie Keranio, Lideta, Nifas silk-lafto, yeka). The health Bureau was responsible for the overall health activity in the city. Medical care was provided by numerous clinics, HCs, hospitals. There are 6 hospitals were owned by Addis Ababa administration health Bureau and around 100 HC (HC) located in the different sub cities. Yeka sub city has the largest number of (14 HC). According to Ethiopia Health and Health Related Indicators, the expected pregnancy in A.A was 78,106 and 105,086 of them delivered by skilled attendant. 1,271 of pregnant women were expected to be HIV positive while they were pregnant.[17]

The study was conducted from April to May 31, 2017 G.C on the selected health institutions.



Source: [http://en.wikipedia.org/wiki/Addis\\_Ababa](http://en.wikipedia.org/wiki/Addis_Ababa)

**Figure 2: Study Area**

## **4.2. Study Design**

Institutional based, comparative cross sectional study was employed to conduct this study.

## **4.3. Source population**

All pregnant women, who utilized MCH services in government health institution under AAHB, Addis Ababa, Ethiopia, 2017.

## **4.4. Study population**

Women who started ANC service during the first trimester and delivered or received PNC service up to 45 days on the selected health institutions, Addis Ababa, Ethiopia, 2017.

## **4.5. Inclusion and Exclusion Criteria**

### **4.5.1. Inclusion Criteria**

Pregnant women started their ANC visit at GA  $\leq 16$  week, delivered in selected health care facilities or come to the health facility up to 45 days of postnatal period and their patient card was available during data collection.

### **4.5.2. Exclusion Criteria**

Pregnant women who deliver twin or more, information about weight is not recorded on their card, who were unable to respond to the interview and critically ill.

## **4.6. Sample size determination and sampling technique**

### **4.6.1. Sample Size Determination**

The sample size was calculated with two population proportion formula considering the prevalence in both the dependent variable and associated factors by Epi Info version 7.2.0.1 Fleiss W/CC method using the following assumptions

$$r = n_1/n_2 = 1:2$$

$Z_{\alpha/2} = 1.96$  (the value of the standard normal distribution curve corresponding to confidence interval 95%)

$Z_{\beta} = 0.84$  (the value of the standard normal distribution curve corresponding to 80% power)

de = 1.5 (design effect)

P1 = percent outcome among HIV negative

P2= percent outcome in HIV positive

**Table 2: Sample Size Calculation 2**

<b>Variable</b>	<b>P1 (%)</b>	<b>P2 (%)</b>	<b>CI</b>	<b>Power</b>	<b>Allocation ratio</b>	<b>Total sample size</b>
Adequate GWG	31	50	95%	80%	1:2	254
GA $\geq$ 37 Wks	32.7	50	95%	80%	1:2	306
Fruit and vegetables consumption per week	32.5	50	95%	80%	1:2	300
Meat consumption per week	33.5	50	95%	80%	1:2	<b>338</b>

**Source:** Factors associated with gestational weight gain during pregnancy fro study conducted in Harari Regional State, 2016

Since the sample size calculated for specific objective two accommodates the largest sample size, it was  $(338 \times 1.5) + 10\% = 558$ . Therefore the minimum total sample size was considered to undertake the study is 558 (186 for HIV positive and 372 for HIV negative women) after considering design effect of 1.5 and non response rate of 10%.

#### **4.6.2. Sampling Technique**

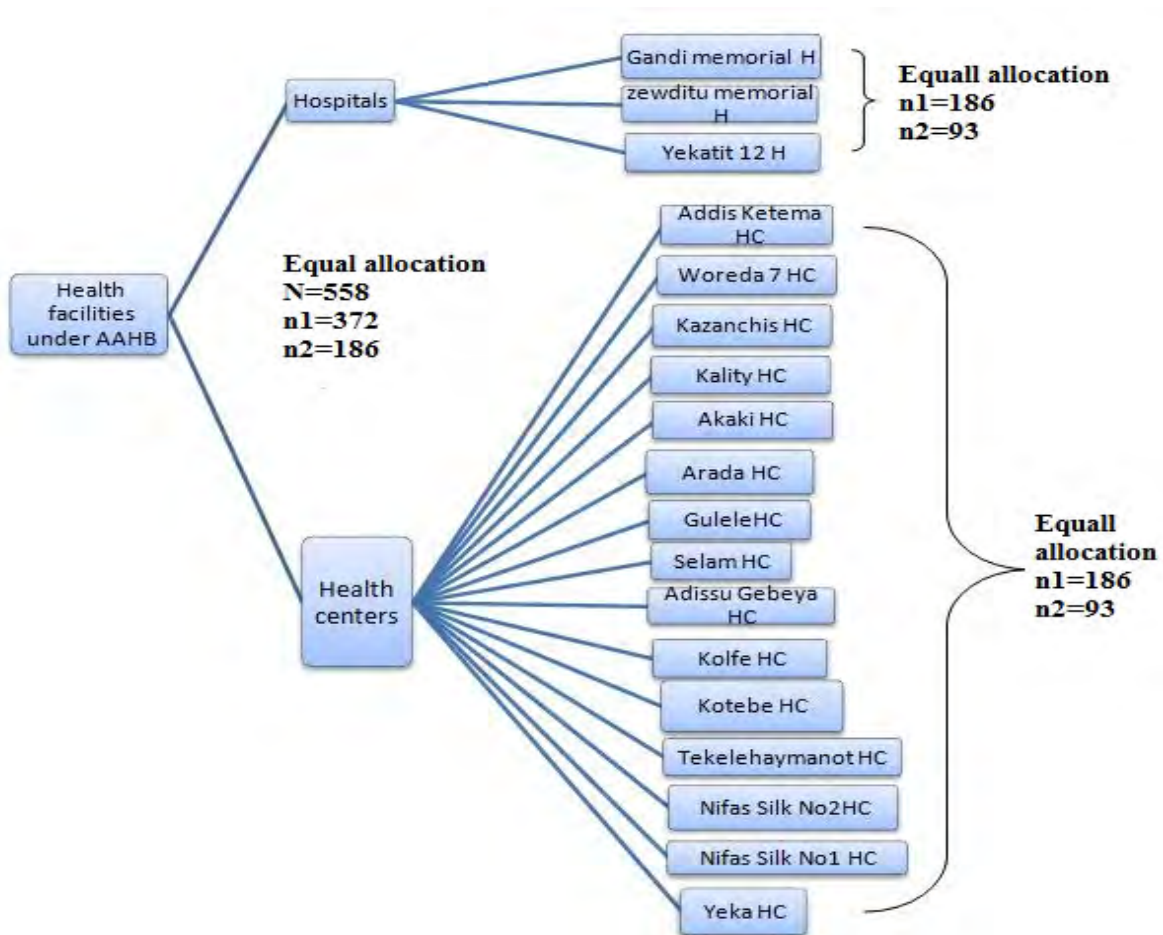
The study was conducted by dividing the health institution into two strata, Hospitals and HCs. There are six hospitals under Addis Ababa health bearue namely; Minillik II, Yekatit 12, Gandhi Memorial, Zewditu Memorial, Ras Desta and Tirunesh Beijing Hospital. From those hospitals four of them provide delivery service currently. Then three hospitals (Yekatit 12, Gandhi Memorial and Zewditu Memorial hospital) were selected using lottery method.

HC were selected purposively based on the number of cases flows according to AAHB HMIS. 100 HC were found in Addis Ababa which provide delivery service, from Addis Ketma SC (Addis Ketma HC and kuas meda HC), from Akaki Kality SC (Akaki HC and Kality HC), from Arada SC (Semen HC and Arada HC), from Gulelei SC (Adissu Gebya HC and Selam

HC), Kazanchis HC from Kirkos SC, Kolfei HC from Kolfei keranio SC, Tekle Haymanot HC from Lideta SC, from Nefasilk Lafto SC (Nefas Silk worda 03 HC and worda 09 HC) and from Yeka SC (Yeka HC and Kotebei HC) were selected randomly using table of random number.(source AAHB)

The sample size was distributed for hospitals and HC equally. Then sample size was distributed proportional allocation within the strata.

The actual study participants were selected from labour ward and PNC ward each day using lottery method. The number of participants selected per day was depending on the average number of monthly delivery in the selected health institution and the data collection period.



**Figure 3. Sampling procedure of selecting hospitals and health institution in Addis Ababa, Ethiopia, 2017**

#### **4.7. Data Collection Tool**

The data was collected using primary data from interview of the mothers, using secondary data by reviewing their patient card and taking height measurement at time of data collection. Questionnaire for primary data was adopted from different literatures in English language first and then translated in to Amharic by language experts and again the Amharic version translated back to English to make it consistent. Data was collected using structured and open ended Amharic interview questionnaire. From secondary data we record weights at each ANC visits. Height of the mothers was measured in standardized measuring tape at the time of data collection.

#### **4.8. Data Collection Procedure**

The data was collected by 18 trained nurses and midwives. The data collection process was supervised by 2 BSC midwives who had previous experience in data collection. On top of that there was continuous follow up and supervision by the principal investigator throughout the data collection period.

#### **4.9. Data Quality Assurance**

In order to maintain quality of the data, data collectors were trained in data collection procedures and taking height measurements. The questionnaire was carefully designed and prepared in English language first and then translated in to Amharic by language experts and again the Amharic version translated back to English to make it consistent. Finally, Amharic version was used to collect data. Before actual data collection time the questionnaire (tool) was pretested for validity and reliability in 5% sample size of women delivered in health institution which was not selected for the actual data collection.

#### **4.10. Data Processing and Analysis**

Data was entered into Epi Data version 3.1 and exported to statistical package for social science (SPSS) version 22 for analysis. To descriptive statistics; frequencies and percentages was used. Binary logistic regression analysis to examine crude association of predictors on GWG, then multiple logistic regressions to see effect of predictors on GWG and Odds ratio, 95% CI and P value 0.05 to measure the statistical association. Finally, the results were presented in texts, tables and graphs.

## **4.11. Variables of the Study**

### **4.11.1. Dependent Variable**

- Gestational weight gain

### **4.11.2. Independent Variable**

- Sociodemographic and economic characteristics
- Gestational age of delivery
- Dietary pattern or dietary habit
- Parity
- Physical activity
- Early pregnancy BMI
- Number of ANC visit
- Bad obstetric history
- Psychological factor
- Behavioral factor
- Knowledge about GWG

## **4.12. Operational Definition**

**Adequate GWG:** GWG in the adequate weight range according to IOM.

**In-adequate GWG:** GWG which is below or excess than the recommended GWG according to IOM.

**Good Knowledgeable:** women who responded above the mean score for knowledge assessing questions.

**Poor knowledgeable:** women who responded below the mean score for knowledge assessing questions.

**Regular physical Activity:** women who had physical activities intentionally for the purpose of physical exercise and health at least once a week.

