

**PREVALENCE OF OBESITY AMONG HORMONAL CONTRACEPTIVE
USERS AND NON USERS IN JIMMA TOWN: IS THERE A DIFFERENCE?**

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JIMMA UNIVERSITY
COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCES
DEPARTMENT OF POPULATION AND FAMILY HEALTH

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Abstract

Introduction: The increasing prevalence of overweight and obesity among women of reproductive age group as part of the increasing worldwide epidemic of obesity is a critical public health problem for women of childbearing age. With obesity rates at epidemic proportions, any association between obesity and strategies that prevent undesired pregnancies constitutes a significant public health and economic concern. Unfortunately; the relationship between obesity and contraception has not been extensively studied. Very few studies were available with regard to the nature and magnitude of the problem in Ethiopia and none available for study area. Therefore this study was aimed at determining the prevalence of obesity among hormonal contraceptive users and non-users and identifying factors associated to obesity among women of child bearing age.

Methods and materials: a comparative community based cross sectional study was conducted in Jimma Town from March, 6-13/2013. Simple random sampling technique was employed to recruit 343 hormonal contraceptive users and 343 non users with a total sample size of 686. WHO steps approach instrument for collecting surveillance data for assessment of risk factors for chronic non-communicable diseases was used to collect data on selected socio-demographic characteristics and lifestyle risk factors. Physical measurements of weight, height, waist circumference and hip circumference were carried out. Data were entered, cleaned and analyzed using SPSS for windows version 16. A bivariate analysis was conducted to select candidate variables at P value of 0.25. Finally multivariable logistic regression was fitted to isolate an independent predictors of overweight/obesity. Results were presented using 95% confidence intervals and adjusted odds ratios. $P < 0.05$ was used to determine statistical significance.

Result: Prevalence of overweight and obesity based on BMI cutoffs were 23.1% and 7.4%, respectively. The prevalence of central obesity was 21.0% and 18.5% based on WC and WHCR respectively. Both overweight/obesity ($BMI \geq 25 \text{kg/m}^2$) and central obesity were significantly higher (chi-squared test $P < 0.05$) among hormonal contraceptive users than non-users. Multivariable logistic regression showed that duration of hormonal contraceptive use, type of oil/fat usually used for meal preparation and marital status were significantly associated to overweight/obesity ($BMI \geq 25 \text{kg/m}^2$). Duration of hormonal contraceptive use, level of physical activity and fruit and vegetable consumption were significantly associated to central obesity measured by WC. While central obesity as measured by WHCR was significantly associated to age group and hormonal contraceptive use for two years and above.

Conclusion: The study showed that the prevalence of obesity among study population was high and requires public health attention. Lifestyle factors like physical activity and dietary factors were important factors independently associated to obesity in this population. Hormonal contraceptive use for two years and above was independent predictor of central obesity measured by WHCR. Like several other public health challenges, overweight and obesity should be tackled early before it gets out of hand ensuring that people have access to healthy diets and get involved in physical activities

Acronyms

BMI: - Body Mass Index

CED: - Chronic Energy Deficiency

DALY: - Disability-Adjusted Life Years

DHS: - Demographic Health Survey

GAM: - Global Acute Malnutrition

GDP: - Gross Domestic Product

GPAQ: - Global Physical Activity Questionnaire

WHCR: - Hip to Waist Circumference Ratio

MET: - Metabolic Equivalent

MONICA: - Monitoring Trends and Determinants of Cardiovascular Disease

NFHS: - National Family Health Survey

NSFG: - National Survey of Family Growth

OCP: - Oral Contraceptive Pills

SES: - Socio Economic Status

WC: - Waist Circumference

WHO: - World Health Organization

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Chapter One: Introduction

Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health. According to WHO, a BMI below 18.5 kg/m^2 is underweight, 18.5 kg/m^2 to 24.9 kg/m^2 is normal, 25.0 kg/m^2 to 29.9 kg/m^2 is overweight and BMI of 30 kg/m^2 or more is obesity. Body mass index (BMI) is a simple index of weight for height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2) [1]. Other indices used to estimate the degree and distribution of obesity include the four standard skin thicknesses sub scapular, triceps, biceps and suprailiac and various anthropometric measures, of which waist and hip circumferences are the most important. Dual-energy X-ray absorptiometry (DEXA) scanning, abdominal CT scanning (at L4-L5) and MRI techniques are used by the researchers for clinical researches [1].

Worldwide obesity has more than doubled since 1980. In 2008, more than 1.4 billion adults, 20 and older, were overweight. Of these over 200 million men and nearly 300 million women were obese. Overall, more than one in ten of the world's adult population was obese. Sixty five percent of the world's population lives in countries where overweight and obesity kills more people than underweight. In 2010, more than 40 million children under five were overweight. Once considered a high income country problem, overweight and obesity are now on the rise in low and middle income countries, particularly in urban settings. Close to 35 million overweight children are living in developing countries and 8 million in developed countries. The prevalence of overweight and obesity are highest in America (62% for overweight in both sexes and 26% for obesity) and lowest in the South-East Asia (14% overweight in both sexes and 3% for obesity). In Europe, Eastern Mediterranean and America, over 50% of women are overweight. For all three of these regions, roughly half of overweight women are obese (23% in Europe, 24% in the Eastern Mediterranean, 29% in the Americas) [1, 4]. In the Western Pacific Region obesity prevalence is highest in the Pacific countries, where some of the highest rates of overweight and diabetes are found, and rapidly increasing in the Asian countries. In all WHO regions, women are more likely to be obese than men. In the WHO regions for Africa, Eastern Mediterranean and South-East Asia, women have roughly double the obesity prevalence of men. It is currently estimated that as much as 20-50% of urban populations in Africa are classified as either overweight or obese and by 2025 three quarters of the obese population worldwide will be in

non-industrialized countries [2]. Reports from study conducted in sub-Saharan Africa showed that the prevalence of urban obesity markedly went up by nearly 42% (from 17.9% to 25.4%) between two successive surveys. The study revealed that the prevalence in overweight and obesity in urban areas ranges from about 23% in Malawi to 35% in Niger and Ghana and 38% in Kenya [2]. Another study conducted in Addis Ababa, Ethiopia showed that about 20% of males and 38% of females were overweight with 10.8 of the females being obese [3].

The etiology of obesity is far more complex than the simple paradigm of an imbalance between energy intake and energy output. It is far more than simply the result of too much eating and/or too little exercise [4]. Two major groups of factors with a balance that variably intertwines in the development of obesity are: genetics which is presumed to explain 40-70% of the variance in obesity and environmental factors. On the other hand, many hormones, neurotransmitters, and neurogenic signals affect appetite and food intake [5]. Weight change can occur through gains and losses in fat deposition and body fluids. These changes can be caused by alterations in dietary habits, physical activity, illness, psychological factors, aging, lifestyle factors, metabolic factors, Genetic factors, behavioral factors, endocrine factors, cultural factors, Socioeconomic status, Pregnancy and child bearing, and history of gestational diabetes [4,5].

Overweight and obesity are linked to more deaths worldwide than underweight. They are the fifth leading risk for global deaths. At least 2.8 million adults die each year as a result of being overweight or obese. 44% of the diabetes burden, 23% of the ischemic heart disease burden and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity [1]. In general overweight and obese individuals are at increased risk for the following health conditions: Cardio metabolic syndrome, Type-2 diabetes, Hypertension, Dyslipidemia, Coronary heart disease, Osteoarthritis, Stroke, Gall bladder disease, Gastro esophageal reflux disease and some cancers (endometrial, breast, and colon) [6]. Women who are overweight or obese during their adult life have a higher risk of: cerebral atrophy which may contribute to cognitive decline [7]. First trimester and recurrent miscarriage [8]. Gestational hypertension, preeclampsia, gestational diabetes, fetal birth weight > 4000 and an increased rate of cesarean delivery [9]. A Swedish study looked specifically at morbidly obese women BMI > 40 and found an increased risk of: Preeclampsia, stillbirth, cesarean delivery, instrumental delivery, shoulder dystocia, meconium aspiration, fetal distress and early neonatal death, large for gestational age (LGA) births,

chorioamnionitis and failed induction [10]. And obese women are also at increased risk of very low rate and short duration of breastfeeding [11].

Weight gain is commonly cited as a side effect of hormonal contraceptives by clients and providers, and is one of the frequent reasons given for method discontinuation [12, 13]. The role of progestin's and estrogens in hormonal contraception and the possible mechanisms through which weight change could occur are complex [14, 15]. However, a recent *Cochrane* systematic review found that there was insufficient evidence to determine the effect of combination contraceptives on weight [16]. The data on progestogen only contraceptives have produced conflicting results, with many studies reporting weight gain in depot-medroxyprogesterone acetate (DMPA) users, while fewer have found no significant weight gains compared with other hormonal method users or nonuser controls [17]. On the other hand, obesity hinders contraception while also contributing to infertility [14]. Several methods of steroid contraception, including oral contraceptive (OC) pills, progesterone only pills, Tran's dermal contraceptive patches, and the vaginal ring have been shown to be less effective in obese women. With obesity rates at epidemic proportions, any association between obesity and strategies that prevent undesired pregnancies constitutes a significant public health and economic concern. Unfortunately; the relationship between obesity and contraception has not been extensively studied [13].

WHO recommends that data of good quality is mandatory on the trends of obesity epidemic especially in developing countries and countries undergoing economic transition to combat the epidemic, however very few studies were available with regard to the nature and magnitude of the problem in Ethiopia and non-available for study area. Therefore this study is aimed at determining the prevalence of obesity among hormonal contraceptive users and non-users and identifying factors associated to overweight/obesity.

Chapter Two: Literature Review

In order to better understand the epidemic of obesity among women of child bearing age and factors associated with it, first, review of literatures on the prevalence of obesity and factors associated to it among women of child bearing age in different parts of the world will be explained. Second, literatures on the relation between hormonal contraception and weight gain will be reviewed in the following session.

In a US study of population drawn from the 2002 National Survey of Family Growth (NSFG) and consisted of non-pregnant female respondents aged 20-44 years with a valid body mass index (BMI) by probability sampling. Angel V. *et al*, found that 24.5% of women were overweight and 23 % were obese. Among those who were obese, 10.3% met the criteria for class II or III obesity according to this study. The study revealed that the odds of being overweight or obese significantly increased with age, ranging from 1.61 times higher among women 30-39 years of age to 1.69 times higher among women 40-44 years of age, compared to women 20-29 years of age. Additional analyses by educational attainment showed that women who had more than a high school education had 27% lower odds of being overweight or obese compared to women with only a 12th grade education. Household income was substituted for educational attainment and demonstrated similar results according to this study [18]. But this study used self reported weight and height to calculate the BMI of the participants and this may lead to bias as people tend to overestimate their height and underestimate their weight. On the other hand the study had used only BMI to determine the prevalence of obesity among the participants, BMI alone may overestimate overweight and obesity in some subgroups and the addition of waist circumference can be used to verify weight status and estimate risk. Yet none response rate for this study is very high (30%).

In another study conducted among 3202 women of child bearing age recruited by cluster sampling technique in Bogotá, Columbia in February 2006. Diane G.*et al* reported that the prevalence's of overweight/obesity and obesity, based on measured height and weight, were 41.9% and 11.6%, respectively. Age and cohabiting with a partner were each positively associated with increased prevalence of overweight/obesity after adjustment for age, but not with obesity alone, whereas the number of household assets and parity were both positively related to

obesity according to this study. The study revealed that higher parity was associated with increased prevalence of obesity after adjusting for age and number of home assets. After adjustment for parity and age, the prevalence of obesity was 68% higher in women who had five or six home assets compared with those who had two or fewer according to this study. Education was not associated with overweight/obesity or obesity. The study found that none of the socio-demographic predictors considered was significantly associated with abdominal obesity in multivariate analysis [19]. However, the results of this study cannot be generalized to all women in Bogota including those of the highest SES, because the women in this study were of low income and middle income families. Finally, they were unable to examine the association between obesity and other SES indicators, such Occupation, Diet and physical activity.

On the other hand, the Thailand study of 6,445 Thai adults (18–70 years) during 2004–2005, found that Overall, 35 % of men, and 44.9% of women were overweight or obese ($BMI \geq 23 \text{ kg/m}^2$) using the Asian cut off points. Regression models demonstrated that age was positively associated with being overweight in both genders according to this study. In gender-stratified analyses, Women who were older, had higher education, were not in a marriage-like relationship and were in semi-professional occupation were at greater risk for being overweight and obese according to this study. High carbohydrate and protein intake were found to be positively associated with BMI whereas the frequent use of dairy foods was found to be negatively associated with BMI among men [20]. However, this study did not collect data on physical activity or waist circumference, which can be used to assess associated factors of overweight and obesity in this sample. Last, BMI alone may overestimate overweight and obesity in some subgroups and the addition of waist circumference can be used to verify weight status and estimate risk.