**Sleep pattern:** the usual total number of hours the women had in 24 hours during pregnancy

#### **4.13. Ethical Consideration**

Ethical clearance was obtained from the Institutional Review Board committee (IRB) of Addis Ababa University, school of Health Science Department of Nursing and Midwifery Research Ethics Committee and from Addis Ababa Health bearue research ethics committee. Participants were informed about the objective of the study. Oral consent was obtained from the mothers. In order to keep confidentiality of any information provided by study subjects, the data collection procedure were anonymous. Participation was on voluntary basis and they were told they could withdraw from the study at any time of data collection

#### **4.14. Dissemination of Results**

The final result of this paper will submitted to Addis Ababa University, School of Health Science department of Nursing and Midwifery Postgraduate Program, to Addis Ababa health bearue and to national health officers who have direct contact with the study findings and an attempt was made to present in national and international conferences and to publish in international journals.

## **CHAPTER 5: Result**

### **5.1 Sociodemographic characteristic**

Five hundred forty nine of postnatal women out of 549 eligible study participants were participated in the study, from those 368(67.8%) of them were HIV negative and the rest 181(32.2%) were HIV positive. Making an overall response rate of 98.4%, (98.9% from HIV negative women and 97.3% from HIV positive women). Four participants were refused to participate in the study while the rest five participants fail to complete the interview and height measurement.

The Age distribution of both groups showed normal pattern with mean age of 27.04( $\pm$  3.88) and 28.37 ( $\pm$ 4.06) years whereas, the median age of 27 and 28 years among HIV negative and HIV positive women respectively.

Majority of the study participants were married 304(82.6%) among HIV negatives and 135(74.6%) among HIV negative. Concerning the educational status majority of HIV negative study participants were high school level 128(34.8%) while 70(38.7%) of HIV positive women in this study were had elementary level education.

Regarding the religion of the mothers, majority of the respondents were Christian (orthodox, protestant and catholic), 278(75.5 %) and 126(69.6 %) from HIV negative and HIV positive women respectively. In this study majority of the women were Amharas 128(34.9%) and 70(38.7%) among HIV negative and HIV positive respectively.

In both groups, majority of the study participants were house wife with frequency of 166(45.1%) and 65(35.9%) among HIV negative and HIV positive. When we see the income of the study participants monthly income range among women who exactly know their family monthly income, most of HIV negative women have monthly income more than 150\$(21.2%) while HIV positive women income was between 50\$ to 100\$(22.1%).

**Table 3: Sociodemographic characteristic among HIV negative and HIV positive women in Addis Ababa, Ethiopia, 2017**

Variables		HIV status of the women			
		HIV negative (n=368)		HIV positive (n=181)	
		<u>No</u>	N %	<u>No</u>	N %
Age group of the participants	Less than 25 Years	79	21.4%	27	15%
	25-29 Years	208	56.5%	91	50.3%
	30-34 Years	63	17.1%	44	24.3%
	35 And Older	18	4.9%	19	10.5%
Marital status of the mother	Unmarried	52	14.1%	32	17.7%
	Married	304	82.6%	135	74.6%
	Divorced and Widowed	12	3.2 %	14	7.7%
Educational status of the mother	No Formal Education	33	9.0%	26	14.4%
	Elementary School	112	30.4%	63	34.8%
	High School	129	35.1%	53	29.3%
	Collage and Above	94	25.5%	39	21.5%
Ethnicity of the mother	Amhara	128	34.8%	70	38.7%
	Oromo	110	29.9%	56	30.9%
	Tigray	42	11.4%	25	13.8%
	Gurage	43	11.7%	19	10.5%
	Other*	45	12.3%	11	13.8%
Religion of the mother	Orthodox Christian	165	44.8%	68	37.6%
	Muslim	87	23.6%	54	29.8%

	Protestant	75	20.3 %	46	25.4%
	Catholic	41	11.1%	12	6.6%
	Other**	3	0.8%	1	0.6%
Occupation status of the mother	Housewife	166	45.1%	65	35.9%
	Farmer	16	4.3%	6	3.3%
	Government Employee	52	14.1%	37	20.4%
	PrivateEmployee	62	16.8%	33	18.2%
	Merchant	46	12.5%	23	12.7%
	Daily Labor Worker	17	4.6%	7	3.9%
	Other***	9	2.5%	10	4.9%
Income in USD****	Up To 50\$	39	10.6%	24	13.3%
	50-100\$	62	16.8%	40	22.1%
	100-150\$	61	16.6%	27	14.9%
	More Than 150\$	78	21.2%	33	18.2%
	Don't Know	128	34.8%	57	31.5%

(\* = Silite, Afar, Harari, Hadiya, Wolayta)

(\*\* = Atheist, Waqqe Fettaa)

(\*\*\* = student, Prostitute, Artist)

(\*\*\*\* = conversion rate, 22 ETH birr = 1USD)

## 5.2 Past obstetric History of Respondents

Regarding their past obstetric history of respondents, majority women in both groups has one child with 168(45.7%) and 62(34.3%) among HIV negative and HIV positive women respectively.

Among other 200(54.3%) HIV negative and 119(65.7%) HIV positive women who had more than child, majority of the women in both groups didn't face any medical problem related to pregnancy with frequency of 151(41.0%) and 86(47.5%) among HIV positive and HIV negative women. more or less all of the study participants in both group has no history of delivering low

birth weight baby with 344(90.7%) and 168(94.9%) among HIV negative and HIV positive pregnant women.

**Table 4: past obstetric history among HIV negative and HIV positive women in Addis Ababa, Ethiopia, 2017**

Variables		HIV status of the women			
		HIV negative (n=368)		HIV positive (n=181)	
		No	N %	No	N %
Past no of pregnancy	One	168	45.7%	62	34.3%
	Two	108	29.3%	57	31.5%
	Three	61	16.6%	39	21.5%
	Four And More	31	8.4%	23	12.7%
Number of deliveries in the past	One	230	62.5%	98	54.1%
	Two	88	23.9%	53	29.3%
	Three	38	10.3%	22	12.2%
	Four and more	11	3%	8	4.5%
Number of children alive	One	63	33.3%	36	32.4%
	Two	81	42.9%	49	44.1%
	Three	37	19.6%	21	18.9%
	Four and more	8	6.7%	5	4.5%
Any medical disorder in the past	Yes	45	22.9%	28	19.4%
	No	151	70.1%	86	80.6%
Type of medical disorder in the past	Hypertension	20	44.3%	11	39.3%
	Nausea And Vomiting	20	44.3%	14	50%
	Other*	6	1.6%	5	2.7%
History of LBW	Yes	12	7.7%	13	7.2%
	No	334	92.3%	168	92.8%
History of still birth	Yes	15	7.7%	8	6.8%
	No	179	92.3%	109	93.2%
History of preterm	Yes	12	6.1%	5	4.3%

delivery	No	184	93.9%	112	95.7%
History of psychiatric problem	Yes	9	4.5%	5	4.3%
	No	189	35.5%	112	95.7%
Any abortion	Yes	75	20.8%	43	24.0%
	No	286	79.2%	136	76.0%
Total number of abortion	One	60	80.0%	32	74.4%
	Two and more	15	20%	11	6.1%
Type of abortion	Induced	44	58.7%	35	81.3%
	Spontaneous	34	45.3%	11	2.6%

(\*=Cardiac disease, Asthma, PUD)

### 5.3 History of current pregnancies

In this study population majority of the women respond that the pregnancy was planned 32(87.8%) among HIV negatives and 148(21.8%) among HIVpositives. And also the pregnancy was supported among majority of women in both groups with frequency of 332(90.2%) and 150(82.9%) among HIV negatives and HIV positives.

All of the women in this study received ANC service. Majority of them received the first ANC visit during the fourth month of pregnancy. This accounts 234(63.3%) HIV negative and 117(64.6%) of HIV positive women in this study population. And majority of those women had four ANC visit, 253(68.8%) and 113(62.4%) among HIV negative and HIV positive respectively.

Regarding on thenutritional advice during their ANC visits, majourity of the women recivednutritional advice at least once. This accounts 308(83.7%) of HIV negatives and 150(82.9%) of HIV positives in this study population. And majority of the respondents mentioned that they receivednutritional visit four times during their ANC visit, 107(33%) and 49(30%) among HIV negative and HIV positive respectively. Among those who receivednutritional advice 272(84.9) HIV negatives and 145(94%) HIVpositive receivednutritional advice from nurses and midwives.

Regarding the time of delivery, 243(72%) and 124(68.5) among HIV negative and HIV positive women deliver term baby. According our study population finding 186(51%) of HIV negatives delivered male baby while 94(52.5%) of HIV positives derived female baby.

**Table 5: History of current pregnancy among HIV negative and HIV positive women in Addis Ababa, Ethiopia, 2017**

Variables		HIV status of the women			
		HIV negative (n=368)		HIV positive (n=181)	
		No	N %	No	N %
Dose the pregnancy was planned	Yes	323	87.8%	148	81.8%
	No	45	12.2%	33	18.2%
Dose the pregnancy was supported	Yes	332	90.2%	150	82.9%
	No	36	9.8%	31	17.1%
First ANC visit in GA week	On The First Month Pregnancy	9	2.4%	3	1.7%
	Within The First Two Months Of Pregnancy	26	7.1%	9	5.0%
	Within The First Three Months Of Pregnancy	98	26.6%	51	28.2%
	Wit In The First Four Months Of Pregnancy	234	63.6%	117	64.6%
Total number of ANC visit	Twice	20	5.4%	4	2.2%
	Three Times	40	10.9%	17	9.4%
	Four Times	253	68.8%	113	62.4%
	More Than Three Times	54	14.7%	46	25.4%
Did you receive advice on nutrition	Yes	308	83.7%	150	82.9%
	No	60	16.3%	31	17.1%
How many times	Once	88	27%	33	20%
	Twice	54	16.6%	30	18.8%
	Three Times	38	11%	18	11.3%

	Four Times	107	33%	49	30%
	More Than Four	37	11.4%	29	18%
Who gives the nutritional advice	Doctor	48	14.9%	9	5.8%
	Nurse Or Midwife	272	84.9%	145	94%
Any medical disorder in the current pregnancy	Yes	107	29.1%	76	42.0%
	No	261	70.9%	103	56.9%
What was the health problem	Nausea And Vomiting	69	64.4%	39	50%
	Lack Of Appetite	31	30%	22	28%
	Others*	7	1.8%	16	1%
GA at delivery in weeks	Pre-Term	16	4%	11	6.1%
	Term	243	72%	124	68.5%
	Post-Term	76	22%	35	19.3%
Sex of newborn	Male	186	51.0%	85	47.5%
	Female	179	49.0%	94	52.5%

(\*=Public ulcer disease, cardiac disease, Diabetic Militates, Hypertension)

#### **5.4 Knowledge about nutrition and GWG**

Regarding on the overall knowledge status of the respondents, nearly half of the respondents have good knowledge 178(48.4%) among HIV negative and 97(53.6%) of HIV positives. Though the result shows HIV positive women have better knowledge regarding on GWG and nutrition than HIV negative women in this study. But health care providers were main source of information in both groups with 264(71.7%) and 132(72.9%) among HIV negatives and HIV positives respectively.

**Table 6 Knowledge about nutrition and GWG among HIV negative and HIV positive women in Addis Ababa, Ethiopia, 2017**

Variables		HIV status of the women			
		HIV negative (n=386)		HIV positive (n=181)	
		<u>N<sub>o</sub></u>	<u>N %</u>	<u>N<sub>o</sub></u>	<u>N %</u>
Do You Know The Importance Of Food For Growth and Development Of Fetus	Yes	338	91.8%	161	89.0%
	No	30	8.2%	19	10.5%
Know Fruits Are Main Food Type	No	83	22.6%	30	16.6%
	Yes	285	77.4%	151	83.4%
Know Vegetable are Main Food Type	No	109	29.6%	40	22.1%
	Yes	259	70.4%	141	77.9%
Know Meat and Dairy Products are Main Food Type	No	65	17.7%	26	14.4%
	Yes	303	82.3%	155	85.6%
Know Cereals are Main Food Type	No	188	51.1%	83	45.9%
	Yes	180	48.9%	98	54.1%
Know Grains are Main Food Type	No	214	58.2%	91	50.3%
	Yes	154	41.8%	90	49.7%
Knowledge Malnutrition	No	167	45.4%	75	41.4%
	Yes	201	54.6%	106	58.6%
Knowledge of Parent Influence	No	106	28.8%	53	29.3%
	Yes	262	71.2%	128	70.7%
Know Pregnant Women Should Gain Additional Weight	No	81	22.0%	46	25.4%
	Yes	287	78.0%	135	74.6%
Know How Much Kg Should Pregnant Women Gain	No	148	40.2%	71	39.2%
	Yes	220	59.8%	110	60.8%

Source of Information	Health Care Provider	264	71.7%	132	72.9%
	Family	30	8.2%	14	7.7%
	Other*	19	5.1%	12	6.6%
Knowledge Based on Mean Score.	Poor Knowledge	190	51.6%	84	46.4%
	Good Knowledge	178	48.4%	97	53.6%

(\* = mass media, internet)

### 5.5 Nutrition intake and dietary pattern

In this study population majority of the respondents used to eat meal three times a day 287(78%) and 130(71.8%) of HIV negatives and HIV positive women respectively while they were pregnant. And majority women in both groups used to eat snack twice a day 126(34.2%) and 58(32%) among HIV negatives and HIV positives respectively while they were pregnant. 266(72.3%) of HIV negatives and 13(74%) of HIV positive women used to drink milk often while they were pregnant.

Women in both group used to drink juice twice a week 102(24.2%) and 54(29.8%) of HIV negative and HIV positive women respectively while they were pregnant. And they were used to eat meat once a week 117(31.8) of HIV negative and 54(29.8%) of HIV positive women respectively. But they used to eat egg twice a week 104(28%) and 44(24.3%) of HIV negative and HIV positive respectively. Women in HIV negative group eat fruits more than four times per week 85(43%). On the other hand, frequency of women who used to fruit eat twice and more than four times a week was exactly equal 43(23.8%) among HIV positive study group.

**Table 7: Nutrition intake and dietary pattern among HIV negative and HIV positive women in Addis Ababa, Ethiopia, 2017**

Variables		HIV status of the women			
		HIV negative (n=368)		HIV positive (n=181)	
		No	N %	No	N %
Number of meals per day	Once	20	5.4%	6	3.3%
	Twice	35	9.5%	20	11.0%
	Three Times	287	78.0%	130	71.8%
	More Than Three Times	26	7.1%	25	13.8%
Number of snacks per day	Didn't Eat Snack	83	22.6%	38	21.0%
	Once	120	32.6%	53	29.3%
	Twice	126	34.2%	58	32.0%
	Three Times	32	8.7%	22	12.2%
	More Than Three Times	7	1.9%	10	5.5%
Drink milk more than once per week	Yes	266	72.3%	134	74.0%
	No	102	27.7%	47	26.0%
Drink alcohol more than once per week	Yes	25	6.8%	18	9.9%
	No	343	93.2%	163	90.1%
Do you drink tea or coffee more than once per week	Yes	251	68.2%	123	68.0%
	No	117	31.8%	58	32.0%
*Other drinks taken more than once per week	Yes	75	20.4%	32	17.7%
	No	293	79.6%	149	82.3%
Number of days juice consumed	Didn't Drink	64	17.4%	26	14.4%
	Once	78	21.2%	37	20.4%
	Twice	102	27.7%	51	28.2%
	Three Times	61	16.6%	32	17.7%

	More Than Three Times	63	17.1%	35	19.3%
Number of times meat is consumed per week	Do Not Eat Meat	89	24.2%	43	23.8%
	Once	117	31.8%	54	29.8%
	Twice	89	24.2%	43	23.8%
	Three Times	43	11.7%	21	11.6%
	More Than Three Times	30	8.2%	20	11.0%
Number of times egg was consumed per week	Don't Eat Egg	55	14.9%	39	21.5%
	Once	77	20.9%	36	19.9%
	Twice	104	28.3%	44	24.3%
	Three Times	73	19.8%	30	16.6%
	More Than Three Times	59	16.0%	32	17.7%
Number of times fruit is consumed per week	Do Not Eat Fruit Regularly	22	6.0%	23	12.7%
	Once	71	19.3%	40	22.1%
	Twice	85	23.1%	43	23.8%
	Three Times	76	20.7%	32	17.7%
	More Than Three Times	114	31.0%	43	23.8%
Number of times vegetable is consumed per week	Do Not Eat Vegetable Regularly	41	11.1%	24	13.3%
	Once	51	13.9%	30	16.6%
	Twice	80	21.7%	39	21.5%
	Three Times	63	17.1%	36	19.9%
	More Than Three Times	133	36.1%	52	28.7%

(\* = Soft drink, Mewdwd<sup>1</sup>, Bordei<sup>1</sup>, Karibo<sup>1</sup>)

(<sup>1</sup> = local names)

## 5.6 Regular Physical exercises

Regarding on regular physical exercise during pregnancy, majority of HIV negative women 242(65.38%) and 130(71.8%) do not had regular physical exercise during pregnancy. Among those who had physical exercise majority of them had physical excises more than three days per

week with frequency of 54(42.9%) and 22(43.1%). In this study, majority HIV negative women had have engaged in work more than 6 hours but majority of HIV positive women 61(33.7%) had engaged on work about 3 to 4 hours per day. Majority of the respondents in both group were satisfied with their pre-pregnancy weight 114(31%) and 65(35.9%) of HIV negative and HIV positive women respectively.

**Table 8: Physical exercise among HIV negative and HIV positive women in Addis Ababa, Ethiopia 2017**

Variables		HIV status of the women			
		HIV negative (n=386)		HIV positive (n=181)	
		N <sub>0</sub>	N %	N <sub>0</sub>	N %
Have you ever engage in physical exercise	Yes	126	34.2%	51	28.2%
	No	242	65.8%	130	71.8%
Number of days of exercise per week	Once a week	16	12.7%	3	5.9%
	Twice a week	27	21.4%	20	39.2%
	Three times a week	28	22.2%	5	9.8%
	More than three weeks	54	42.9%	22	43.1%
Walking or exercising on a typical day	Up to 2 hours	97	26.4%	41	22.7%
	3 to 4 hours	60	16.3%	61	33.7%
	4-6 hours	88	23.9%	30	16.6%
	More than 6 hours	123	33.4%	49	27.1%
Satisfaction with pre pregnancy weight	Never satisfied	12	3.3%	6	3.3%
	Dissatisfied	28	7.6%	23	12.7%
	Not concerned	93	25.3%	44	24.3%
	Satisfied	114	31.0%	65	35.9%
	Very satisfied	121	32.9%	43	23.8%

## 5.6 Sleep pattern and behavior during pregnancy

Majority of the study participants sleep more than 8 hours 211(57.3%) among HIV negative and 100(55.2%) among HIV positive women in the study. The same number of women had day time sleep more than 30 minute. Regarding to presence of stress or depression during pregnancy, 242(65.8%) HIV negative and 102(56.4%) of HIV positive women had experience either stress or depression during their pregnancy.

Only 2(0.5%) and 2 (1.1%) participants from HIV negative and HIV positive were smoking while they were pregnant. Also 22(6%) from HIV negative and 14(7.8%) from HIV positive women drink at least one day per week. Among HIV negative women 6(1.6%) responded that they were using Hookah and narcotics substance like cocaine. While among HIV positive respondents only 1(0.6%) was using hookah while she was pregnant.

**Table 9: sleep pattern and behavior among HIV negative and HIV positive women in Addis Ababa, Ethiopia, 2017**

Variables		HIV status of the women			
		HIV negative (n=368)		HIV positive (n=181)	
		No	N %	No	N %
Hours of quality sleep in 24hrs	Less than 6 hour	24	6.5%	10	5.5%
	6 up to 7 hours	21	5.7%	19	10.5%
	Exactly 8 hours	106	28.8%	48	26.5%
	More than 8 hours	211	57.3%	100	55.2%
Day sleep	No	157	42.7%	80	44.2%
	Yes	211	57.3%	101	55.8%
Do you had stress and depression during	Yes	126	34.2%	79	43.6%
	No	242	65.8%	102	56.4%

pregnancy					
Cigarette smoking	Yes	2	0.5%	2	1.1%
	No	366	99.5%	179	98.9%
Alcohol drinking	Yes	22	6.0%	14	7.8%
	No	346	94.0%	166	92.2%
How many times did you drink alcohol per week	Yes	10	8.9%	5	12.5%
	No	9	8.0%	9	22.5%
Other drugs like cocaine and heroin	Yes	6	1.6%	1	0.6%
	No	356	96.7%	175	97.2%

## 5.7 Early pregnancy BMI and GWG of the study participants

### 5.7.1 Early pregnancy BMI

When we compare early pregnancy weight of HIV negative women and HIV positive ones, majority of the women's were having normal early pregnancy weight. It accounts 238(64.7%) of HIV positives and little bit higher frequency among HIV positive women which are 133(73.5%) were found to have normal pre pregnancy.