A case control study conducted among community of Varanasi City, India which included 215 cases (women with $BMI \geq 25$) and 215 non overweight/obese controls revealed that, in univariate analysis age, educational status, occupation, marital status, number of children born were significantly associated with overweight and obesity (cases) as compared to non-overweight women (controls). In multinomial logistic regression analysis odds ratio indicated that age, family type, higher education; housewives by occupation, and more number of children born were significantly associated with increased risk of developing overweight and obesity [21].

In a systematic review of relevant published studies of European countries which identified relevant published studies by means of a MEDLINE search (1990–2008) supplemented by information obtained from regulatory agencies. Anne B. *et al.* found that the prevalence of obesity (body mass index ≥ 30 kg/m²) in women ranges from 6.2% to 36.5%. The study observed considerable geographic variation, with prevalence rates in Central, Eastern, and Southern Europe being higher than those in Western and Northern Europe [22]. However, the validity of this study is limited in self-report estimates and this study reviewed studies that used BMI only, BMI alone may overestimate overweight and obesity in some subgroups and the addition of waist circumference can be used to verify weight status and estimate risk.

In an Australian cross-sectional study conducted between May 1999 and December 2000, which involved participants from 42 randomly selected districts throughout Australia recruited by stratified cluster sampling, Adrian J. *et al.* found that the prevalence of overweight and obesity in both sexes was almost 60%, defined by either BMI or waist circumference. The study showed that the prevalence rates for overweight and obesity were 39.0% and 20.8% respectively, defined by BMI, and 30.5% and 25.5% by waist circumference. The study revealed that the prevalence of obesity by waist circumference was higher in women (34.1%) than in men (26.8%). Using BMI, however, the difference was not significant. Lower educational status, higher television viewing time and lower physical activity time were each strongly associated with obesity, with television viewing time showing a stronger relationship than physical activity time [23]. However, the response rate for this study was 55%, hence lacking representativeness and on the other hand participants with medical illness and pregnant mothers were not excluded.

In another field investigations of 391 married women aged 20 years or over in Basotho Province, North-east Thailand, conducted to elucidate the effects of oral contraceptive use on body mass index and blood pressure, Murayama N. *et al.* (2003) found that the proportion of overweight/obese (BMI ≥ 25) subjects was high in the age groups 30–39, 40–49 and 50–59, accounting for, respectively, 39.4%, 51.1% and 48.5% of these populations. The proportion of women with hypertension (90/140 mmHg) according to this study was 23.7%, 18.5% and 26.2% in the 40–49, 50–59 and 60–69 age groups. The study revealed that socio-demographic factors such as reproductive history, years of education and household income were not significantly related to BMI or to blood pressure. In contrast, the study showed that oral contraceptive users

had significantly higher BMIs and diastolic blood pressures. Multiple regression analysis also revealed that oral contraceptive use was a weak but significant contributing factor to both high BMI and blood pressure when sociodemographic factors were taken into account and controlled for statistically in this study. The study concluded that the use of contraceptive pills, which contain estrogen and progestin and were provided free of charge to Thai women, tend to increase BMI and to elevate blood pressure [24]. This study however used only BMI to determine the prevalence of obesity among contraceptive users and BMI is not the best indicator of obesity, yet the study was not comparative as all participants are on different types of contraception.

Gallo MF *et al* (2008). revealed that the three placebo-controlled, randomized trials did not find evidence supporting a causal association between combination oral contraceptives or a combination skin patch and weight gain. Most comparisons of different combination contraceptives showed no substantial difference in weight according to this study. In addition, discontinuation of combination contraceptives because of weight gain did not differ between groups where this was studied. The study showed that the ORs for the proportions of women who gained or lost more than a set amount were generally either weak or too imprecise to convey much meaning [25].

Sohana *et al.* (2006) conducted study on reproductive age women from rural Bangladesh and selected urban poor areas using data collected by the Nutritional Surveillance Project during 2000–2004. The study showed that while the prevalence of chronic energy deficiency [CED, body mass index (BMI) < 18.5 kg/m²] continues to be major nutritional problem among Bangladeshi women (38.8% rural, 29.7% urban poor) between 2000–2004, 9.1% of urban poor and 4.1% of rural women were overweight (BMI of greater than 25 kg/m²). In addition, 9.8% of urban poor and 5.5% of rural women were found to be ‘at risk of overweight’ (BMI 23.0–<25 kg/m²) according to this study. The study revealed that from 2000 to 2004, prevalence of CED decreased (urban poor: 33.8–29.3%; rural: 42.6–36.6%), while prevalence of overweight increased (urban poor: 6.8–9.1%; rural: 2.8–5.5%). The risk of being overweight was higher among women who were older and of higher socioeconomic status according to this study. Rural women with at least 14 years of education had an 8.1-fold increased risk of being overweight compared with non-educated women [26]. However this study used only BMI to determine the prevalence of obesity and BMI alone may overestimate overweight and obesity in some

subgroups and the addition of waist circumference can be used to verify weight status and estimate risk. Yet hormonal contraception use was not considered as one of the variable.

Sherina *et al.* (2004) conducted community based cross sectional study in Selangor Malaysia among Women aged 20–59 years old who were selected by multi stage stratified proportionate to size sampling method. The prevalence of obesity among the respondents was found to be 16.7% (mean = 1.83 ± 0.373). Obesity was found to be significantly associated with age, ethnicity, religion, schooling, educational level, marital status and the history of suffering a miscarriage within the past 6 months [27] according to this study. However this study used only BMI to determine the prevalence of obesity and BMI alone may overestimate overweight and obesity in some subgroups and the addition of waist circumference can be used to verify weight status and estimate risk. Yet hormonal contraception use was not considered as one of the variable.

In a population-based cross-sectional study conducted in Golestan Province (north Iran) in which stratified cluster sampling based on age and sex was used to enroll 2471 subjects (1250 males and 1221 females) in 2006. G Veghari reported that the prevalence of central obesity was 32.0% and it was approximately three times more prevalent in women than in men and four times more in married subjects than in single subjects. The study revealed that central obesity markedly increased with age and that it was prevalent five times more in 45-55 years age group than in 15-25 years age group. WC has a positive correlation with age and it was significantly increased in uneducated people than in educated people according to this study. The study showed that WC was negatively correlated with physical activity and increased up to 3.22 cm for ten years increase in age. Results of Logistic regression showed that gender, marital status, age group and educational level were significantly associated with central obesity, while physical activity and economic status were not [28].

In another Turkish study of 5016 subjects (2728 women and 2288 men) recruited by Random cluster sampling conducted in the central province of Trabzon northeastern Part of Turkey, from February 2001 to September 2002, the prevalence of obesity was 23.5%: 29.4% in women and 16.5% in men. The combined prevalence of both overweight and obesity was 60.3%. The prevalence of abdominal obesity was 29.4%: 38.9% among women and 18.1% among men. The prevalence of obesity increased with age, being highest in the 60- to 69 year's old age group (40.8%). Obesity was associated positively with marital status, parity, cessation of cigarette

smoking, alcohol consumption, and household income and inversely with level of education, cigarette use and physical activity. According to waist girth, prevalence of central obesity was 29.4%; 38.9% in women and 18.1% in men. The prevalence was higher in women than in men [29].

In another study conducted using data from all sub-Saharan African countries with a DHS containing women's nutritional status conducted between 1992 and 1993 and another one carried out in 2003 or later in 2008. Abdalla K. *et al.* (2009) reported that the prevalence of urban obesity markedly went up by nearly 42% (from 17.9% to 25.4%) between survey 1 and survey 2. Over the same period, the prevalence of overweight rose by 14.5%, and the prevalence of overweight/obesity increased by 35.5% according to this study. The study revealed that urban women were almost three times more likely to be overweight or obese compared to their rural counterparts. The prevalence in overweight and obesity in urban areas ranges from about 23% in Malawi to 35% in Niger and Ghana and 38% in Kenya according to this study. The study showed that the increase in prevalence of overweight obesity was higher among the poorest (+50% from 13.7% to 20.5%) than among the richest (+7% from 35.4% to 37.9%). While the prevalence of overweight/obesity increased by about 45-50% among the non-educated and primary-educated women, it dropped down by close to 10% among women with secondary education or higher according to this study. Multivariate analysis shows that the overall likelihood of overweight and obesity increased over time in urban areas. The odds ratio of the variable *time lapse* was 1.05 indicating that the prevalence of overweight/obesity increased by about 5% per year on average in the countries in the study according to this study. The study showed that all socioeconomic variables included in the analysis were strongly associated with overweight/obesity. Women from the richest households were more than three times as likely as their counterparts from the poorest households to be overweight or obese, women with secondary or higher education were about 60% more likely to be overweight or obese compared to their counterparts with no education and working women were more than 13% more likely to be overweight or obesity as compared to their counterparts who were not working according to this study. With regard to demographic covariates urban overweight/obesity increases with age and to a lesser degree, with parity (though women with six or more children were less likely than those with 4-5 children to be overweight or obese). Currently married women were more likely to be overweight or obese than those who had never been married. Finally, this study revealed that country differences in the

prevalence of urban overweight/obesity were apparent in the multivariate results; accordingly Malawi had the lowest prevalence followed by Burkina Faso. At the other end of the scale, Kenya and Niger (1.49) recorded the highest risk of urban overweight/obesity. Kenya and Tanzania had comparable rate of change over time, while the three remaining countries recorded significantly lower rate of increase in overweight/obesity [30]. However the female population used in this study was not representative of the entire women of childbearing age, given that the anthropometric measurements in the DHS are restricted to women who had given birth in the five years preceding the survey. Lastly, this study used only BMI, BMI alone may overestimate overweight and obesity in some subgroups and the addition of waist circumference can be used to verify weight status and estimate risk. Furthermore the effect of hormonal contraception was not considered in this study.

In another study among Tanzanian adults aged 18 - 65 years in Dar es Salaam; from April 2007 to April 2008 to determine the prevalence of obesity among 1249 adults recruited by simple random sampling, the overall prevalence of obesity was found to be 19.2 % (240/1249). However, the study revealed that obesity was significantly more prevalent in women (24.7%) than men (9%) among Respondents with high socio-economic status (29.2%) as compared to those with medium (14.3%) and low socioeconomic status (11.3%), and among respondents with light intensity activities (26.0%) [31]. But this study had excluded women on hormonal contraception from the study and didn't address the effect of hormonal contraception, yet the study used only BMI to determine the prevalence of obesity among participants.

Carlos S.*et al.* (2010) in a Cross-Sectional Study of four Western Sahara refugee camps in Algeria by implementing stratified nutrition survey of 1,781 women (15–49 y), among the women, 14.8% were found to be stunted, 53.7% were overweight or obese, and 71.4% had central obesity. This study found that Central obesity (71.4) and overweight (38.8%) in women affected a higher proportion of households than did GAM (7.0%), stunting (19.5%), or underweight (13.3%) in children. Overall, the study revealed that households classified as overweight (31.5%) were most common, followed by undernourished (25.8%), and then double burden-affected (24.7%) [32]. However, this study failed to examine the differences between prevalence's of obesity among contraceptive users and non-users.

Another Ethiopian population based, cross sectional survey of a probabilistic sample of 3713 adult males and females, 25–64 years of age residing in Addis Ababa found that about 20% of males and 38% of females were overweight (body-mass-index ≥ 25 kg/m²), with 10.8 (9.49, 12.11) % of the females being obese (body-mass-index ≥ 30 kg/m²). Similarly, 17% of the males and 31% of the females were classified as having low level of total physical activity in this study. (9) However this study used BMI, BMI alone may overestimate overweight and obesity in some subgroups and the addition of waist circumference can be used to verify weight status and estimate risk and hormonal contraception use was not considered in this study.

Another longitudinal 2 years follow up cohort study of reproductive-age women in the Central Pennsylvania, found that among women of normal weight at baseline, 18% became overweight or obese by follow-up, where as 25% of women overweight at baseline became obese. In multiple regression analyses, low physical activity at baseline was significantly associated with a 2-fold elevation in the odds of transitioning from normal BMI to overweight/ obesity as was having an interim live birth according to this study. On the other hand, the study found that demographics lower education and younger age were the only significantly predictors of transition from overweight to obesity [33].