**Table 10: Early pregnancy BMI among HIV negative and HIV positive women in Addis Ababa, Ethiopia, 2017**

Early pregnancy BMI	HIV status of the women			
	HIV negative (n=368)		HIV positive (n=181)	
	No	N %	No	N %
Underweight	79	21.5%	28	15.5%
Normal	238	64.7%	133	73.5%
Overweight and More	51	13.9%	20	10.0%
Total	368	100.0%	181	100.0%

### 5.7.2 Assessment of GWG

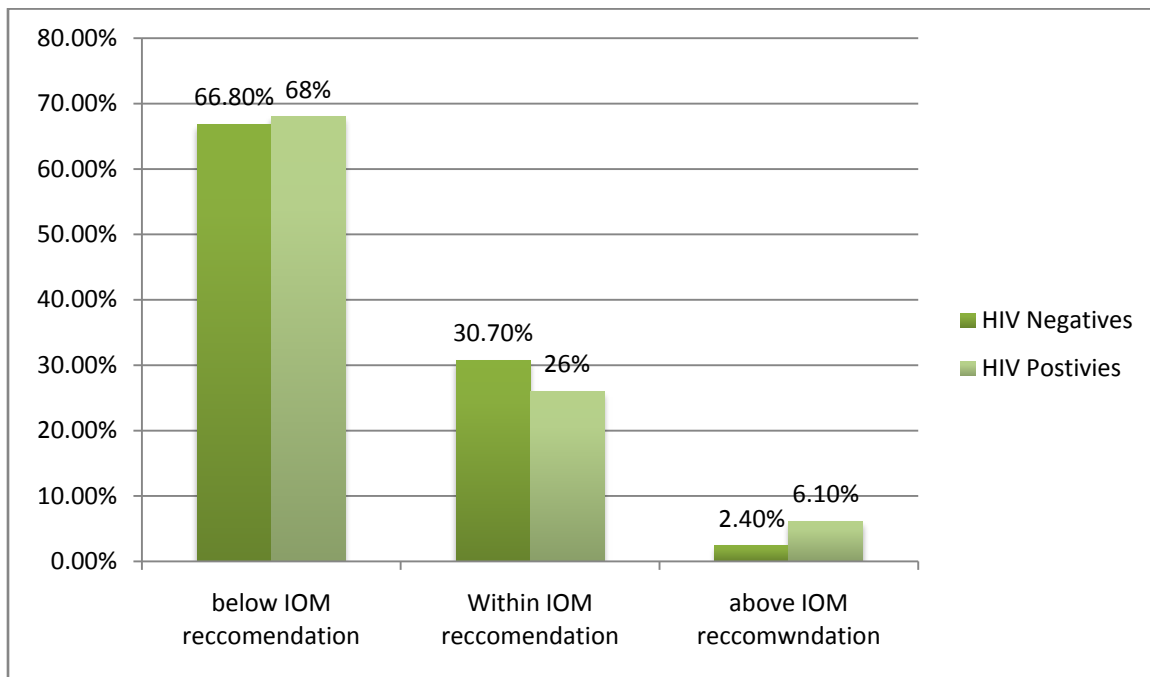
For the analysis of GWG, first pre pregnancy BMI was calculated to determine their classification and to estimate the expected GWG. Then GWG is calculated by subtracting the last maternal weight recorded during ANC with the first recorded weight of the mother at first trimester. Finally according to the expected GWG corresponding to pre pregnancy BMI, the study populations in both groups are classified as below the recommendation, within recommendation and above recommendation according to IOM GWG recommendation. For the purpose of binary logistic regression we group below and above recommendation as in-adequate GWG and within recommendation as adequate GWG.

When we see the difference in total weight gain during pregnancy among the two groups, mean weight gain of the two groups ( $8.00 \pm 3.64$  for HIV negatives were as HIV positives mean weight gain was  $8.64 \pm 4.06$  kg) nearly equal but HIV positives gain a little bit more weight during pregnancy.

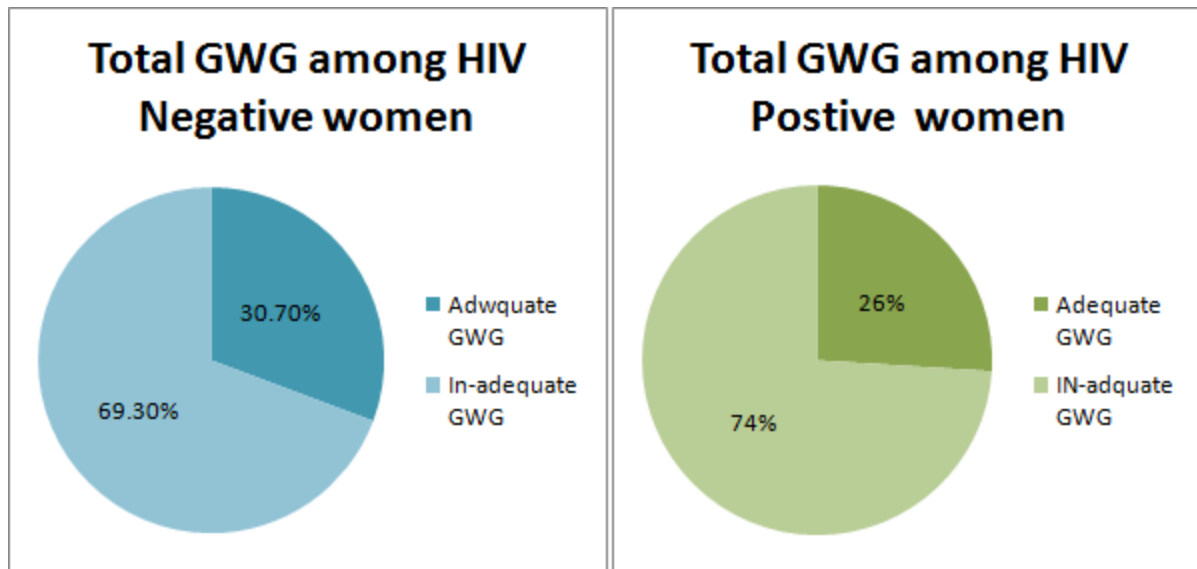
**Table 11 GWG assessment among HIV negative and HIV positive women in Addis Ababa, 2017**

Variable	HIV status of the women					
	HIV negative			HIV positive		
	Mean	Median	SD	Mean	Median	SD
Gestational weight gain during pregnancy.	8.60	8.00	3.64	8.64	8.00	4.06

The information from the above table seems both groups are in a good gestational weight gain range. But is the reverse when we use IOM standard recommendation of weight gain. Majority of the women in both groups 246(66.8%) of HIV negatives and 123(68%) of HIV positives had total GWG below the IOM recommendation of GWG. In this study only 113 (30.7%) HIV negative and 47(26%) HIV positive women get gestational weight within the IOM classification of adequate GWG. The rest very few of the participants get above the recommendation which is 9(2.4%) and 11(6.1%) among HIV negative and HIV positive respectively. But the chi-square analysis shows that there is no difference between the GWG among the two groups.



**Figure 4: GWG according to IOM three classification of GWG among HIV negative and HIV positive women in Addis Ababa, Ethiopia 2017**



**Figure 5: Adequate and in-adequate GWG according to IOM classification among HIV negative and HIV positive women in Addis Ababa, 2017**

## 5.8 Factors associated with Gestational weight gain

### A. Factors associated with GWG among HIV Negatives

During binary logistic regression analysis, those variables with P-values of less than 0.2 were entered to multiple logistic regressions. Under sixty eight independent variables which categorize in to nine, Income in Us dollar (USD), Number of nutritional advice received, know fruit as main food type, know vegetable as main food type, know grains are main food type and hours engaged in activity in typical day shows statically significant association with p-value less than 0.05 during binary logistic regression and these variables become candidate for multiple logistic regression.

After multiple logistic regression was conducted using backward Wald method, four variables with p-value with p-value less than 0.05 are found, these are income in USD, who knows fruits are main food types, hours engaged in typical activity in typical day and early pregnancy BMI over weight and more.

The result of multiple logistic regression shows that, the odds of HIV negative women whose family income is greater than 150USD to have adequate GWG are more than four times more

likely than the odds of HIV negative women whose family income is less than 50USD [AOR=4.35,95% CI(1.75-10.7)]. Also the odds of HIV negative women who knows fruits are main food types are more than two times more likely to have adequate GWG than the odds of those who do not know [AOR=2.84,95% CI(1.5-7.6)]. HIV negative women who are engaged in activity less than two hours on typical day are more than two times more likely to had adequate GWG than who engaged in activity for more than six hours, while HIV negative women who engaged in activity four to six hours had adequate GWG nearly three times more likely than HIV negative women [AOR=1.32, 95% CI (1.06-3.49)], [AOR=4.65, 95% CI (1.76-12.29)] respectively. Finally women who were overweight and more before they were pregnant were more than thirteen times more likely to have adequate GWG than those who were underweight before they were pregnant. [AOR=13.9, CI 95 %=( 4.26-45.87)]

**Table 12: Factors affecting GWG among HIV Negative women in Addis Ababa Ethiopia, 2017**

	Inadequate GWG		Adequate GWG		COR(95% CI)	AOR(95% CI)
	No	N %	No	N %		
<b>Income in USD</b>						
up to 50\$	29	11.3%	10	8.8%		
50-100\$	46	17.9%	16	14.2%	0.904(0.408-2)	1.22(0.44-3.36)
100-150\$	33	12.8%	28	24.8%	0.912(0.469-1.77)	0.74(0.29-1.89)
150\$	29	11.3%	14	12.4%	<b>2.23(1.21-4.1)*</b>	<b>4.35(1.75-10.79)*</b>
Don't know	118	45.9%	45	39.8%	1.27(0.61-4.1)	1.05(0.43-2.623)
<b>know fruits are one of main food type</b>						
No	67	6.1%	16	14.2%		
Yes	188	73.2%	97	85.8%	<b>2.16(1.18-3.93)*</b>	<b>2.84(1.5-7.6)*</b>
<b>Hours engaged in activity in a typical day</b>						
up to 2 hours	63	24.5%	34	30.1%	<b>1.32(1.06-3.49)*</b>	<b>3.77(1.54-9.21)*</b>
3 to 4 hours	34	13.2%	26	23.0%	<b>2.72(1.4-5.29)*</b>	<b>4.65(1.76-12.29)*</b>
4-6 hours	62	24.1%	26	23.0%	<b>1.49(1.02-2.78)*</b>	1.31(0.71-2.62)
more than 6 hours	96	37.4%	27	23.9%		
<b>Pre-pregnancy BMI</b>						

Underweight	67	26.1%	14	12.4%		
Normal	172	66.9%	66	58.4%	<b>1.86(1.08-3.49)*</b>	1.36(0.57-3.22)
Overweight and obese	16	6.2%	31	27.4%	<b>9.27(4.02-21.35)*</b>	<b>13.9(4.26-45.87)**</b>

*Adjusted for Income in US dollar (USD), Number of nutritional advice received, knows fruit as main food type, knows vegetable as main food type, knows grains are main food type and hours engaged in activity in typical day*

**\*=P-value <0.05 and \*\*= p-value <0.001**

### **B. Factors associated with GWG among HIV positives**

During binary logistic regression analysis, like what we did for the analysis of HIVnegatives, those variables that had P-values of less than 0.05 were entered to multiple logistic regressions. Under sixty eight independent variables which categorize in to nine, Educational status of the mother, family income in USD, Number of ANC visit, Knowledge about effect of malnutrition to the fetus and number of fruits consumed per week were entered to multiple logistic regression. Finally Educational status of the women and family income in USD shows significant association with p-value less than 0.05. The finding of this study shows that HIVnegative women who had collage and above educational level nearly fourtimes more likely to had adequate GWG than women who had no formal education.[AOR=3.16 95% CI= (1.25-8.86)]. The second associated factor was family monthly income. HIV positive women whose family monthly income is greater than 150USD are also nearly four times more likely to have adequate GWG than women whose family monthly income was less than 50USD. [AOR=3.91, 95% CI= (1.02-15.2)].

**Table 13: Factors associated with GWG among HIV positive women in Addis Ababa Ethiopia, 2017**

	Inadequate GWG		Adequate GWG		COR(95% CI)	AOR(95% CI)
	No	N %	No	N %		
<b>Educational status of the mother</b>						
No formal education	19	16.8%	7	10.3%		
Elementary school	49	43.4%	14	20.9%	0.76(0.43-1.37)	0.66(0.32-1.3)
High school	28	24.8%	25	36.8%	1.01(0.5-2.02)	0.89(0.11-1.97)
Collage and above	17	15%	22	32.4%	<b>3.86(1.73-8.59)*</b>	<b>3.16(1.25-8.86)*</b>
<b>Income in USD</b>						
up to 50\$	29	11.3%	10	8.8%		
50-100\$	46	17.9%	16	14.2%	1.3(0.43-3.9)	1.21(0.35-4.18)
100-150\$	33	12.8%	28	24.8%	2.25(0.71-7.19)	1.01(0.33-3.14)
150\$	29	11.3%	14	12.4%	<b>4.16(1.56-15.0)*</b>	<b>3.91(1.02-15.2)*</b>
Don't know	118	45.9%	45	39.8%	1.09(0.39-3.03)	2.05(0.62-6.826)

*Adjusted for Number of ANC visit, Knowledge about effect of malnutrition to the fetus and number of fruits consumed per week*

**\* =P-value <0.05 and \*\*= p-value <0.001**

## CHAPTER 6: Discussion

This comparative cross-sectional study provides very important information regarding in assessing GWG and associated factors among HIV positive and HIV negative women.

The prevalence of HIV negative women who had adequate GWG (30.7%) is higher than the prevalence of HIV positive women who had adequate GWG (26%). This is supported by Prospective cohort study conducted in Rwanda Kigali during 1992-1994, which follows 101 HTV+ and 106 HTV- women until 5 months after delivery. Weight and BMI during pregnancy were lower in HTV+ women than in HTV- women. After delivery, weight and BMI gains were significantly lower in HTV+ women. Until 5 months after delivery, the mean weight variation was -2.2 kg (standard deviation [SD] = 5.9 kg) in HTV+ women and +0.2 kg (SD = 6.6 kg) in HTV- women (P = 0.007) in comparison to pre-pregnancy weight.[11]

The prevalence adequate GWG among HIV negative in this study is similar to a study conducted in 2016 Brazil country shows 31.6% had a healthy gestational weight gain; 31.8% had inadequate gestational weight gain; and 36.6% had excessive gestational weight gain[21]. But our prevalence shows little bit higher than two studies conducted in Bangladesh and Ethiopia in Hariri region. A population-based study in Bangladesh to assess maternal factors, early pregnancy Anthropometry and gestational weight gain shows only 25% of women had gain adequate gestational weight.[10]. A recent study conducted in Hariri region shows that 71 %, 28 %, and 2.7 % of the women gained inadequate, adequate and excess gestational weight, respectively this shows that majority of the pregnant women's gain out of the recommended weight gain during pregnancy.[2]. The difference may be due to socioeconomic characteristic difference and the difference in the time that the studies were conducted. But the two studies (study conducted in Bangladesh and study conducted in Hariri region) prevalence is nearly similar to the prevalence of HIV positive women who had adequate GWG.

The prevalence of adequate GWG in our two comparative groups is lower than most of the studies conducted in the world. A result of study conducted in Austria revealed 39% of women gained adequate weight during pregnancy according to IOM categories.[1]A cross-sectional study conducted in Morocco in 2011 on pregnant women showed 55% of women gained

gestational weight according to recommended by IOM.[23]another study in Ghana showed higher proportion of women (78.8%) gained gestation weight according to IOM recommendation. Whereas, 14.7% gained below recommendation and only 6.3% gained above recommendation.[24]. This difference can be due to socodemographic and economical status difference of the countries.

Though prevalence of HIV positive women who had GWG below IOM recommendation (68%) is greater than those with HIV negative women (66.8%), HIV positive women were also show higher prevalence of having GWG above IOM recommendation of (6.1%) while only 2.4% of HIV negative women are above IOM recommendation of GWG. This shows that HIV positive women are showing double burden prevalence. Even though there is much difference of prevalence, the study in Bangladesh reviled that double burden prevalence can occur.[10]

The key associated factors for adequate GWG among HIV negative women in this study are Family monthly income, who knows fruits are main food types, hours of engagement in activity in atypical day and pre-pregnancy. In this study HIV negative women whose family income is greater than 150USD are 2.5 times more likely have adequate GWG than HIV negative women whose family income is less than 50USD [AOR=4.35,95% CI(1.75-10.79)].The IOM committee found that, Migrant farm workers who had lower income in the past decade show they gain relatively low GWG when it compared to non-migrant women.[1] This is also supported by the study conducted in Southern Brazil.[8]This might be due to having good family income enhance food security, enough rest and adequate exercise.

The second key determinant factor among HIV negative women is women who knows fruits are main food types are more than two times more likely to have adequate GWG than those who do not know [AOR=2.84,95% CI(1.5-7.6)].National guideline written by Queensland government health department to assess what women should do to have healthy weight gain during pregnancy fruit toast dried fruit are higher chance of getting healthy weight.[15] Another National protocol support knowledge about importance of fruit is important. The Newziland Ministry of Health 2014 Guidance for Healthy Weight Gain in Pregnancy recommend that, health professionals should discuss and inform pregnant women to buy seasonal fruits and to eat fruits like banana each day.[5] this is also supported from a qualitative study conducted in Egypt. Pregnant women believed that fruits are necessary for health pregnancy. The authors support this

by referring to one of the participant mentions that “fruits are important during pregnancy”. The study also mentions many women who know fruit as main food type consumed more for health outcome. The study further tells us pregnant women rarely mentioned grains (breads, rice, and pasta) and potatoes as essential foods for a healthy pregnancy. Carbohydrates, as a food group, were viewed as “not beneficial” for pregnancy and were perceived to cause “bloating for the mother” and excessive weight gain; therefore mothers believed they should restrict their intake and “[these foods] should not be consumed much.”[25]

The third key determinant factor of GWG among HIV negative women is hours engaged in physical exercise. HIV negative women who are engaged in activity less than two hours on typical day are more than three times more likely to have adequate GWG than who engaged in activity for more than six hours, while HIV negative women who engaged in activity four to six hours had adequate GWG more than four times more likely than HIV negative women [AOR=3.77, 95% CI (1.54-9.21)], [AOR=4.65, 95% CI (1.76-12.29)] respectively. This shows that physical activity is important but the time should be not more than six hours according to this study. This is supported by IOM, women who exercise 30 minutes or longer on most days of the week are more likely to have pregnancy weight gain according to the guidelines.[1]. The Queensland government report recommends that, to get the most health benefits, a good goal is at least half an hour of moderate-intensity physical activity on most, preferably, all days. Pregnant Women do not have to do it all at once. Her exercise can be spread over the day, in ten-minute blocks. Try three ten minute walks, or two fifteen-minute periods of activity.[15]

Finally the last key determinant factor, women who were overweight and more before they were pregnant were more than thirteen times more likely to have adequate GWG than those who were underweight before they were pregnant. The study conducted in Brazil shows that women who started overweight had 58% low risk of insufficient weight gain during pregnancy compared with normal BMI and not a risk factor for insufficiency when it compared with women who were underweight in early in pregnancy.[8] Another study conducted in South Korea shows obese women are seventeen times more likely to get adequate GWG according to IOM classification.[28]. The study conducted in our country Harari region also revealed that women

who had higher early pregnancy BMI (overweight and obese) were more likely to gain adequate gestational weight as compared to the underweight mothers [AOR = 3.2,95 % CI (1.6,6.3)]. The authors also justify that, Women who are underweight at early pregnancy are required to gain more weight than their overweight or obese counterparts do in order to achieve a healthy GWG. It may be difficult for these women to gain a significant amount of weight during pregnancy, particularly if they tend to be underweight due to metabolic or food security factors. Overweight and obese women, on the other hand, are required to gain comparatively little weight to achieve adequate GWG as they are able to use a portion of their stored energy to support the growth of the fetus. As such, adequate GWG may be attained easily for these women.[2] we also agree with their justification that it is difficult for underweight women to get 12.5kg up to 18 kg in order to had adequate GWG according to IOM when we considering the real situation our country.

But there are also some evidences that overweight pre-pregnancy do not grants adequate GWG. Cohort study conducted in Newziland shows 84% (n = 476) of overweight women has excess GWG.[7]since gaining excess weight is not also recommended due to different health impacts for the mother and her new born, we can't recommend women to be overweight before pregnancy. This idea also supported by recent cohort study in Italy shows different result. Underweight women had a mean weight gain within the IOM guidelines range, and that this was without deleterious consequences for themselves or their infants.[33] this difference may be due to the difference in the study design, difference in the sociodemographic, economic, nutritional intake and other similar factors.

The analysis of HIV positive women we found that there are two key determinant factors, educational status of the women and monthly family income were determined to be affecting GWG among HIV positive women.

Even though similar literatures found to be accessible which are related to GWG among HIV women were not recent, a study conducted in Tanzania shows that low educational level is related to low GWG among HIV-I infected women.[34]During the revision of GWG classification at 2009, The IOM committee found few studies that have reported GWG found

that women with less than 12 years of education were more likely to gain less than 15 pounds, and less likely to gain more than 34 pounds, compared to women with more than 12 years of education. Evidence for a role of social support as a determinant of GWG is mixed and inconclusive.[1]but another study conducted to assess Effect of multivitamin and vitamin A supplements on weight gain during pregnancy among HIV-1-infected women shows that There were no significant interactions between the treatments and other potential effect modifiers including the mother's level of educations[35]. This difference is may be due to the difference in the objectives, the study designs and the sample size difference.

The second determinant factor was similar with our HIV negative group. In many studies income shows significant association with GWG. A study from Tanzania which assesses the pattern of and predictors of GWG among HIV women shows that low household income related to decreased rate of weight gain during pregnancy.[34] during the second trimester normal BMI women should increase up to 10kg,when this much amount of gestational weight is decrease, is related to low income, it is obvious that income affect the overall GWG. This also supported by study conducted in USA to assess excess GWG among low income women. the result shows Excessive pregnancy weight gain was highly prevalent among young low-income ethnic minority women.[36]the above two studies (study from Tanzania and America) shows that economic status affect GWG either by related to low or excess than the recommended When both of them are considered insufficient GWG.

## **CHAPTER 7: STRENGTH AND LIMITATION OF THE STUDY**

### 7.1 Strength of the study

- ✚ It is comparative study.
- ✚ The study targeted two important risk populations which are pregnant women and HIV positives.

### 7.2 limitation of the study

- ✚ GWG among HIV positives should be supported with qualitative approach.
- ✚ The study also didn't consider the effect of ART drugs that may affect GWG.
- ✚ No control over the measurements of weights and also the associated factors were subjected to recall bias.

## **CHAPTER 8: Conclusion and Recommendation**

### 8.1 conclusions

The first objective of this comparative study was to compare the prevalence of adequate GWG among HIV negative and HIV positive women during pregnancy. The finding shows that both groups have lower prevalence of adequate GWG. Only less than one third of the participants in each comparative group had adequate GWG.

The second objective of this study was identifying the underling determinant factors for GWG among HIV negatives and HIV positive women. The result of HIV negative women shows that there are four underling factors for adequate GWG among HIV negative women. These are family income in greater than 150 USD, having knowledge about fruits as main food type, engaged in activity for less than six hours and starting pregnancy with better BMI are helpful in order to have adequate GWG. The result from HIV positive women shows that also family income greater than 150USD is associated with adequate GWG among HIV positive women. Additionally mother educational level also affects GWG among HIV positive women.