Conceptual framework

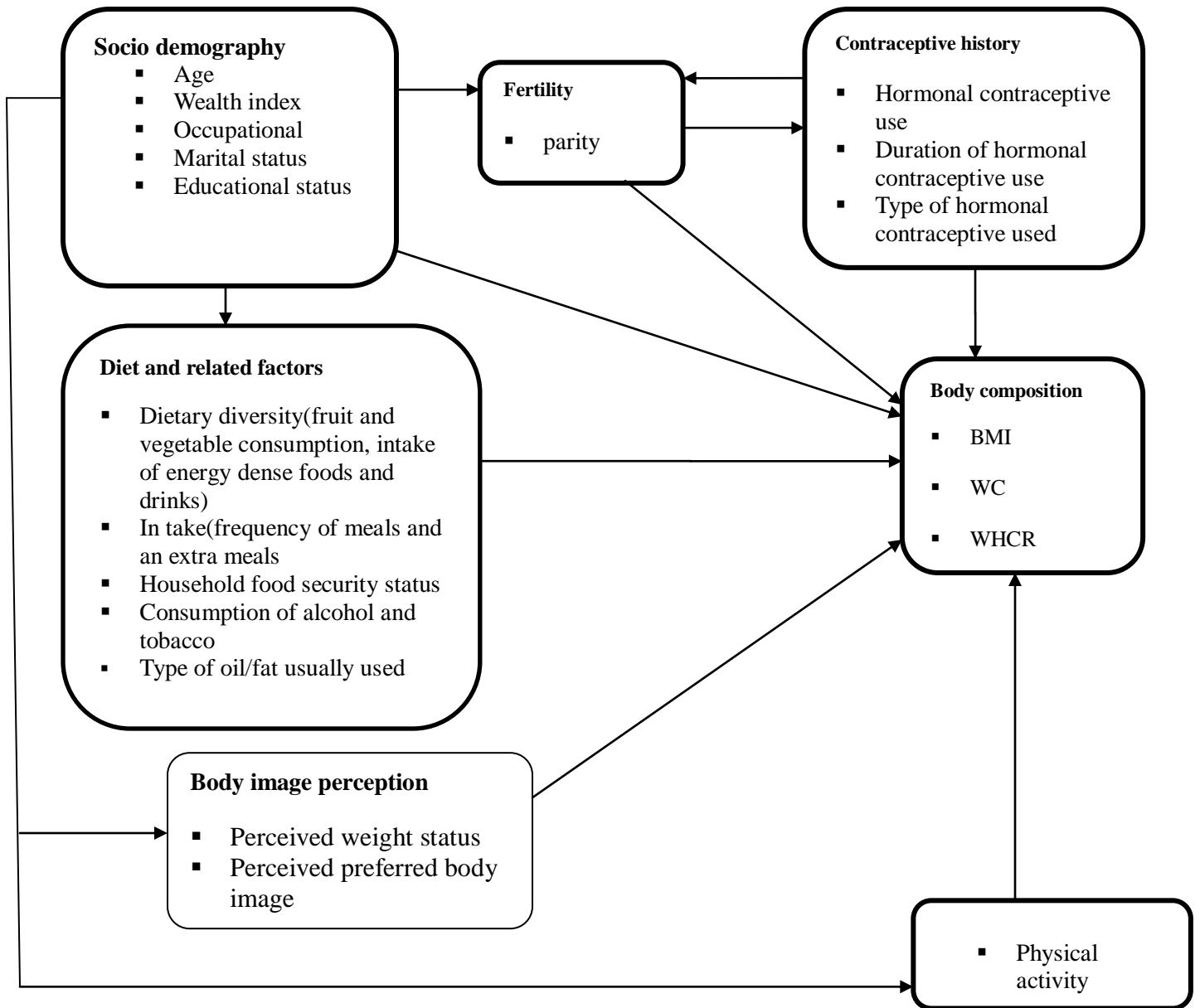


Figure: 1 Conceptual framework of the study

Significance of the Study

Most of the studies aimed at determining the prevalence of overweight/obesity among women of child bearing age had used only BMI, some of them had used self-reported weight and height to calculate BMI, others still used secondary data from national demographic health surveys to determine the prevalence of obesity. In all of these cases it will be difficult to obtain valid and representative results, not only due to the fact that BMI alone may overestimate overweight and obesity in some subgroups, but also due to lack of quality of measurement obtained from self-reports of participants. Yet none of the studies aimed at determining the prevalence of overweight and obesity among women of child bearing age had examined the difference in prevalence of overweight and obesity between hormonal contraceptive users and non-users. This study will determine the prevalence of overweight and obesity among contraceptive users and non-users and furthermore it will identify factors associated with overweight and obesity among women of child bearing age. Results from this study is expected to provide necessary information encouraging health care providers particularly urban health extension workers in Ethiopian context to conduct appropriate and effective interventions to prevent obesity among women of child bearing age. For the policy makers, this study will be utilized to reduce personal, policy and environmental factors that contribute to overweight and obesity among women of childbearing age. The study will also provide basic information that can be compared with findings in other countries and for guiding the direction of future studies.

Chapter Three: Objectives

3.1. General objective

To determine the prevalence of overweight and obesity among contraceptive users and non-users and identify associated factors among women in the age range of (25-49) in Jimma Town from March, 6-13/2013.

3.2. Specific objectives

- To determine the prevalence of overweight and obesity among hormonal contraceptive users and nonusers.
- To identify factors associated with overweight and obesity among 25-49 years old women.

3.3. Research question and hypothesis

Is there a difference in prevalence of overweight and obesity between hormonal contraceptive users and nonusers?

Hypothesis of the study

Ho: The prevalence of overweight and obesity is higher among hormonal contraceptive users than nonusers or the same for both groups.

Ha: prevalence of overweight and obesity is higher among hormonal contraceptive users than nonusers.

Chapter Four: Methods and Materials

4.1. Study area and period

The study was conducted in Jimma Town, which is located 357km south-west of Addis Ababa. During the 2007 Census the total population of the town was 120,960, of whom 60,824 were males and 60,136 were females. With an area of 50.52 square kilometers, it has a population density of 2,394.30. There are a total of 32,191 households in the town [35]. The study was conducted from March 6-13/2013.

4.2. Study design

A community based comparative cross-sectional study was employed

4.3. Source population

Women in the age range (25-49) who are residents of Jimma Town.

4.4. Study population

Study participants were randomly selected women in the age group (25-49) from the residents in Jimma Town.

4.5. Sample size

Sample size was calculated using EPI-Info 6.04 statistical software. The assumptions for the sample size calculation were: proportion of obesity among non-users taken to be 50% and an odds ratio of 1.54 [24], 80% power, 95% confidence interval, 10% non-response rate and a contraceptive user to non-user ratio of 1:1. The total sample size was 686 (343 contraceptive users and 343 non users).

4.6. Sampling technique

Simple random sampling technique was employed.

4.7. Sampling procedure

Census was conducted to identify all contraceptive users and non-users. Using the sampling frame of contraceptive users and non-users from the census, 343 contraceptive users and 343 nonusers were recruited by simple random sampling technique using computer generated random numbers. In cases where there were more than one women of child bearing age in the same house, only one woman was included by lottery method.

4.8. Inclusion criteria

- Women in the age range of (25-49) who are residents of Jimma town and
- Women who have been using hormonal contraceptive for at least the last two years or who have not used hormonal contraceptive for the last two years

4.9. Exclusion criteria

- Pregnant women
 - Non users who had not seen their menses for the last two successive menstrual cycles from data collection period and
- Mothers who were less than six months postpartum
- Hormonal contraceptive users of less than two years

4.10. Data collection technique

Data were collected by interviewer administered questionnaire and anthropometric measurement. WHO steps approach instrument for collecting surveillance data for chronic non-communicable diseases [36] was used to collect data on socio-demographic characteristics and four behavioral risk factors tobacco use, alcohol consumption, diet and physical activity. To assess the smoking status the question focuses on current daily cigarette smoking, duration and quantity of daily smoking, then the variable tobacco use was tricotomized as current daily smoker, smoker not daily and non-smoker. Frequency and quantity of alcohol consumption was measured and alcohol consumers were categorized as life time abstainers, non-heavy drinkers, infrequent heavy drinkers and frequent heavy drinkers. Information on household food security, frequency of an extra meal(snack), frequency of junk foods, frequency of red meat, frequency of chicken meal, amount of sugar usually added to tea/coffee, type of oil/fat most used for meal preparation and frequency of fruit and vegetable intake was collected and 5 or more servings of fruit and vegetable per week was considered sufficient whereas less than 5 serving of fruit and vegetable per week was considered insufficient fruit and vegetable intake. Level of physical activity was measured by considering the total time spent in physical activity during a typical week, the number of days as well as the intensity of the physical activity. Respondents were classified based on the three levels of physical activity suggested for classifying populations:

High intensity physical activity: Vigorous-intensity activity such as carrying heavy loads, heavy construction, digging, shoveling, sawing wood, running and strenuous sports on at least 3 days achieving a minimum of at least 1,500 MET-minutes/week OR 7 or more days of any combination of walking, moderate or vigorous intensity activities achieving a minimum of at least 3,000 MET-minutes per week.

Moderate intensity physical activity: A person not meeting the criteria for the "high" category, but meeting any of the following criteria is classified in this category: 3 or more days of vigorous-intensity activity of at least 20 minutes per day, Or 5 or more days of moderate-intensity activities such as cleaning, farming, painting/plastering, gardening, swimming, climbing stairs or walking of at least 30 minutes per day Or 5 or more days of any combination of walking, moderate or vigorous intensity activities achieving a minimum of at least 600 MET-minutes per week.

Low intensity physical activity: A person not meeting any of the above mentioned criteria falls in this category.

The steps questionnaire was modified with expanded and optional questions to suit local needs. Extended questions were questions in the steps instrument which can be modified by adding locally relevant response options. Optional questions were new questions added to the instrument because they were deemed locally important. All the modifications were made in accordance with the WHO steps manual. The questionnaire was translated in to Afan Oromo then it was back translated by independent translators to ensure the appropriate meaning of each item was retained. The questionnaire and physical measurement sections of the steps instrument have been previously validated and subsequently applied in predominantly rural settings in developing countries including Ethiopia [37].

4.11. Measurements

Weight was measured in bare feet without heavy clothing using Seca digital scales and it was recorded to the nearest 100 g. Height was measured in bare feet without headwear using a Seca Stadiometer and it was recorded to the nearest 0.1cm. Waist circumference was measured at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest, using a non-stretchable tape. Hip circumference was measured around the widest portion of the buttocks, with the tape parallel to the floor. For both measurements, the subject stood with feet close together, arms at the side and body weight evenly distributed and wearing little clothing. The subject relaxed and the measurement was taken at the end of a normal expiration.

4.12. Data collectors

Data were collected by six trained nurses.

4.13. Data quality assurance

Training was given on standardized data collection procedure including practical training on anthropometric measurements. The questionnaire was tested on 5% of sample prior to data collection and weighing scale was calibrated regularly. Each anthropometric measurement was done twice; if the measurements were within 1 cm difference, the average was calculated. In the where the difference between the two measurements exceeded 1 cm, the two measurements were repeated. Some anthropometric measurements were repeated on randomly selected participants daily by principal investigator and research assistant to ensure reliability of data.

4.14. Variables of the study

4.14.1. Dependent variables

- BMI
- WHCR
- WC

4.14.2. Independent variables

Socio-demographic variables

- Age
- Educational status
- Marital status
- Occupation
- Wealth index

Hormonal contraceptive use

- Ever use of hormonal contraceptives
- Hormonal contraceptive use in the last 2years
- Duration hormonal contraceptive use
- Type of hormonal contraceptive used

Diet and related factors habits

- Fruit and vegetable consumption
- Type of oil/fat usually used for meal preparation
- Frequency of snacks/an extra meal/
- Frequency of fast food
- Frequency of junk food
- Amount of sugar usually added to tea/ coffee
- Frequency of red meat
- Alcohol consumption
- Tobacco use
- Household food security

Body image perception

- Perceived weight status
- Perceived preferred body image

Physical activity

Parity

4.15. Data analysis

Data were entered, cleaned and analyzed using SPSS for windows version 16. Frequencies and proportions were calculated for descriptive presentation of the findings. A bivariate analysis was conducted to select candidate variables at P value of 0.25. Finally multivariable logistic regression was fitted to isolate an independent predictors of overweight/obesity. Results were presented using 95% confidence intervals and adjusted odds ratios. $P < 0.05$ was used to determine statistical significance.

4.16. Ethical consideration

Ethical clearance was obtained from the Ethical Review Committee of Jimma University and permission to conduct the study was obtained from local authorities and verbal consent was obtained from all participants.

4.17 Operational definition

- Underweight: a BMI of less than 18.5kg/m^2
- Overweight: a BMI greater than $25 - 29.9\text{kg/m}^2$
- Obesity: a BMI greater than 30kg/m^2
- One serving of fruit and vegetable: One cup for vegetables, half cup for vegetable juice, 1 medium size piece for fruit, half cup for chopped, cooked, canned fruit and half cup for fruit juice (juice from fruit not artificially flavored).
- Hormonal contraceptives: Refers to birth control methods that act on the endocrine system and composed of steroid hormones
- Contraceptive user: Refers to woman of child bearing age who had been on hormonal contraceptive for at least the last two years and continued using during the study period.
- Non user: Refers to woman of child bearing age who had never used hormonal contraceptive or who had discontinued hormonal contraceptive use at least two years ago.
- High intensity physical activity: A person reaching any of the following criteria is classified in this category: Vigorous-intensity activity such as carrying heavy loads, heavy construction, digging, shoveling, sawing wood, running and strenuous sports on at least 3 days achieving a minimum of at least 1,500 MET-minutes/week OR 7 or more days of any combination of

walking, moderate or vigorous intensity activities achieving a minimum of at least 3,000 MET-minutes per week.