The third objective of the study was compare the prevalence of adequate GWG among HIV negative and HIV positive women during pregnancy and answering wither the determinant factors for GWG among HIV negative and HIV positives are similar or not. This research revealed that even though the prevalence of GWG among both groups is low, the prevalence of HIV negative women is higher than the prevalence of HIV positive ones. Thus the result indicates that the probability of gating adequate GWG among HIV positive women is less than HIV negative women. So that, HIVpositives are more risky group according to the study findings.

Finally this study also reviled that factors affecting GWG among HIV positives and HIV negatives are different. Even though family monthly income greater than 150 USD is associated with adequate GWG in both comparative groups, majority of predictor factors toward adequate GWG are different among HIV negative and HIV positive women.

## 8.2 Recommendation

### A. For health professionals

- ✚ Health professionals should know that the recommended GWG for pregnant women is not equal across different pre-pregnancy BMI.
- ✚ Health professionals should be aware of the current prevalence of GWG which is low across all of the study participants; they should work together with the women on key modifiable determinant factors.
- ✚ During ANC, health professionals should know that HIV positives are more risky than HIV negatives regarding having the recommended GWG, additional advice and follow up should be given to those groups.

### B. For policy makers

- ✚ Policy makers should be aware of the current GWG and associated factors so that it should be given better attention
- ✚ While making protocols and guidelines, Policy makers also must know that HIV negative and HIV positive pregnant women are at different risk and have different associated factors affect their GWG, there should be different approaches should be undertaken in order to have better out come.
- ✚ During referral to the higher institution during ANC no information about weight and related measurements were transferred, we think the responsible body makes this correct. Not only for the sake of such studies but for the better pregnancy and delivery outcome.

### C. for other interested researchers

- ✚ GWG is relatively is a very important issues related to pregnant women and the outcome of the delivery. Since it is relatively recent research topic for our country, conducting similar research in different siciodemographic area will provide better input the study topic.
- ✚ Since there is wide information gap about GWG related to HIV, it was very help full to study this important risk target population with better study designs that can dig more determinant factors.

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## **Annex I: Questionnaire in English**

### Information Sheet

Title of the Research Project: Gestational weight gain and associated factors: cross-sectional comparative study among HIV positive and HIV negative pregnant women in Addis Ababa.2017

Name of Principal Investigators: Benyam Seifu

Name of the Organization: Addis Ababa University, college of health sciences school of nursing and midwifery.

Name of the Sponsor: Addis Ababa University

Purpose of Research Project: The purpose of this research is to assess gestational weight gain and associated factors then compare the result of HIV positive and HIV negative women. The study is helpful in determining how many women are getting appropriate gestational weight gain and what the underlying causes are. It helps to design appropriate intervention strategies. It will also serve as a subsequent study in the country.

Procedure: To assess gestational weight gain and associated factors, I invite you to take part in this project. If you are willing to participate in this project, you need to understand and give us your written consent. Then after, you will be interviewed by the data collector to give your response and for the purpose of the study they will measure your height. You do not need to tell your name to the data collector and all your responses and the results obtained will be kept confidentially by using a coding system whereby no one will have access to your response.

Risk/ Discomfort: By participating in this research project, you may feel that it has some discomfort especially on wasting time about 20 minutes during interview with the data collection. We hope you will participate in the study for the sake of the benefit of the research result. There is no risk in participating in this research project.

Benefits: If you participate in this research project, there may not be direct benefit to you but your participation is likely to help us in assessing gestational weight gain and underlying causes in Addis Ababa. Ultimately, this will help us to work on it.

Incentives: You will not be provided any incentives or payment for participation in this project.

Right to Refuse or Withdraw: You have full right to refuse from participating in this research. You can choose not to respond to some or all questions if you do not want to give your response. You have also the full right to withdraw from this study at any time you wish, without losing any of your right.

**Persons to Contact:**This research project was reviewed and approved by the Ethical clearance committee of the department of Nursing and midwifery of Addis Ababa University. If in case you want to know more information about the research and its undertakings, you can contact the investigatorsthrough the address below.

Name:Benyam seifu

Tell: 0910451184

Email: [benyamseifu77@gmail.com](mailto:benyamseifu77@gmail.com)

## Consent Sheet

Code No \_\_\_\_\_

Addis Ababa University, Department of Nursing and Midwifery

Questionnaire for Assessment of Gestational weight gain and associated factors in Addis Ababa Ethiopia.

Consent Form

Good morning/after noon

My name is..... , I am working as data collector in this study that assess the Gestational weight gain and associated factors among women who delivered in health institution in Addis Ababa for an investigator doing his thesis for the partial fulfillment of Master's degree in Maternity and Reproductive Health at Addis Ababa University, Ethiopia. It is my pleasure to notify you that you have been identified to participate in this study. I am doing the research on those mothers who gave birth in the last three days. I am going to ask you few questions which are very important and related to gestational weight gain and finally I will measure your height.

Your name will not be written in this form and the information you will give to us is kept confidential. If you do not want to answer all or some of the questions, you do have the right to do so. However, your willingness to answer all of the questions would important to the organization and the mother be appreciated. It doesn't take more than 15 minutes.

Would you participate in study?

Yes -----

No-----

If the answer is yes, Thanks! Conduct

If the answer is no, Thanks! Transfer to the next respondent

Signature of participant \_\_\_\_\_

Name and Signature of the data collector who sought the consent \_\_\_\_\_

Date of interview \_\_\_\_\_

Name and signature of the supervisor \_\_\_\_\_

Date \_\_\_\_\_

### Part 3: Questionnaire

<b>Part I :Questions concerning socio-demographic characteristic</b>			
<b>Code</b>	<b>Variables</b>	<b>Response</b>	<b>Skip</b>
101	Age		
102	What is your marital status?	1.Unmarried 2.Married/live with partner 3.Divorced 4.Widowed 5.other specify	
103	What is your educational status?	1. Illiterate 2. Primary education 3. Secondary education 4. College and above	
104	What is your ethnicity?	1.Amhara 2.Oromo 3.Tigrai 4.Gurage 5.other specify	
105	What is your religious?	1.Muslim 2.ortodox Christian 3. protestant 4.other specify	
106	What is your occupational status?	1. Housewife 2. Farming 3. Government employee 4. Private employee 5. Merchant 6. student 7. Daily labourer 8. Others	
107	How much is your family income per month in Eth birr	.....	

<b>Part II : questions concerning past pregnancy and obstetrics history</b>			
201	Number of pregnancy		<b>First pregnancy</b>
202	Number of delivery		<b>First pregnancy</b>
203	Number of children alive		<b>First pregnancy</b>
204	Any abortion	1.yes 2.no	
205	Number of abortion		<b>If No abortion</b>
206	Type of abortion	1.Induced 2.Spontaneous	<b>If No abortion</b>
207	Any Medical disorder in the past pregnancy	1.yes 2.no	
208	Medical disorder in the past pregnancy	1.Diabetic Mellitus 2.hypertention 3.CVD	<b>First pregnancy and if no disorder occur</b>
209	Do you have history of LBW?	1.yes 2.no	<b>If pregnancy is for the first time</b>
210	Do you have history of still birth?	1.yes 2.no	<b>If pregnancy is for the first time</b>
211	Do you have history of preterm?	1.yes 2.no	<b>If pregnancy is for the first time</b>
212	Past history of psychiatric disorder	1.yes 2.no	<b>If pregnancy is for the first time</b>
<b>Part III: questions concerning current/recent pregnancy</b>			
301	Dose the pregnancy was planned	1.Yes 2.No	
302	Dose the pregnancy was supported	1.Yes 2.No	
303	Spacing between past and recent pregnancy	1.Less than 18 month 2.18 month or more	<b>First pregnancy</b>
304	Birth Order		
305	did you receive ANC service	1.Yes	

		2.No	
306	When was your first ANC visit	1.Less than 8 weeks 2.8–12 weeks 3. 13–16 weeks	
307	Did you receive nutritional advice	1.Yes 2.No	
308	How many times	_____	<b>If question 307 is yes</b>
309	Who gives the nutritional advice	1.physician 2.Nurse/midwife 3. other specify_____	<b>If question 307 is yes</b>
310	Any Medical disorder in the current pregnancy	1.yes 2.no	
311	Minor and major medical disorder in the current pregnancy	1.Diabetic Mellitus 2.hypertention 3.CVD 4. nausea and vomiting 5. hyperemesis gravidium 6.loss of apatite 8. other	
312	Duration of pregnancy (weeks)	1.< 37 2.37–39 3. 40–42 4. ≥ 43	
313	Infant sex	1.Male 2.Female	
<b>Part IV: questions about knowledge about gestational weight</b>			
401	Do you know importance of food for growth and development of fetus	1.Yes 2.No	
402	Knowledge about the main food groups or balance diet	1.firuts 2.vigitabels 3.drains 4.dairy 6.oil	
403	Knowledge about inadequate nutrition can be the cause of miscarriage and/or preterm birth	1.Yes 2.No	

404	Knowledge about husband or family member should not influence and decide on the type and frequency of taking food during pregnancy		
405	Do you think women should get additional weight during pregnancy	1.Yes 2.No	
406	If yes how many Kg		<b>If the answer for 406 is no</b>
407	Source of information	1.Health care providers during ANC 2.Health care providers during home to home visits 3.Health care providers in other conditions 4.Family members 5.Media 6.Elderly and religious leaders 7. from books Other specify	
<b>Part V: Questions concerning dietary habit</b>			
501	How many times do you eat each day?	Meal(breakfast,lunch and dinner)----- Snack-----	
502	Which fluid do you drink most? (Please check all that apply.)	1.milk 2.Alcohol 3.Coffee/Tea 4.other specify	
503	Soda or juice consumption on a typical per week	_____	
504	How many times do you eat fruits per week?	_____	
505	How many times do you eat vegetables per week?	_____	
506	How many times do you consume meat and eggs per week?	1.Meat _____times 2.Eggs _____times 3.do not eat	
507	In your culture/religion which foods are		

	recommended to eat during pregnancy		
508	In your culture/religion which foods are recommended to avoid during pregnancy		
<b>Part VI :Questions concerning physical activity</b>			
601	Have you ever engaged in any regular physical exercise during your pregnancy?	1.yes 2.no	
602	If yes to question number 301,how many times per week	-----	<b>If 601 is No</b>
603	Walking or exercising on a typical day	1. ≤ 15 minutes 2. 16 to 30 minutes 3. 31 to 45 minutes 4. 46 to 60 minutes 5. > 60 minutes	
<b>Part VII: question about psychological condition during pregnancy</b>			
701	Hours of good quality sleep (including nighttime sleeping and daytime napping in 24 hours) in average		
702	Do you had Stress/depression during pregnancy	1.yes 2.no	
703	Satisfaction with pre-pregnancy weight	1.Not satisfied at all 2.Not very satisfied 3.Somewhat satisfied 4.Very satisfied	
<b>Part VIII: questions concerning behavior during pregnancy</b>			
801	Cigarette smoking	1.yes 2.no	
802	Alcohol drinking	1.yes 2.no	
803	How many times you drink alcohol drinks per week		If question 704 is yes
804	Other drugs like cocaine, heroin ...	1.yes 2.no	

<b>Part IX: check lists for secondary data/ client card</b>			
901	Number of antenatal visit		
902	Maternal weight at first visit		
903	Maternal weight at second visit		
904	Maternal weight at third visit		
905	Maternal weight at fourth visit		
906	Maternal weight at birth		
907	Maternal height		
908	Birth Weight of the newborn		
909	Parity		
910	Gestational age at birth		

**Thank you!!!**

Annex II. Questionnaire in Amharic

ጥናቱ ለሚሳተፉ የመረጃና የስምምነት ፎርም በአማርኛ

መግቢያ

ጤና ደስ ጥልኝ ስሜት ----- (መረጃ ሰብሳቢ)
እባላለሁ። እኔ በዚህ የጤና ተቋም ለሚደረገው ጥናት ውስጥ መረጃ ሰብሳቢ ስሆን እኔ ህይወት ለገዥ ሆኑት አቶቢኒያ
ም፣ ሰይፉ በአዲስ አበባ ዩኒቨርሲቲ ሆስፒታል ተኝ ዲግሪ ትምህርታቸውን ለመመረቅ በአዲስ አበባ ከተማ ውስጥ በሚገኝ
ኙት የህብረተሰብ ጤና ተቋማት ውስጥ የድህረ ወሊድ የሚከታተሉት እና ቶች ላይ በእርግዝና ጊዜ የክብደት አ
ጨማመር ሁኔታ፣ ወሊድ ውጤት እና ተጓዥ ጉዳዮች ዳሰሳ ይካሄዳሉ። ስለዚህ ህልግና ተመሳካታ የሚረዱትን
አንዳንድ መረጃዎች በትክክል እንድትሰጡኝ/ጨኝነው። የዚህ ጥናት ተሳታፊ ሆኖ ለምን/ሽቦ ጣተ መርጠህ/ሽነ
ው። ስለዚህ የሚከተሉትን ጥያቄዎች በትክክል እንድትሞላ/ይልኝ በትህትና እጠይቃለሁ።

1. የጥናቱ ርዕስ፡-

በአዲስ አበባ ከተማ ውስጥ በሚገኙት የህብረተሰብ ጤና ተቋማት የድህረ ወሊድ የሚከታተሉት እና ቶች ላይ በእርግዝና ጊዜ የክብደት አ
ጨማመር ሁኔታ፣ ወሊድ ውጤት እና ተጓዥ ጉዳዮች ዳሰሳ

2. የጥናቱ ዓላማ፡-

የዚህ ጥናት ዋነኛ አላማ በአዲስ አበባ ከተማ ውስጥ የድህረ ወሊድ የሚከታተሉት እና ቶች ላይ በእርግ
ዝና ጊዜ የክብደት አጨማመር ሁኔታ፣ ወሊድ ውጤት እና ተጓዥ ጉዳዮች ለመዳሰስ። በተጨማሪም
ጥናቱ በተጨማሪም የጥናቱ ውጤት ለከተማ ውጤት ስርዓት ለመፍጠር፣ ሌሎች የሚመለከታቸው
አካላት እንደ ግብአት ሊጠቀሙበት የሚችሉ መሆኑን በአገራችን እንዲሁም በሌሎች በሌሎች ሀገራ
ት ያለውን ግርሎ መፍታት ሊያግዝ ይችላል።

3. የጥናቱ ሂደትና የሚወሰድብህ/ሽ ጊዜ፡-

እኔ አሁን ቃለ መጠይቁን እስከ ታለሁ። ዕርስዎ ቃለ መጠይቁን በማንበብ ለጥናቱ መሳካት የሚረዱ
ኝን መረጃዎች መሰለዎትን መልስ እንድትሰጡኝ መልካም ትብብርና ፍቃድ ኝነት ላይ የተመሰረተነው።
ቃለ መጠይቁ ወደ 20 ደቂቃዎች ያህል ሊወስድብህ/ሽ ስለሚችል ለቃለ-
መጠይቁ ጊዜዎን እንዲሰጡኝ በትህትና እጠይቃለሁ።

4. ጥናቱ ለተሳታፊዎች ያለው ጥቅምና ጉዳት

- ጉዳት፡- ጥናቱ በጣም ዝቅተኛ ጉዳት ሊያስከትል ይችላል (ሠዓት ህን/ሽን ስለሚነካ)
➢ ጥቅም፡-
በአሁን ጊዜ በጥናቱ ስለተሳተፍክ/ሽ የምታገኘው/ኝ ውቅጥ ተኝ ጥቅም የለም። ነገር ግን የም
ትሰጠው/ጨው መረጃ ግሩን ለመፍታት ከፍተኛ ጥቅም ይኖረዋል።

5. ሚስጥራዊነቱ፡-

ዕርስዎ የሚሰጡኝ መረጃ በአጠቃላይ በሚስጥር ይጠበቃል። በተለየ መልክ የርስዎን ማንነት የሚገ
ልፅ መረጃ የለውም። የጥናቱም ውጤት አጠቃላይ የጥናቱን ተሳታፊዎች እንጂ ማንንም ግለሰብ
ሚገልፅ አይደለም። በንግግር ወይም በፅሁፍ የጥናቱ ተሳታፊዎችንና ጥናቱን የሚያያይዝበት ምን
ምምክንያት የለም።

6. መብት፡-

በዚህ ጥናት ለመሳተፍ ሙሉ ፍቃድ ኝነት ይጠይቃል። በጥናቱ ለመሳተፍ ወይም ላለመሳተፍ ሙብ

ትክለዎት።ጥያቄውን በምትሞሉበት ወቅት ምንም ዓይነት መቼት ሁኔታ ካጋጠመዎት በማንኛውም ጊዜ ማቋረጥ ይችላሉ። በተጨማሪም ግልፅ ያልሆኑ ሃሳቦች ካሉ ለማብራራት ደስተኛነትን። መልስ ለመስጠት የማይፈልጉትን ጥያቄዎች ለመመለስም አይገደዱም።

7. አድራሻ፦

ጥናቱን ወይም የጥናቱን ቅድመተከተል በተመለከተ ማንኛውንም ጥያቄ በማንኛውም ጊዜ ለመጠየቅ ከዚህ በታች የተጠቀሱትን አድራሻ ይጠቀሙ

ስም፡ ቢንያም ሰይፉስልክ 0910451184

ኢ.ሜይል፡ benyamseifu77@gmail.com

ፖ.ሳ.ቁ፡ 3770 አ.አ

8. ተሳታፊው በጥናቱ ላይ እንዲሳተፉ ፈቃድ መጠየቁ ያቅጥቡ

- የተሳተፎ መረጃና ፍቃድ ማረጋገጫ ቅጽ አንብቤ ያለሁ። የጥናቱን ግብርና፣ ቅድመተከተል፣ ጉዳትና ጥቅም፣ ሚስት ራዊነቱን፣ የመሳተፍ መብትና የግንኙነት አድራሻ በግልፅ ተረድቻለሁ። ግልፅ ያልሆኑ ልክን ጉዳዮች ለመጥቀስ እድል ተሰጥቶኛል። በማንኛውም ጊዜ ላይ በጥናቱ ያለኝን ተሳትፎ ማቋረጥ እንደምችል ወይም መልስ መስጠት በማልፈልገው ጉዳይ ላይ መብት እንዳለኝ ተረድቻለሁ። ስለዚህ በጥናቱ ላይ ፍቃድ ማረጋገጥ ለመሳተፍ ወስኛለሁ።

የተሳታፊው ፊርማ ----- ቀን -----/-----/-----

የመረጃ ሰብሳቢ ፊርማ ----- ቀን -----/-----/-----

የሱፐርቫይዘር ፊርማ ----- ቀን -----/-----/-----

መረጃው የተሰበሰበበት ተተቋም ----- ቀን -----/-----/-----

አባሪ 4:- መጠይቅ

<b>ክፍል አንድ--መሃበራዊና -ዲሞኒራሬያዊ ሁኔታዎች ( ግላዊዳራ )</b>			
<b>ተ.ቁ</b>	<b>ጥያቄ</b>	<b>አማራጭ መልሶች</b>	<b>ዝለል</b>
101	ዕድሜ	-----	
102	የጋብቻ ሁኔታ	<ol style="list-style-type: none"> <li>1. ያላገባች</li> <li>2. ያገባች</li> <li>3. የፈታች</li> <li>4. ባልየሞተባት</li> <li>5. ሌላ ግለፅ</li> </ol>	
103	የትምህርት ደረጃ	<ol style="list-style-type: none"> <li>1. ያልተማረ</li> <li>2. 1ኛ ደረጃ የተማረ</li> <li>3. 2ኛ ደረጃ የተማረ</li> <li>4. ኮሌጅና ከዛብላይ</li> </ol>	
104	ብሔር	<ol style="list-style-type: none"> <li>1. አማራ</li> <li>2. ኦሮሞ</li> <li>3. ትግራይ</li> <li>4. ጉራጌ</li> <li>5. ሐረሪ</li> <li>6. ሌላ ግለፅ</li> </ol>	
105	ሃይማኖት	<ol style="list-style-type: none"> <li>1. እስልምና</li> <li>2. ክርስቲያን</li> <li>3. ሌላ ግለፅ</li> </ol>	
106	የእናት ሥራ ሁኔታ	<ol style="list-style-type: none"> <li>1. የቤት እመቤት</li> <li>2. ገበሬ</li> <li>3. የመንግስት ሠራተኛ</li> <li>4. የግል ተቀጣሪ</li> <li>5. ነጋዴ</li> <li>6. ተማሪ</li> <li>7. ቀን ሠራተኛ</li> <li>8. ሌላ ግለፅ</li> </ol>	
107	የወር ገቢ?	በኢትዮጵያ ብር -----	
<b>ክፍል ሁለት:- ከእርግዝናና ወሊድ ጋር የተያያዙ መጠይቆች</b>			
201	እስካሁን ስንት ጊዜ አርግዘሻል? በቁጥር		የመጀመሪያ እርግዝና ከሆነ ዝለልል
202	እስካሁን ስንት ጊዜ ወልደሻል? በቁጥር		የመጀመሪያ እርግዝና ከሆነ ዝለልል
203	ምን ያህል ልጆች በህይወት አሉሽ? በቁጥር		የመጀመሪያ እርግዝና ከሆነ ዝለልል