- Moderate intensity physical activity: A person not meeting the criteria for the "high" category, but meeting any of the following criteria is classified in this category: 3 or more days of vigorous-intensity activity of at least 20 minutes per day. OR 5 or more days of moderate-intensity activities such as cleaning, farming, painting/plastering, gardening, swimming, climbing stairs or walking of at least 30 minutes per day OR 5 or more days of any combination of walking, moderate or vigorous intensity activities achieving a minimum of at least 600 MET-minutes per week.
- Low intensity physical activity: A person not meeting any of the above mentioned criteria falls in this category.
- Life time abstainers: are individuals who had never consumed any standard alcoholic drink in their life
- Non-heavy drinkers: less than five standard drinks per week
- Infrequent heavy drinkers: 1-2 days with 5 or more standard drinks per week.
- Frequent heavy drinkers: 3 or more days with 5 or more standard drinks per week.
- Sufficient fruit and vegetable intake: 5 or more servings of fruit and vegetable on average per day.
- Insufficient fruit and vegetable intake: Less than 5 servings of fruit and vegetable on average per day
- A standard drink: is the amount of ethanol contained in standard glasses of beer, wine, fortified wine such as sherry, and spirits. Depending on the country, these amounts will vary between 8 and 13 grams of ethanol.
- Fruit: The ripened seed bearing part of a plant when fleshy and edible like apple, banana, orange, etc.
- Household food security status is categorized based on household food insecurity access scale. A household is food secure if [(Q39a=0 or Q39a=1) and Q40=0 and Q41=0 and Q42=0 and Q43=0 and Q44=0 and Q45=0 and Q46=0 and Q47=0]. Mildly food insecure if [(Q39a=2 or Q39a=3 or Q40a=1 or Q40a=2 or Q40a=3 or Q41a=1 or Q42a=1) and Q43=0 and Q44=0 and Q45=0 and Q46=0 and Q47=0]. Moderate food insecure if [(Q41a=2 or Q41a=3 or Q42a=2 or Q42a=3 or Q43a=1 or Q43a=2 or Q44a=1 or Q44a=2) and Q45=0 and Q46=0 and Q47=0]. Severely food insecure if [Q43a=3 or Q44a=3 or Q45a=1 or Q45a=2 or Q45a=3 or Q46a=1 or Q46a=2 or Q46a=3 or Q47a=1 or Q47a=2 or Q47a=3]

4.18. Plan for dissemination of the study result

Formal final report will be presented and submitted to Jimma University College of public health and medical science department of population and family health, Jimma town health office, Jimma zonal health department and Oromia regional health bureau. The findings of the study will also be presented on different conferences. Furthermore an effort will be made to publish the study on both national and international journals. The finding will be used as a baseline for further studies; development of guidelines on strategies to prevent obesity in urban areas for urban frontline health professionals and as input for health professionals providing family planning service.

Chapter Five: Result

5.1. Characteristics of study participants

5.1.1. Socio-demographic characteristics

A total of 686 women were recruited and visited. Of which 666 women participated in the study, giving a response rate of 97.0%. Ten hormonal contraceptive users and 8 nonusers refused to participate in the study and two of hormonal contraceptive users were dropped to get one to one ratio of users to nonusers. The age of the respondents ranged from 25 to 49 years. Large proportion 37.0% (33.6% nonusers and 40.2% of hormonal contraceptive users of the respondents was in the age group between 25-29) and followed by those in the age group of 30 – 34 accounting for 31.9% (33.0% nonusers and 30.6%); Whereas only 22 (3.3%), (1.8% of nonusers and 4.8% of users) were in the age group of 45-49. Large proportion of respondents 33.3% (34.8% of non users and 31.8% of users) were self employed, followed by those who were government employee 18.0% (15.3% non users and 20.7% hormonal contraceptive users) and home maker 14.7% (14.1% of nonusers and 15.3% of hormonal contraceptive users); non-paid respondents account for 6% (6.3% of nonusers and 5.7% of hormonal contraceptive users). With regard to marital status of study participants, majority 61.7 % (63.7% of nonusers and 59.7% of hormonal contraceptive users) were currently married, 99 (14.9%) (13.2% non users and 16.5% of hormonal contraceptive users) were never married, 60 (9.0%) (10% of nonusers and 8.1% of hormonal contraceptive users) were divorced, 50 (7.5%), (6.9% nonusers and 8.1% hormonal contraceptive users) were separated and 46 (6.9%) (6.3% of nonusers and 7.5% of hormonal contraceptive users) were widows. Three hundred ninety six (59.5%), (of the women had formal education and 270 (40.6%) had no formal education. Of those who had formal education 34.2% had 1-8 years of schooling, 14.0% had above 13 years of schooling, and 11.3% had 9-12 years of schooling. Of 270, with no formal education 159 (58.9%) can read and write whereas 111 (16.7%) cannot read and write. Regarding ethnicity of the study participants, 309 (46.4%) were Oromo, 113 (17.0%) were Amhara, 72 (10.8%) were Dawro and 171 (25.7%) were from one of the ethnic groups Gurage, Silte, Yem and Tigre. Majority 227 (34.1%) of the study participants had given 1-2 births, 157 (23.6%) had given 3-4 births, 90 (13.5%) were Nulliparous and only 13 (0.5%) had given more than 9 births. (**Table1**)

5.1.2. Dietary and lifestyle characteristics of study participants

Six hundred sixteen (92.5%), (90.7% of nonusers and 94.3% of hormonal contraceptive users) were from food secure households, 28(4.2%), (5.7% of nonusers and 2.7% hormonal contraceptive users) were from mildly food insecure households, 14(2.1%), (2.7% of non users and 1.5% of hormonal contraceptive users) were from moderately food insecure households and 8(1.2%) (0.9% of nonusers and 1.5% of hormonal contraceptive users) were from severely food insecure households. Majority 68.5 % (had an extra meal/snacks/ some times, 107(16.15) had snacks every day and 103 (15.5%) rarely had snacks. 444(66.7%), (69.4% of nonusers and 66.7% hormonal contraceptive users) consumed red meat 1-3 times a week. One hundred twenty eight (19.2%), (15.6% of nonusers and 12.6% of hormonal contraceptive users) consumed red meat rarely and 94(14.1%), consumed red meat once a month. Two hundred fifty four (38.1%), (40.2% of nonusers and 36.0% of users) rarely eat fast food meal, 214(32.1%), 30.6% of nonusers and 33.6% of hormonal contraceptive users) eat fast food meal twice or more per week, 198(29.7%), (29.1% of nonusers and 30.3% of hormonal contraceptive users) eat fast food meal once a week. Majority five hundred fifty two (82.9%), (82.0% of nonusers and 83.8% of hormonal contraceptive users) had insufficient fruit and vegetable intake, whereas 114(17.1%), 18.0% of nonusers and 16.2% of hormonal contraceptive users) had sufficient fruit and vegetable intake. Four hundred twenty (63.1%), (60.7% of nonusers and 65.5% of hormonal contraceptive users) mostly use vegetable oil for meal preparation, 154(23.1%), (22.8% of nonusers and 23.4% of hormonal contraceptive users) use butter/ghee oil and 92(13.8%), (16.5% of nonusers and 11.1% of hormonal contraceptive users) use lard/suet oil. Majority 363(54.5%), (52.6% of nonusers and 65.5% of hormonal contraceptive users) were physically active taking part in various activities that are labeled as vigorous physical activity, 255(38.3%), (40.5% of nonusers and 36.0% of hormonal contraceptive users) were moderately physically active, whereas 48(7.2%), (6.9% of nonusers and 7.5% of hormonal contraceptive users) had low physical activity. (**Table 2**)

Table 1: Socio-demographic characteristics of study participants by hormonal contraceptive use

Variables	Frequencies (%)		
	Nonusers(N=333)	Users(N=333)	Total(666)
Age group			
25-29	112(33.6)	134(40.2)	246(36.9)
30-34	110(33.0)	102(30.6)	212(31.8)
35-39	77(23.1)	57(17.1)	134(20.1)
40-44	28(8.4)	24(7.2)	52(7.8)
45-49	6(1.8)	16(4.8)	22(3.3)
Educational status			
Illiterate	56(18.8)	55(16.5)	111(16.7)
Can read and write no formal education	82(24.6)	77(23.1)	159(23.9)
1-8 years of education	115(34.5)	113(33.9)	228(34.2)
9-12 years of education	32(9.6)	43(12.9)	75(11.3)
>= 13 years of education	48(14.4)	45(13.5)	93(14.0)
Occupational status			
Government employee	51(15.3)	69(20.7)	120(18.0)
Non-government employee	52(15.6)	42(12.6)	94(14.1)
Self employed	116(34.8)	106(31.8)	222(33.3)
Non paid	21(6.3)	19(5.7)	40(6.0)
Student	46(13.8)	46(13.8)	92(13.8)
Home maker	47(14.1)	51(15.3)	98(14.7)
Marital status			
Never married	44(13.2)	55(16.5)	99(14.9)
Currently married	212(63.7)	199(59.7)	411(61.7)
Divorced	33(9.9)	27(8.1)	60(9.0)
Widowed	21(6.3)	25(7.5)	46(6.9)
Separated	23(6.9)	27(8.1)	50(7.5)
Ethnicity			
Oromo	145(43.5)	164(49.2)	309(46.4)
Amhara	65(19.5)	49(14.7)	114(17.1)
Dawuro	40(12.0)	32(9.6)	72(10.8)
Others	83(24.9)	88(26.4)	171(25.7)

Table 2: distribution of study participants by dietary and lifestyle characteristics

Variables	Frequencies (%)		
	Nonusers(N=333)	Users(N=333)	Total(666)
House hold food security			
Food secure	302(90.7)	314(94.3%)	616(92.5%)
Mildly food insecure ace	19(5.7)	9(2.7)	28(4.2)
Moderately food insecure	9(2.7)	5(1.5)	14(2.1)
Severely food in secure ac	3(0.9)	5(1.5)	8(1.2)
Level of physical activity			
High intensity	175(52.6)	188(56.5)	363(54.5)
Moderate intensity	135(40.5)	120(36.0)	255(38.5)
Low intensity	23(6.9)	25(7.5)	48(7.2)
Alcohol consumption			
Life time abstainer	305(91.6)	315(94.6)	620(93.1)
Non heavy drinkers	14(4.2)	8(2.4)	22(3.3)
Infrequent heavy drinkers	8(2.4)	6(1.8)	14(2.1)
Frequent heavy drinkers	6(1.8)	4(1.2)	10(1.5)
Tobacco use			
Non smoker	322(96.7)	320(96.1)	642(96.4)
Current daily smoker	4(1.2)	5(1.5)	9(1.4)
Smoker not daily	7(2.1)	8(2.4)	15(2.3)
Fruit consumption			
Insufficient	273(82.0)	279(83.8)	552(82.9)
Sufficient	60(18.0)	54(16.2)	114(17.1)
Type of oil used			
Vegetable oil	201(60.7)	218(65.5)	420(63.1)
Lard /suet	55(16.5)	37(11.1)	92(13.8)
Butter/ghee	76(22.8)	78(23.4)	154(23.1)
Frequency of fast food			
Never	134(40.2)	120(36.0)	254(38.1)
Once	97(29.1)	101(30.3)	198(29.7)
Twice or more	102(30.6)	112(33.6)	214(32.1)
Frequency of red meat			
Never/rarely	68(20.4)	60(18.0)	128(19.2)
1-3 times a week	213(64.0)	231(69.4)	444(66.7)
Once a month	52(15.6)	42(12.6)	94(14.1)
Sugar added to tea/coffee			
1/2tea spoon	42(12.6)	32(9.6)	74(11.1)
1 tea spoon	55(16.5)	62(18.6)	117(17.6)
2 tea spoon	235(70.6)	238(71.5)	473(71.0)
More than 2	1(0.3)	1(0.3)	2(0.3)

Majority of hormonal contraceptive users 184 (55.3%) had used hormonal contraceptives for 2-4 years, 97(29.1%) for 5-8 years and 52 (15.6%) for more than 8years. Majority168 (50.5%) were using inject able (Depo-Provera), 87(26.1%) were using OCP, 40(12.0%) were using Implanon and 38 (11.4%) were using Norplant during the study period. **(Figure 2)** One hundred eighty six (28.0%), (24.3% of users and 31.5% of nonusers) perceived their weight as somewhat thin, whereas 84(12.6%),(14.4% of users and10.8% nonusers) perceived as very thin. Out of one hundred eighty six who perceived their weight status as somewhat thin, 16(32.7%) and 41(26.6%) were actually obese and overweight based on BMI respectively, whereas 97(25.5%) and 32 (38.5%) were actually normal and underweight respectively. One hundred eighty two (27.3%), (28.2% of users and 26.4% of nonusers) thought they were normal but BMI revealed that 18(36.7%) and 42(27.3%) were obese and overweight respectively, whereas 105 (27.6%) and 17(20.5%) where normal and underweight respectively. **(Figure3)**. With Regard to perceived preferred body image two hundred forty three (36.5%), (37.8 of users and 35.1% of nonusers) preferred to have a body image representing overweight, 198(29.7%),(32.1% of users and 27.3% nonusers) preferred to have a body image representing normal body weight, whereas 97(14.6%),(12.6% of users and 16.5% nonusers) preferred to have a body image representing obesity. Out of 97 participants who preferred to have obese body image, 5(5.2%) were obese, 20(20.6%) were overweight and 58(59.8%) were normal.