	ከሆነ መቼን በርዕይ መረዳት ይቻላል?	2/ ከሁለት እስከ ሶስት ወር 3/ ሶስት ወር እስከ አራት ወር	
307	በቅድመ ክትትሉ ወቅት የሰለጠነው ጋንብ ምክር ቤቱ ሰጥቶ ሻል	1/ አዎ 2/ አልተሰጠኝም	
308	ጥያቄ 307 አዎ ከሆነ፤ ምን ያህል ጊዜ በቁጥር		
309	ጥያቄ 307 አዎ ከሆነ፤ ማንን በርዕይ ነው ምን ጋንብ ምክር ቤቱ ነው?	1/ ሀኪም 2/ ነርስ / ሚዲካል ማህተም 3/ ሌላ ሌላ ግለሰብ ----- -----	ጥያቄ ቁጥር 307 አልተሰጠኝም ከሆነ ዝለል
310	በእርግዝና ወቅት ያጋጠመ ሽህመም / ችግር / ነበረ?	1/ አዎ 2/ አይደለም	
311	ጥያቄ 310 “አዎ” ከሆነ፤ ህመሙ ምን ይኖር?	1/ ማቅለሽ ለሽና ማስታወክ 2/ የምግብ ፍላጎት መቀነስ 3/ ስኳር በሽታ 4/ የደም ግፊት 5/ የልብ ህመም 6/ ሌላ ሌላ ጥቅስ ----- -----	
312	እርግዝና ሽህመም ምን ያህል ጊዜ ነበር?	1/ ከ 37 ሳምንት በታች 2/ ከ 37-39 ሳምንት 3/ 40-42 ሳምንት 4/ ከ 43 ሳምንት በላይ	
313	የወለድ ሽውልጅ ጾታው ምን ይኖር?	1/ ወንድ 2/ ሴት	
<b>ክፍል አራት:- የእርግዝና ጊዜ ነጭ መርሰ ላለ ብሽቶ ሰውነት ክብደት እውቀት የተመለከቱ ጥያቄዎች</b>			
401	የተመጣጠነ ምግብ በሆድ ሽውስጥ ላለው ልጅ እድገት አስፈላጊ መሆኑን ታውቋል?	1/ አዎ 2/ አላውቅም	
402	ዋና የምግብ ክፍሎች ሚባሉት ምን ምን ናቸው? (የጠቀሰችውን ✓ ምልክት ይጠቀስ)	1/ ፍራፍሬ 2/ የንጥል አትክልት 3/ የወተት ተዋፅኦ እና ስጋ 4/ ጥሬ 5/ እህል	
403	የተመጣጠነ ምግብ በእርግዝና ወቅት አለመመገብ የእርግዝና መቋረጥ ወይም ያለ ጊዜው መውለድ እንደሚያጋልጥ ታውቋል?	1/ አዎ 2/ አላውቅም	
404	በእርግዝና ወቅት አመጋገብ ሽንብት ለሌሎች ተሰቦች ሽመድ እንደሌለበት ታውቋል?	1/ አዎ 2/ አላውቅም	

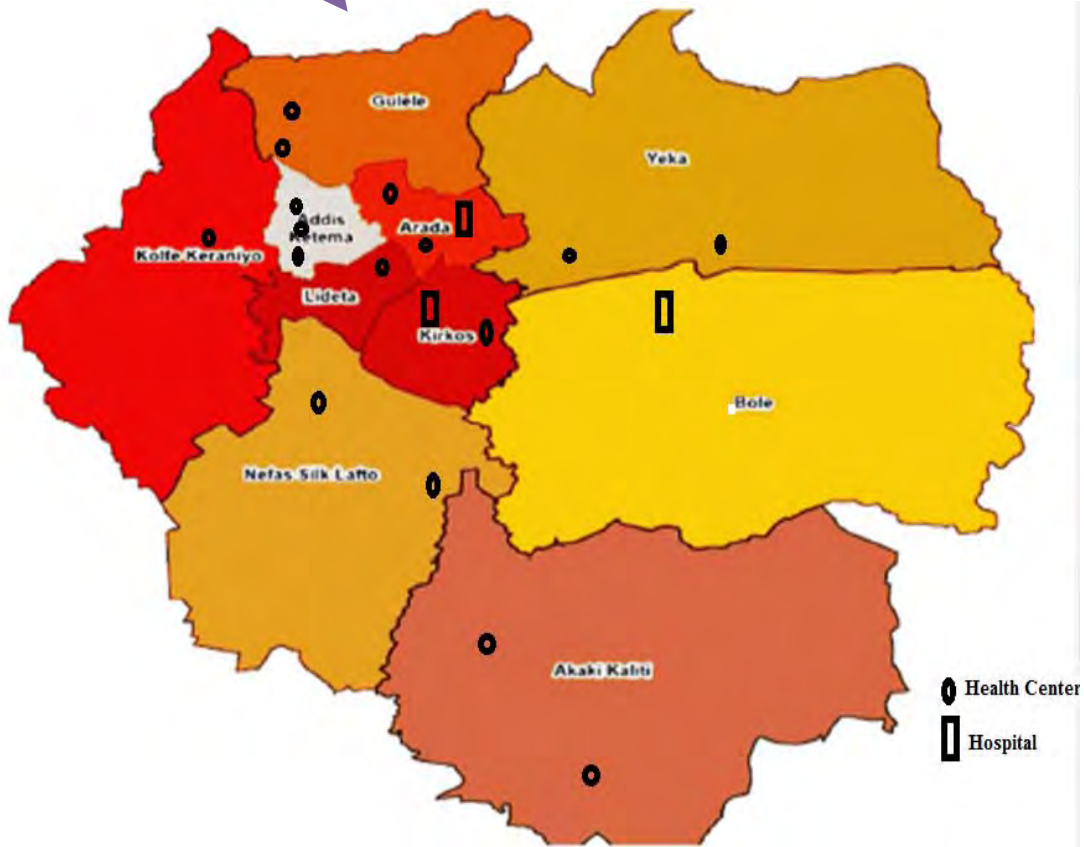
406	ምታውቁከሆነእስከስንትኪሎሜትርአለበት?		ጥያቄቁጥር 405 አላውቅምከ ሆነዝለል
407	በእርግዝናወቅትክብደትመጨመርአስፈላጊነቱንከማንሰማሽ?	1/ ከጤናባለሙያዎች 2/ ከመገናኛብዙሀን 3/ ከቤተሰብ 4/ ከሀይማኖትአባቶች 5/ ሌላካለጥቀሱ ----- -----	
<b>ክፍልአምስት:- አመጋገብስርዓትንየተመለከቱጥያቄዎች</b>			
501	በቀንለምንያህልጊዜትመገቢያለሽበቁጥር በመሀልምንያህልጊዜመቆያቀለልያሉምግቦችትመገቢያለሽ?	----- መደበኛምግብ (ቁርስ፣ እራት) ----- እንደመክሰስ	
502	በቀንውስጥየትኞቹንመጠቦችአዘውትረሽትጠጪያለሽ? (ከአንድበላይመልስመስጠትይቻላል)	1/ ወተት 2/ ቡና/ሻይ 3/ የአልኮልመጠጥ 4/ ሌላካለጥቀሽ ----- -----	
503	በሳምንትውስጥለምንያህልጊዜለስላሳመጠጥወይምጁስትጠጪያለሽበቁጥር?	----- -	
504	በሳምንትውስጥለምንያህልጊዜእንቁላልወይምስጋትመገቢያለሽ?	1/ ስጋምንያህልጊዜ 2/ እንቁላልምንያህልጊዜ 3/ አልመገብም	
505	በሳምንትውስጥምንያህልጊዜፍራፍሬትመገቢያለሽ?	-----	
506	በሳምንትውስጥምንያህልጊዜየጓሮአትክልትትመገቢያለሽ?	-----	
507	በባህልሽወይምበእምነትሽለምግብነትየተከለከለምግብአለ?		
508	በባህልሽወይምበእምነትሽበእርግዝናወቅትየተከለከለምግብአለ?		
<b>ክፍልስድስት:- የአካእንቅስቃሴየተመለከተጥያቄ</b>			
601	በእርግዝናወቅትየተለመደየአካልእንቅስቃሴታደርጊያለሽ?	1/ አዎ 2/ አላደርግም	

602	ምታደርገከሆነ፤ በሳምንት ምን ያህል ጊዜ ?	-----	
603	በእርግዝና ሽጊዜ በቀን ውስጥ ለምን ያህል ደቂቃ የቤት ውስጥ እንቅስቃሴ ትሰራ ነበር?	1/ ለ 15 ደቂቃ ያህል 2/ ከ16-30 ደቂቃ 3/ ከ31-45 ደቂቃ 4/ ከ46-1ሰዓት 5/ ከአንድ ሰዓት በላይ	
<b>ክፍል ሰባት:- በእርግዝና ወቅት የነበረ የስነ-አይም ሮሁኔታ ጉዳዮች ጥያቄ</b>			
701	በእርግዝና ወቅት ለምን ያህል ጊዜ ትተኚ ነበር? (የለሊት እና የቀንተደም ረው) በሰዓት ሲገለጽ		
702	በእርግዝና ወቅት የጭንቀት ስሜት ወይም የመደብት ስሜት ነበር ?	1/ አዎ 2/ አልነበረም	
703	ከእርግዝና በፊት የነበረ ሽየሰውነት ክብደት ደስተኛነት ነበር ሽ ?	3/ በፍፁም አልነበርኩም 4/ አልነበርኩም 5/ በመጠኑ ደስተኛነት ነበርኩ 6/ በጣም ደስተኛነት ነበርኩ	
<b>ክፍል ስምንት:- በእርግዝና ወቅት የነበረ ግላዊ ባህሪ ጉዳዮች መለከት ጥያቄ</b>			
801	በእርግዝና ወቅት ሲጋራ ታጨሽ ነበር?	1/ አዎ 2/ አላጨሽም	
802	በእርግዝና ወቅት አልኮልት ጠጪ ነበር?	1/ አዎ 2/ አልጠጣም	
803	በእርግዝና ወቅት ምት ጠጪ ከሆነ በሳምንት ለምን ያህል ጊዜ?		ጥያቄ 802 መልስ አልጠጣም ከሆነ ዝለል
804	በእርግዝና ወቅት አደንዛኝ ስና አነቃቂ ንጥረ ነገሮችን ትጠቀሟለህ (ኮኬን፣ ሄሮይን) ?	1/ አዎ 2/ አልጠቀምም	

<b>ክፍልዘጠኝ፡- የእናትየዋካርድላይየሚሞላመረጃ</b>			
901	የቅድመወሊድጊዜክትትልጊዜብዛት? በቁጥር		
902	በቅድመወሊድጊዜለመጀመሪያየተመዘገበየክብደትመጠንበኪሎግራም?		
903	በሁለተኛውበቅድመወሊድጊዜየተመዘገበየክብደትመጠን ?		
904	በሶስተኛውበቅድመወሊድጊዜየተመዘገበየክብደትመጠን		
905	በቅድመወሊድክትትልወቅትለመጨረሻጊዜየተመዘገበውየክብደትመጠን?		
906	ከወሊድበኋላያለየእናትየውየክብደትመጠን ?		
907	ተወለደውልጅክብደትበኪሎግራም?		
908	ልጁለምንያህልቀናትእንደተረገዘ (በሳምንትሲገለፅ)?		
909	የእናትየዋ የቁመት ልኬት (በሜትር ሲገለፅ) ?		

**አመሰግናለሁ!!**

### Annex III. Study Area

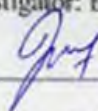


Source: [http://en.wikipedia.org/wiki/Addis\\_Ababa](http://en.wikipedia.org/wiki/Addis_Ababa)

## Annex IV : Declaration

I, the undersigned, declare that this thesis is my original work, has not been done for a degree in this or any other university and that all sources of materials used for the proposal have been fully acknowledged.

Principal investigator: Benyam Seifu (BSC)

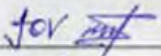
Signature:  Date 19/07/17

Name of institution: Addis Ababa University

This thesis has been submitted for examination with my approval as university advisors.

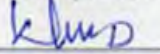
Name of advisors:

1. Dr Hussen Mekonnen(BSc,MPH,PHD)

Signature 

Date 19/06/17

2. Workinesh Daba (BSC, MSC)

Signature 

Date 19/06/17