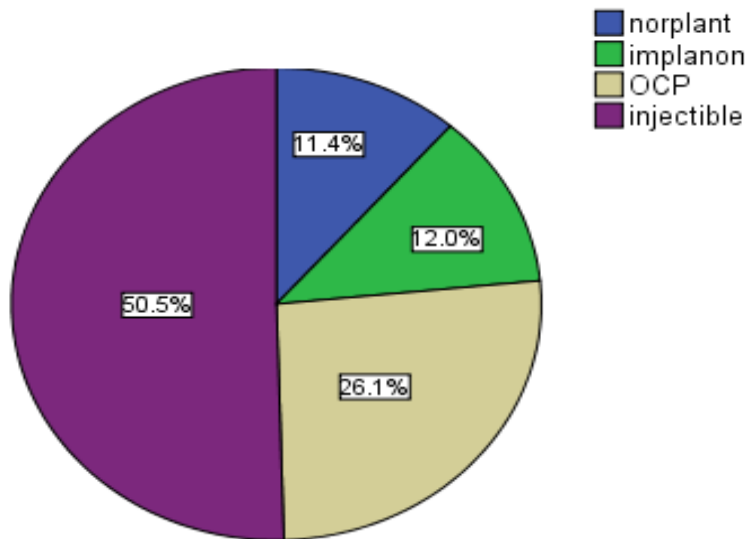


Figure 2: distribution of hormonal contraceptive users by the method of hormonal contraceptives being used during study period.

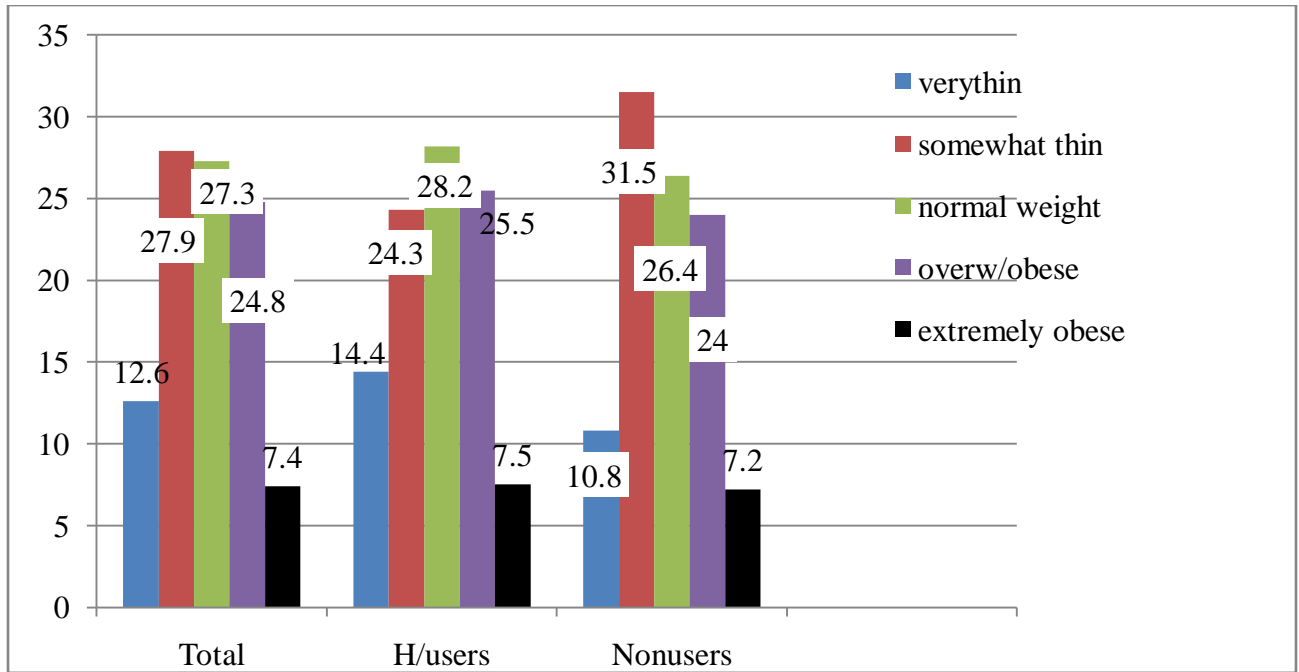


Figure 3: Distribution of study participants by perceived weight status

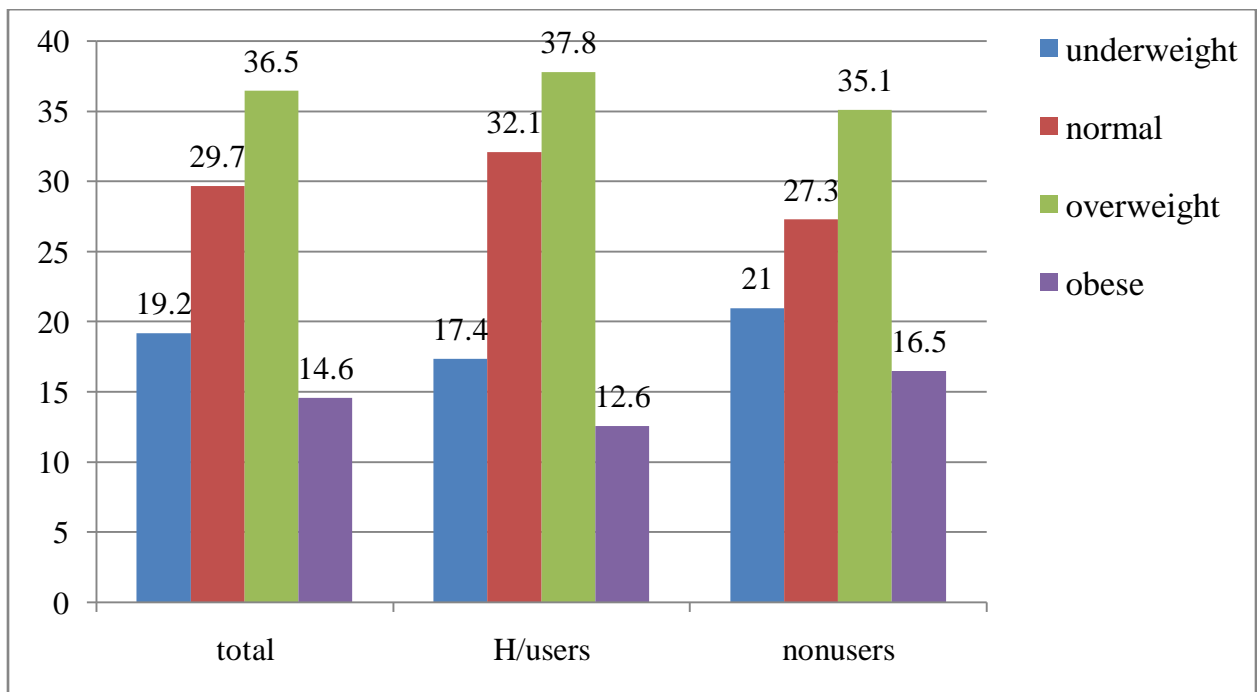


Figure 4: Distribution of study participants by perceived preferred body image

5.2. Anthropometry

The mean BMI (kg/m^2) (SE), waist circumference (cm) (SE), and waist-to-hip circumference ratio of the study participants were 23.3(0.17), 72.0(0.39) and 0.81(0.01), respectively. Users of hormonal contraceptives in this study have significantly (P -value < 0.05) higher BMI, WC, and WHCR than the non-users; where the mean BMI, WC and WHCR of users vs. non-users were 23.87 vs. 22.68, 73.0 vs. 70.9 and 0.82 vs. 0.79 respectively. When participants are grouped by BMI cutoffs, 12.5%, 57.0%, 23.1% and 7.4% are in the BMI categories <18.5 , 18.5-24.9, 25.0-29.9 and ≥ 30.0 , respectively (**Figure 5**). The prevalence of overweight (BMI of 25.0-29.9) and obesity (BMI ≥ 30.0) were 23.1% and 7.4% among the study participants with 24.3% and 10.2% in the hormonal contraceptive users and 21.9 and 4.5 in the non-users. The hormonal contraceptive user group has significantly higher prevalence of both overweight ($P=0.025$) and obesity ($P=.005$) than the nonuser group. The difference was particularly large in the age group (30 – 34 years), where the ratio of prevalence of obese hormonal contraceptive users to obese nonusers was over two (13% versus 6%). The proportion of study participants who were centrally obese based on waist circumference ($\geq 80\text{cm}$) and WHCR (≥ 0.85) cutoffs were 21.0% and 18.5%, respectively (**Figure7&8**). The prevalence of central obesity based on WC was significantly higher among the hormonal contraceptive user group than the non-user group (user vs. non-user prevalence was 24.9% vs. 17.1%; $P=0.013$). Similarly, the proportion of subjects with WHCR (≥ 0.85) was significantly higher for the hormonal contraceptive user group than the non user group (user vs. nonuser was 21.6% vs.15.3%, $P=0.036$)

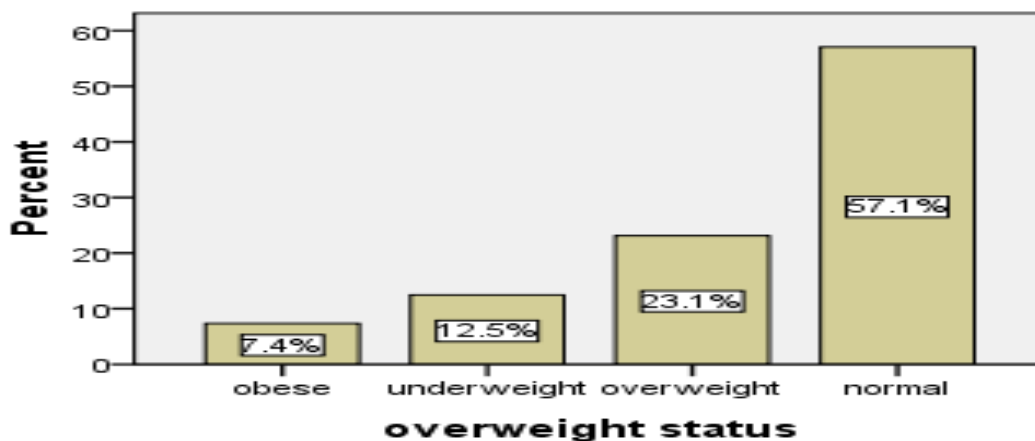
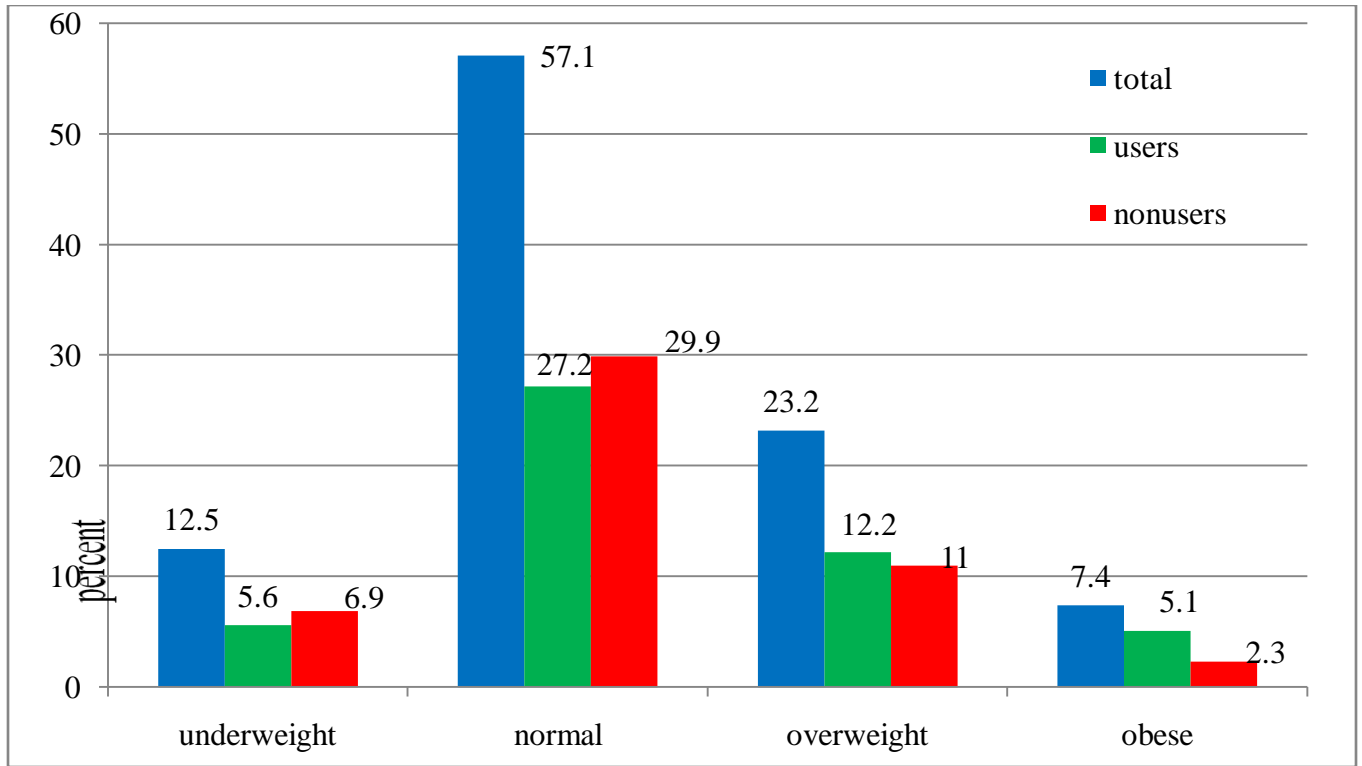
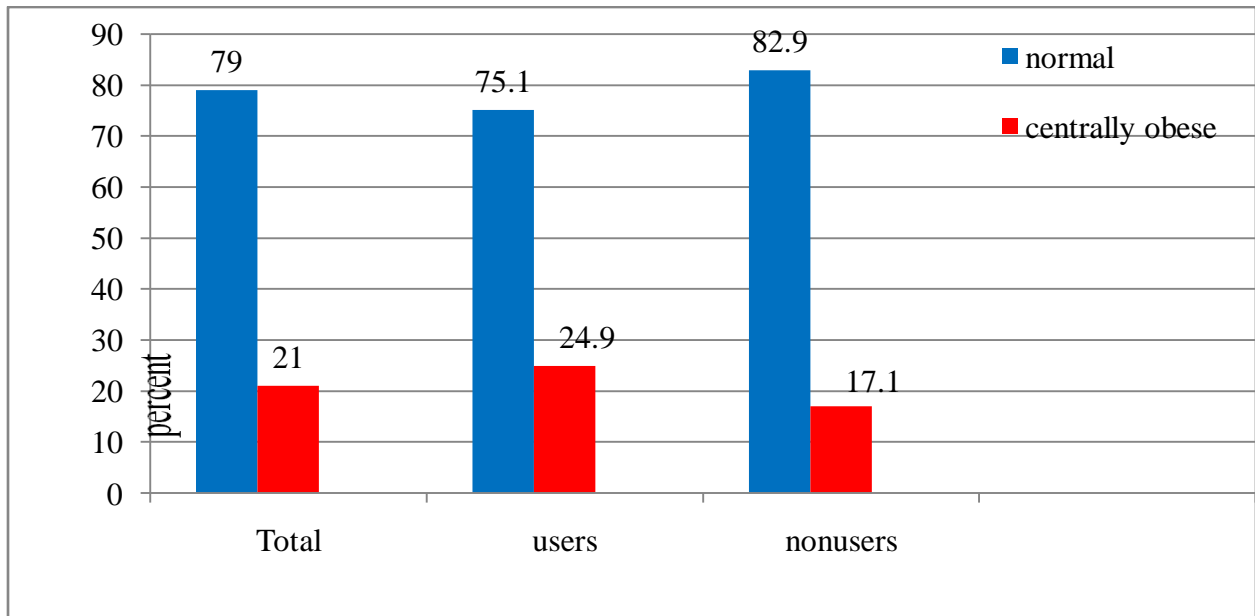


Figure 5: Prevalence of overweight and obesity among study participants



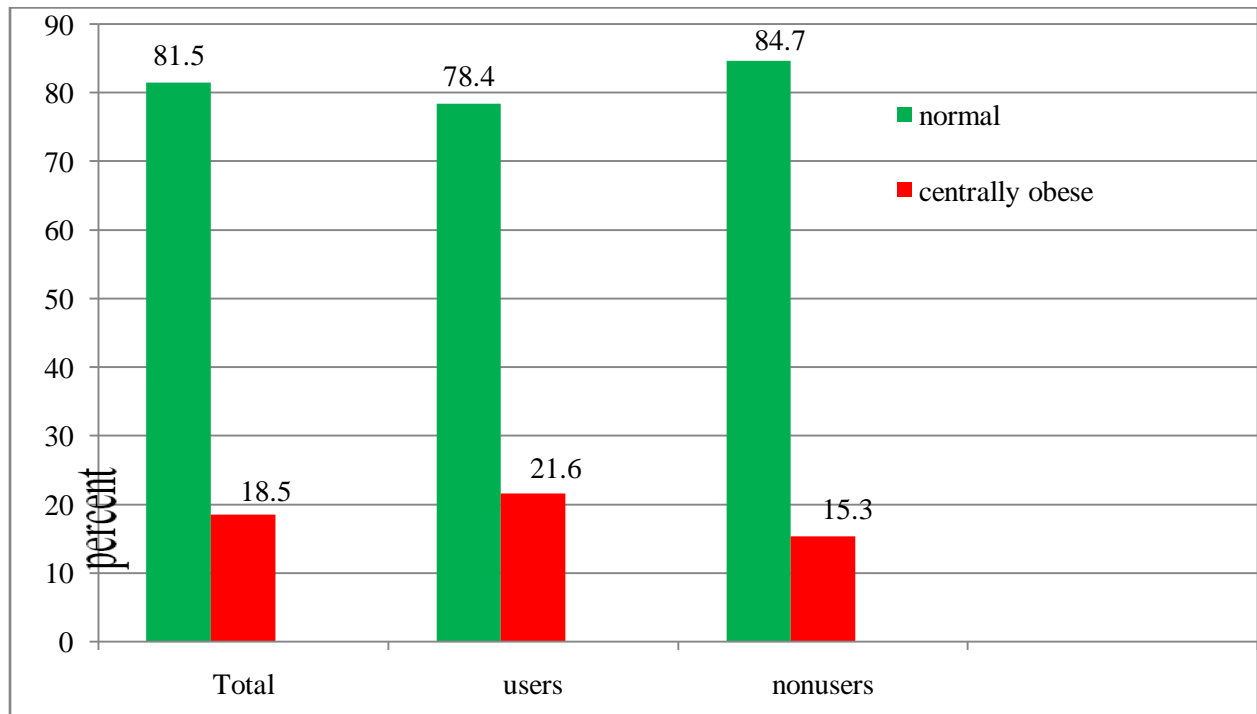
$$\chi^2 = 9.611, P = 0.022$$

Figure 6: Prevalence of overweight and obesity among study participants by hormonal contraceptive use.



$$\chi^2 = 6.114, P = 0.013$$

Figure 7: Prevalence of central obesity among study participants by hormonal contraceptive use based WC



$\chi^2 = 4.398, P = .036$

Figure 8: Prevalence of central obesity among study participants by hormonal contraceptive use based WHCR

Table 3: Comparison of prevalence of obesity between hormonal contraceptive users and non users by dietary and life style factors

Variables	H/contraceptive users				Non-users			
	Underwei Fre(%)	Normal Fre(%)	Overweig Fre(%)	Obese Fre(%)	Underwe (Fre(%))	Normal Fre(%)	Overwe Fre(%)	Obese Fre(%)
Physical activity								
High intensity	20(10.6)	111(59.0)	47(25.0)	10(5.3)	23(13.1)	100(57)	42(24.1)	10(5.7)
Moderate intensi	16(13.3)	63(52.5)	31(25.8)	10(8.3)	22(16.3)	81(60)	29(21.5)	3(2.2)
Low intensity	1(4.0)	7(28)	3(12.0)	14(56.0)	1(4.3)	18(78.3)	2(8.7)	2(8.7)
P-value			0.001					0.18
Fruit consumpti								
Insufficient	26(9.3)	149(53.4)	72(25.2)	32(11.5)	35(12.8)	159(18)	64(23.4)	15(5.5)
Sufficient	11(20.4)	32(59.3)	9(16.7)	2(3.7)	11(18.3)	40(66.7)	9(15.0)	0
P-value			0.023					0.087
Type of oil used								
Vegetable oil	29(13.3)	125(57.3)	52(23.9)	12(5.5)	32(15.8)	117(57.9)	42(20.8)	11(5.4)
Lard /suet	4(10.8)	20(54.1)	9(24.3)	4(10.8)	3(5.5)	37(67.3)	14(25.5)	1(1.8)
Butter/ghee	4(5.1)	36(46.2)	20(25.6)	18(23.1)	11(14.5)	45(59.2)	17(22.4)	3(3.9)
P-value			0.001					0.44
Freq. fast food								
Never	9(7.5)	73(60.8)	37(30.7)	1(0.8)	13(9.7)	86(64.2)	35(26.1)	0
Once	16(15.8)	60(59.4)	23(22.8)	2(2)	16(16.5)	58(59.7)	22(22.7)	1(1)
Twice or more	12(10.7)	48(42.9)	21(18.8)	31(27.7)	17(16.7)	55(53.9)	16(15.7)	14(13.7)
P-value			0.001					0.001
Freq. red meat								
Never/rarely	6(10)	35(58.3)	13(21.7)	6(10)	11(16.2)	42(61.8)	15(22.1)	0
1-3 times a week	28(12.1)	127(55)	50(21.6)	26(11.3)	29(13.6)	130(61)	41(19.2)	13(6.1)
Once a month	3(7.1)	19(45.2)	18(42.9)	2(4.8)	6(11.5%)	27(51.9)	17(32.7)	2(3.8)
P-value			0.126					0.18

5.3 Factors associated with overweight and obesity

Bivariate analysis showed that marital status, occupational status, hormonal contraceptive use, duration of hormonal contraceptive use, type of oil/fat usually used for meal preparation, fruit and vegetable consumption and frequency of red meat consumption were significantly associated to overweight/obesity ($BMI > 25 \text{ kg/m}^2$) at $P = 0.25$. (**Table 4**) While physical activity, duration of hormonal contraceptive use, frequency of fast food, fruit and vegetable consumption, h/contraceptive use, marital status and Occupational status were significantly associated to central obesity measured by WC at $P = 0.25$. (**Table 5**) WHCR was significantly associated to ever use of h/contraceptive, level of fruit consumption, hormonal contraceptive use, Type of oil/fat usually used for meal preparation and age group at $P = 0.25$ on bivariate analysis. (**Table 6**)

Multivariable logistic regression showed that duration of hormonal contraceptive use, type of oil/fat usually used for meal preparation and marital status were associated to overweight/obesity ($BMI \geq 25 \text{ kg/m}^2$). Women who have used hormonal contraceptive for more than 8 years were 2.6 times at increased risk of being overweight/ obese as compared to those who have used only for 2- 4 years (OR=2.605, 95% CI (1.241, 5.464), $P = 0.01$). Whereas 5-8 years use of hormonal contraceptives was associated with about double increase in the risk of being overweight/obese (OR=2.301, 95% CI (1.214, 4.359), $P = 0.01$). Using butter/ghee oil usually for meal preparation increases the risk of overweight/obesity by about two and half as compared to using vegetable oil usually for meal preparation (OR=2.262, 95% CI (1.204, 4.249), $P = 0.01$). Currently married women were 2.7 times at increased risk of being overweight/ obese as compared to separated women. (**table 4**). On the other hand, duration of hormonal contraceptive use, physical activity and level of fruit and vegetable consumption were significantly associated to central obesity ($WC \geq 80 \text{ cm}$) (**table 5**). Women who used hormonal contraceptive for 2-4 years were 67.4% less likely to become centrally obese as compared to those who have used for more than eight years (OR= .326, 95% CI (.131, .812), $P = 0.016$). Low intensity physical activity was associated with six times increased risk of central obesity as compared to vigorous physical activity. (OR=6.079, 95% CI (1.358, 27.208), $P = 0.018$). WHCR was significantly associated to age group and hormonal contraceptive use in the last two years (**table 6**). Women in the age group 30-34 were at 1.617 times increased risk of central obesity as compared to those in the age group 40-44. (OR=1.617, CI(1.060, 2.469), $P = 0.026$). And hormonal contraceptive users were 5.985 times at increased risk of central obesity measured by WHCR. (OR=5.985, CI (1.153, 31.05)

Table 4: Bivariate and multivariable logistic regression model predicting BMI among women

Candidate variables	BMI category Fre (%)		Binary logistic regression		Multivariable logistic regression	
	BMI < 25	BMI ≥25	COR[95%CI]	P	AOR[95% CI]	P
Marital status				0.004		0.034
Never married	29(58)	21(42)	0.247[0.112, 0.541]	0.001	2.973[0.904,9.774]	0.073
Currently married	279(67.9)	132(32.1)	0.653[0.359, 1.189]	0.163	2.699[1.154,6.313]	0.022
Divorced	43(71.7)	17(28.3)	0.546[0.247, 1.208]	0.135	0.743[0.193,2.857]	0.666
Widowed	28(60.9)	18(39.1)	0.888[0.393, 2.008]	0.775	1.574[0.466,5.320]	0.465
separated*	84(84.4)	15(15.2)			1	
Occupation						0.103
Government employee	72(60)	48(40)	1.586[0.900, 2.797]	0.111	2.101[0.888,4.968]	0.091
Non-government employ	78(83)	16(17)	0.488[0.245, 0.974]	0.042	0.521[0.170,1.599]	0.254
Self employed	148(66.7)	74(33.3)	1.190[0.710, 1.993]	0.509	1.139[0.506,2.566]	0.753
Non paid	23(57.5)	17(42.5)	1.759[0.821, 3.769]	0.147	1.691[0.458,6.242]	0.430
Student	73(79.3)	19(20.7)	0.619[0.318, 1.205]	0.158	0.747[0.268,2.080]	0.576
Home maker*	69(70.4)	29(29.6)			1	
H/contraceptive use						
Yes	245(73.6)	88(26.4)	1.469[1.054, 2.047]	0.023	3.452[0.586,20.342]	0.171
No *	248(65.5)	115(34.5)			1	
Duration of H/C				0.022		0.008
More than 8 years	30(57.7)	22(42.3)	2.078[1.094, 3.945]	0.025	2.605[1.241,5.464]	0.011
5- 8years	59(60.8)	38(39.2)	1.825[1.081, 1.081]	0.024	2.301[1.214,4.359]	0.011
2 year*	136(73.9)	48(26.1)			1	
Fruit and vegetable cons						
Insufficient	369(66.8)	183(33.2)	2.331[1.394, 3.898]	0.001	1.988[0.878,4.504]	0.100
Sufficient*	94(82.5)	20(17.5)			1	
Frequency of red meat				0.039		0.203
1-3 times a week	94(73.4)	34(26.6)	0.510[0.289,0.900]	0.020	0.471[0.183,1.214]	0.119
Once a month	314(70.7)	130(29.3)	0.584[0.369,0.923]	0.021	0.513[0.237,1.113]	
Never*	55(58.5)	39(41.5)			1	
Type of fat/oil most used				0.079		0.036
Butter/ghee	96(62.3)	58(37.7)	1.565[1.060, 2.310]	0.024	2.262[1.204,4.249]	0.014
Lard/suet	64(69.6)	28(30.4)	1.133[0.692, 1.854]	0.619	1.919[0.822,4.480]	0.178
Vegetable oil *	303(72.1)	117(27.9)			1	

AOR: adjusted odds ratio, * reference category

Table 5: Bivariate and multivariable logistic regression predicting the likelihood of results (WC)

Candidate variables	WC category Fre (%)		Binary logistic regression		Multivariable logistic regression	
	< 80cm	>/=80	COR[95% CI]	P	AOR[95%CI]	P
Duration of H/C use				0.073		
More than 8 years	35(67.3)	17(32.7)	2.143[1.076, 4.267]	0.030	0.326[0.131,0.812]	0.016
5-8 years	72(74.2)	25(25.8)	1.532[0.851, 2.758]	0.155	0.709[0.261,1.923]	0.499
2-4years*	150(81.5)	34(18.5)				
Freq. of fast food				0.00		
Twice or more	208(81.9)	46(18.1)	0.496[0.322, .763]	0.001	2.075[0.986,4.364]	0.054
Once	170(85.9)	28(14.1)	0.369[0.225,0 .605]	0.000	0.787[0.352,1.760]	0.560
Never*	148(69.2)	66(30.8)				
Fruit and vegetable				0.001		
Insufficient	421(76.3)	131(23.7)	3.630[1.788, 7.372]	0.001	3.526[1.237,10.054]	0.018
Sufficient*	105(92.1)	9(7.9)				
H/contraceptive use						
Yes	250(75.1)	83(24.9)	1.608[1.101, 2.346]	0.014	0.208[0.015,2.935]	0.245
No*	276(82.9)	57(17.1)				
Marital status				0.077		
Never married	39(78)	11(22)	0.398[0.156, 1.015]	0.054	1.225[0.236,6.356]	0.809
Currently married	316(76.9)	95(23.1)	1.066[0.525, 2.162]	0.860	2.957[0.979,8.928]	0.055
Divorced	48(80)	12(20)	0.886[0.353, 2.226]	0.797	0.898[0.155,5.218]	0.905
Widowed	34(73.9)	12(26.1)	1.251[0.490, 3.199]	0.640	2.420[0.504,11.611]	0.269
Separated*	89(89.9)	10(10.1)				
Occupational status				0.023		
Government employee	83(69.2)	37(30.8)	1.739[0.930, 3.250]	0.083	2.052[0.675,6.240]	0.205
Non-government emp	83(88.3)	11(11.7)	0.517[0.233, 1.148]	0.105	0.403[0.082,1.973]	0.262
Self employed	175(78.8)	47(21.2)	1.047[0.582,0 .582]	0.877	1.297[0.464,3.627]	0.620
Non paid	30(75)	10(25)	1.300[0.546, 3.097]	0.554	0.921[0.190,4.455]	0.919
Student	77(83.7)	15(16.3)	0.760[0.363, 1.592]	0.467	1.219[0.340,4.378]	0.761
Home maker*	78(79.6)	20(20.40)				
Physical activity				0.006		
Low intensity	29(60.4)	19(39.6)	2.792[1.479, 5.268]	0.002	6.088[1.750,21.176]	0.005
Moderate intensity	203(79.6)	52(20.4)	1.091[0.730, 1.631]	0.670	0.864[0.431,1.732]	0.680
High intensity*	294(81)	69(19)				

AOR: adjusted odds ratio, * reference category

Table 6: Bivariate and multivariable logistic regression analysis predicting the likelihood of results (WHCR)

Cand. variables	WHCR category		Binary logistic regression		Multivariable logistic reg	
	< 0.85	>= 0.85	COR[95% CI]	P	AOR[95% CI]	P
Ever use h/contra						
No	225(85.2)	39(14.8)	0.656[0.433, 0.995]	0.047	0.918[0.441,1.913]	0.820
Yes*	318(79.1)	84(20.9)				
Fruit serving cat						
Sufficient	88(77.2)	26(22.8)	0.722[0.442, 1.177]	0.191	0.877[0.472,1.628]	0.677
Insufficient*	455(82.4)	97(17.6)				
H/ contracep. use						
Yes	261(78.4)	72(21.6)	1.525[1.026, 2.267]	0.037	1.617[1.060,2.469]	0.026
No*	282(84.7)	51(15.3)				
Type of oil						
Vegetable oil	348(82.9)	72(17.1)	1.475[0.939, 2.316]	0.092	0.790[0.463,1.350]	0.389
Lard/suet oil/	77(83.7)	15(16.3)	0.942[0.512, 1.730]	0.846	0.711[0.320,1.577]	0.401
Butter/ghee/*	118(76.6)	36(23.4)				
Age cat						
19-24	195(79.3)	51(20.7)	2.615[0.592, 11.557]	0.205	3.499[0.739,16.57]	0.115
25-29	172(81.1)	40(18.9)	2.326[0.522, 10.357]	0.268	3.166[0.671,14.94]	0.145
30-34	120(89.6)	14(10.4)	1.167[0.246, 5.526]	0.846	1.790[0.356,9.01]	0.480
35-39	36(69.2)	16(30.8)	4.444[0.926, 21.327]	0.062	5.985[1.153,31.05]	0.033
40-44*	20(90.9)	2(9.1)				

AOR: adjusted odds ratio, * reference category

Chapter six: Discussion

Prevalence of overweight and obesity based on BMI cutoffs were 23.1% and 7.4% respectively whereas prevalence of central obesity was 21.0% and 18.5% based on WC and WHCR respectively among women 25-49 years old in Jimma town. The prevalence is higher than that reported by EDHS, 2011 which was 12.1% for overweight and 2.8% for obesity among urban women of childbearing age. It is also higher than that reported for Oromia region which was 3.8% for overweight and 1% for obesity. On the other hand, the current prevalence is a bit lower than published prevalence of 38% and 10.8% for overweight and obesity respectively among adult women in Addis Ababa. Comparison with findings of other Sub-Saharan countries shows that the prevalence is lower than that reported by Abdalla *et al*(2) where the prevalence of overweight and obesity ranges from about 23% in Malawi to 35% in Niger and Ghana and 38% in Kenya. The study was also inconsistent with the reports of Carlos *et al* (32) where 53.7% of the women were overweight or obese, and 71.4% had central obesity based on waist circumference measurement in Western Sahara refugee in Algeria. Yet the prevalence is lower than that reported from Tanzania, where the prevalence of obesity using BMI measurement was (24.7%).

Prevalence's of overweight and obesity as measured by BMI, WC and WHCR were higher among hormonal contraceptive users than non-users (24.3% and 10.1% for overweight and obesity using BMI measurement among hormonal contraceptive users) vs. (21.9% and 4.5% for overweight and obesity among non-users respectively). Based on WC and WHCR, 24.9% and 21.6% respectively among hormonal contraceptive users, where as it was 17.1% and 15.3% for WC and WHCR respectively among non-users. The result is consistent with the reports by Murayama *et al* (24) which showed that oral contraceptive users had significantly higher BMIs as compared to non-users among Thai women.

Multivariable logistic regression showed that duration of hormonal contraceptive use, type of oil/fat usually used for meal preparation and marital status were factors significantly associated to overweight/obesity measured by BMI, whereas duration of hormonal contraceptive use, physical activity level and fruit and vegetable consumption were significant predictors of central obesity measured by WC and hormonal contraceptive use for two years and above was significantly and independently associated to central obesity measured by WHCR. The result is

inconsistent with findings of many published studies in which socio-demographic variables showed significant association with overweight/ obesity, thus, Abdalla *et al* (2) showed that all socioeconomic variables included in the analysis were strongly associated with overweight/obesity among women in sub-Saharan country, Angel *et al* (18) showed that age, household income and educational attainment were significant predictors of overweight /obesity among US women, Diane *et al* (19) showed that age and cohabiting with a partner were each positively associated with increased prevalence of overweight/obesity among Columbia women, Nattinee *et al* showed that Women who were older, had higher education, were not in a marriage-like relationship and were in semi-professional occupation were at greater risk for being overweight and obese among Thai women, Sherina *et al* (27) showed that age, ethnicity, educational level, and marital status were significantly related to overweight/obesity among Malaysian women. The result is consistent with reports of Murayama *et al* (24) in which none of socio-demographic factors were significantly related to overweight obesity among Thai women but use OCP.

On the other hand, duration of hormonal contraceptive use, physical activity and fruit and vegetable consumption were significantly associated to central obesity measured by waist circumference in the current study. This result is consistent with the reports by Diane *et al* (19) which found that none of the socio-demographic predictors considered was significantly associated to abdominal obesity and inconsistent with the report by Veghari *et al* (28) in which multivariate analysis showed that marital status, age group and educational level were significantly associated to central obesity, while physical activity and economic status were not. This study showed that hormonal contraceptive use in the last two years was significantly associated to central obesity measured by WHCR in multivariable analysis; the finding is inconsistent with the reports by Gallo *et al* (25) which showed that the ORs for the proportions of women who gained a set amount of weight were generally either weak or too imprecise to convey much meaning and consistent with reports by Murayama *et al* (24) where multiple regression analysis revealed that oral contraceptive use was a weak but significant contributing factor to overweight/obesity. In general the finding of this study showed that hormonal contraceptive use, duration of hormonal contraceptive use, type of oil/fat usually used for meal preparation, fruit and vegetable consumption and level of physical activity were strongly and positively associated to overweight/obesity and in contrast to many other published studies other

socio-demographic variables were not significantly associated to overweight/obesity on multivariable analysis, this could be because of the reason that many studies which aimed at examining the association between socio-demographic variables and overweight/obesity didn't include dietary factors, level of physical activity and hormonal contraceptive use in their analysis.

This study had included variables which were not included in many other studies like dietary factors, hormonal contraceptive use and physical activity level and had used three different indices concomitantly: BMI, WC and WHCR to measure overweight/obesity. But the study was cross-sectional, whereas the ideal situation would have been to track individuals over time and ascertain changes in body mass index and associated risk factors and the study didn't include the biochemical measurement, blood pressure measurement and information on chronic non-communicable diseases.

Chapter seven: Conclusion and Recommendation

The study showed that the prevalence of obesity among study population was high and requires public health attention. Lifestyle factors like physical activity and dietary factors (fruit and vegetable consumption and type of oil/fat usually used for meal preparation) were important factors independently associated to obesity in this population. Hormonal contraceptive use for two years and above was independent predictor of central obesity measured by WHCR, while duration of hormonal contraceptive use was independent predictor of overweight/obesity ($BMI \geq 25 \text{kg/m}^2$) and central obesity measured by WHCR. Like several other public health challenges, overweight and obesity should be tackled and prevented early before it gets out of hand as envisioned in the WHO Global strategy on diet, physical activity and health, ensuring that people have access to healthy diets and get involved in physical activities

Recommendations

1. A combination of sound and effective actions is needed by all partners, stakeholders, public and private sectors to prevent overweight and obesity among women of child bearing age.
2. Public health intervention should focus on bringing about changes in dietary habits and patterns of physical activity.

For Jimma town health office and health service delivery points

1. Family planning service providers should give proper and evidence based counseling, measurement of key biological risk factors, such as: blood pressure, serum cholesterol and BMI combined with education of the population and regular follow up of woman on hormonal contraceptive helps to prevent overweight and obesity.
2. Counseling to new and continuing users of hormonal contraception should address weight gain as a possible side effect and provide individualized advice on how to minimize weight gain, should it occur.
3. Health care providers should play an important role in prevention including practical advice on the benefits of healthy diets and increased levels of physical activity, combined with support to help patients initiate and maintain healthy behaviors.
4. Training of health personnel and dissemination of appropriate guidelines are key underlying factors in preventing risk factors for non-communicable disease including overweight and obesity.

Recommendation for future research

1. Longitudinal studies that can examine an association between weight gain and specific type of hormonal contraceptive use by controlling for dietary and other factors is mandatory.

Chapter Eight: Annexes

8.1 Questionnaires

Consent form

My name is _____ I am collecting data for a research aimed at determining the prevalence of obesity as a risk factor to non-communicable disease and examining an association between hormonal contraceptive use and obesity among women. Obesity is risk factor for many chronic non communicable diseases and women are at special risk, therefore such studies are very crucial to prevent and control the problem. Your contribution to the study by giving information is the key to success of the research. Any information collected for the purpose of this research will be confidential and privacy will be kept while measuring anthropometric measurements. If you participate in this study you will get information on your wait status. You will also be informed about what measures to take if you are found to be overweight. Participating in this study will not have any financial payment. You have the right to refuse to give any information and you can interrupt giving information at any time during this study and if you have any unclear point you can ask me or the main investigator at any time, Refusing to participate in this study will not harm you by any means. Having heard the above statements, I will give consent to participate in this study.

Signature _____

Date _____

A. Socio-demography

No	Questions	Response
1	How old are you?	_____ age in years
		Don't know 77
2	What is the highest level of education you have completed?	Can't read and write, no formal education 1
		Can read and write, no formal education 2
		Formal education 3
		Maximum grade achieved _____
		Refused 88
3	What is your ethnic group?	Oromo 1
		Amhara 2
		Gurage 3
		Dawuro 4
		Others (specify)_____
		Refused 88
4	What is your marital status?	Never married 1
		Currently married 2
		Divorced 3
		Widowed 4
		Separated 5
		Refused 88
5	Which of the following best describes your main work status over the past 12 months?	Government employee 1
		Non-government 2
		Self-employed 3
		Non-paid 4
		Student 5
		Homemaker 6
		Retired 7
		Unemployed 8
		Refused 88

Household Wealth

Now I will ask you about some fixed assets that your household have.

6. Does the household have any of the following functioning properties? (Circle)		Yes	No
6.1	Functioning radio/Tape recorder/CD player Radio	1	0
6.2	Dish Television		
6.3	Mobile telephone/ Non mobile telephone		
6.4	Refrigerator		
6.5	Chair/table		
6.6	Bed with cotton/sponge/spring mattress		
6.7	Sofa		
6.8	Electricity		
6.9	Electric mitad		
	Main material of the floor		
6.10	sand/earth		
6.11	Dung		
6.12	Wood planks		
6.13	Palm/bamboo		
6.14	ceramic tiles		
6.15	cement		
6.16	Carpet		
	Main material of the roof		
6.17	No roof		
6.18	Thatch/leaf/mud		
6.19	Rustic mat/plastic sheets		
6.20	Corrugated iron /metal		
6.21	Wood		
6.22	Cement/concrete		
	Main material of the exterior walls.		
6.23	No walls		
6.24	Dirt		
6.25	Bamboo/wood with mud		
6.26	Stone with mud		
6.27	Cement		
6.28	Bricks		
	Does any member of this household own:		
6.29	A bicycle?		
6.30	A motorcycle or motor scooter		
6.31	An animal-drawn cart?		
6.32	A car or truck?		

6.33	Does any member of this household have a bank or Microfinance saving account?		
6.34	What kind of toilet facility do members of your Household usually use?		
6.35	Flush toilet		
6.36	Ventilated improved pit latrine (VIP).		
6.37	Pit latrine with slab		
6.38	Pit latrine without slab		
6.39	Open pit		
6.40	No latrine/bush/field		
6.41	Do you share this toilet facility with other households?		
6.42	Water pump		
	Where do your children attend school?		
6.43	Government community school		
6.44	Private school		
6.45	No children		
6.46	Children do not attend any school		

B. Fertility and hormonal contraceptive history

7	Now I would like to ask about all the births you have had during your life. Have you ever given birth?	Yes 1
		No 2, if no go to Q10
8	How many births have you given? Including the dead ones if any?	Number of births_____
9	Have you ever used hormonal contraceptive?	Yes 1
		No 2, if no go to Q14
10	Are you using hormonal contraceptive currently?	Yes 1
		No 2
11	Which hormonal contraceptive method are you using?(observe the appointment card)	OCP 1
		Inject able 2
		Implanon 3
		Norplant 4
		others(specify)_____
12	For how long have you used the specified method?	In months_____
13	Have you been using the specified hormonal contraceptive regularly?	Yes 1
		No 2

C. Behavioral measurements

14	Have you ever smoked tobacco products?	Yes 1
		No 2, if no go to Q19
15	Do you currently smoke tobacco products daily?	Yes 1
		No 2
16	How old were you when you first started smoking daily?	_____ years,
		Not known 77
17	Do you remember how long ago it was?	In Years _____
		in Months _____
		in Weeks _____
18	On average, how many of the following do you smoke each day	Manufactured cigarettes _____
		Hand-rolled cigarettes _____

19	Have you ever consumed an alcoholic drink such as beer, wine, arake, Teji, fermented cider	Yes 1
		No 2, if no go to Q 27
20	Have you consumed an alcoholic drink within the past 12 months?	Yes 1
		No 2
21	During the past 12 months, how frequently have you had at least one alcoholic drink?	Daily 1
		5-6 days per week 2
		1-4 days per week 3
		1-3 days per month 4
		Less than once a month 5
22	Have you consumed an alcoholic drink within the past 30 days?	Yes 1
		No 2
23	During the past 30 days, on how many occasions did you have at least one alcoholic drink?	frequency _____,
		Don't know 77
24	During the past 30 days, when you drank alcohol, on average, how many standard alcoholic drinks did you have during one drinking occasion?	Number _____
		Don't know 77
25	During the past 30 days, what was the largest number of standard alcoholic drinks you had on	Largest number _____

	a single occasion, counting all types of alcoholic drinks together?	Don't know 77
26	During the past 30 days, how many times did you have four or more Standard alcoholic drinks in a single drinking occasion?	Number of times _____
		Don't Know 77

D. Diet

27	In a typical week, on how many days do you eat fruit?	Number of days _____
		Don't know 77
28	How many servings of fruit do you eat on one of those days?	Number of servings _____
		Don't Know 77
29	In a typical week, on how many days do you eat vegetables?	Number of days _____
		Don't Know 77, _____
30	How many servings of vegetables do you eat on one of those days?	Number of servings _____
		Don't know 77
31	What type of oil or fat is most often used for meal preparation in your household?	Vegetable oil 1
		Lard or suet 2
		Butter or ghee 3
		Margarine 4
		Other 5
		None used 6
		Don't know 77
		Others _____
32	What type of beverage do you drink?	Tea 1
		Coffee 2
		Soft drink 3
		Others _____
33	How much sugar do you add to your tea/coffee?	1/2 tsp 1
		1 tsp 2
		2 tsp 3
		more than 2 tsp 4
34	How often do you eat food such as:	
	A. Tripe (pense)	1-3 times a week 1

		4-7 times a week	2
		Once a month	3
		Never	0
	B. Red meat:	1-3 times a week	1
		4-7 times a week	2
		Once a month	3
		Never	0
	C. Chicken:	1-3 times a week	1
		4-7 times a week	2
		Once a month	3
		Never	0
	D. Sour milk:	1-3 times a week	1
		4-7 times a week	2
		Once a month	3
		Never	0
	E. fat cookies:	1-3 times a week	3
		4-7 times a week	2
		Once a month	1
		Never	0
35	In the past month, how often did you: Eat three meals per day?	Never	0
		Some times	1
		Every day	2
36	In the past month how often did you eat an extra meal, a snack, a bowl of cereal	never	0
		Some times	1
		Every day	2
37	In the past month How often did you eat a fast food meal? (pizza, hamburgers, fried chicken)	Once	1
		Twice or more	2
		Never	0
38	Eat 'Junk food'? (candy bars, potato chips cookie	Never /less than once a week	0
		Several times a week	1
		Once a day	2
		Twice or more a day's	3

E. Household food security

39	In the past four weeks, did you worry that your household would not have enough food?	Yes	1
		No	0
39a	How often did this happen?	Rarely (once or twice in the past four weeks)	1
		Sometimes (three to ten times in the past four weeks)	2
		Often (more than ten times in the past four	

		weeks) 3
40	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	yes 1
		No 0
40a	How often did this happen?	Rarely (once or twice in the past four weeks) 1
		Sometimes (three to ten times in the past four weeks) 2
		Often (more than ten times in the past four weeks) 3
41	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources	Yes 1
		No 0
41a	How often did this happen?	Rarely (once or twice in the past four weeks) 1
		Sometimes (three to ten times in the past four weeks) 2
		Often (more than ten times in the past four weeks) 3
42	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	Yes 1
		No 2
42a	How often did this happen?	Rarely (once or twice in the past four weeks) 1
		Sometimes (three to ten times in the past four weeks) 2
		Often (more than ten times in the past four weeks) 3
43	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	Yes 1
		No 2
43a	How often did this happen?	Rarely (once or twice in the past four weeks) 1
		Sometimes (three to ten times in the past four weeks) 2
		Often (more than ten times in the past four weeks) 3
44	In the past four weeks, did you or any	Yes 1

	other household member have to eat fewer meals in a day because there was not enough food?	No 2
44a	How often did this happen?	Rarely (once or twice in the past four weeks) 1
		Sometimes (three to ten times in the past four weeks) 2
		Often (more than ten times in the past four weeks) 3
45	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	Yes 1
		No 2
45a	How often did this happen?	Rarely (once or twice in the past four weeks) 1
		Sometimes (three to ten times in the past four weeks) 2
		Often (more than ten times in the past four weeks) 3
46	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	Yes 1
		No 2
46a	How often did this happen?	Rarely (once or twice in the past four weeks) 1
		Sometimes (three to ten times in the past four weeks) 2
		Often (more than ten times in the past four weeks) 3
47	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	Yes
		No
47a	How often did this happen?	Rarely (once or twice in the past four weeks) 1
		Sometimes (three to ten times in the past four weeks) 2
		Often (more than ten times in the past four weeks)

F. Physical activity

48	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like(use show card)	Yes 1
		No 2, if no go to Q 51
49	In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days_____
50	How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours, minutes:_____
51	Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as (Use show card)	Yes 1
		No 2. if no go to Q 54
52	In a typical week, on how many days do you do moderate intensity activities as part of your work?	Number of days_____
53	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours : minutes_____
54	Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?	Yes 1
		No 2,if no go to Q 58
55	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days_____
56	How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes_____
58	Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like [running or football] for at least 10 minutes continuously? (USE SHOWCARD)	Yes 1
		No 2, if no go to Q 61
59	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (leisure) activities?	Number of days_____
60	How much time do you spend doing vigorous-intensity Sports, fitness or recreational activities on a typical day?	Hours: Minutes_____
61	Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that	Yes 1

	cause a small increase in breathing or heart rate such as brisk walking, [cycling, swimming, and volleyball] for at least 10 Minutes continuously? (Use show card)	No 2, if no go to Q 64
62	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (leisure) activities?	Number of days_____
63	How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?	Hours: Minutes_____
64	How much time do you usually spend sitting or reclining on a typical day?	Hours: Minutes_____

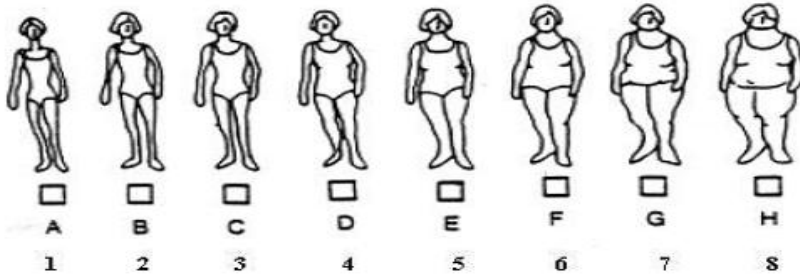
		Yes	No
65	What is the advantage of being fat?	Well liked	
		Feel better about yourself	
		More attractive	
		Look pretty?	
		Healthy	
		Dignified	
66	Do overweight people suffer from?	High blood pressure	
		Diabetes	
		Malaria	
		Arthritis	
		Cancer	
		Liver disease	
		Heart disease	
67	Do you think the following is true about a thin woman?	She is sick	
		She has worries	
		Her husband doesn't treat her well	
68	How do you feel about your current weight?	Very thin	
		Somewhat thin	
		Normal weight	
		Overweight/obese	
		Extremely obese	

G. Physical measurement

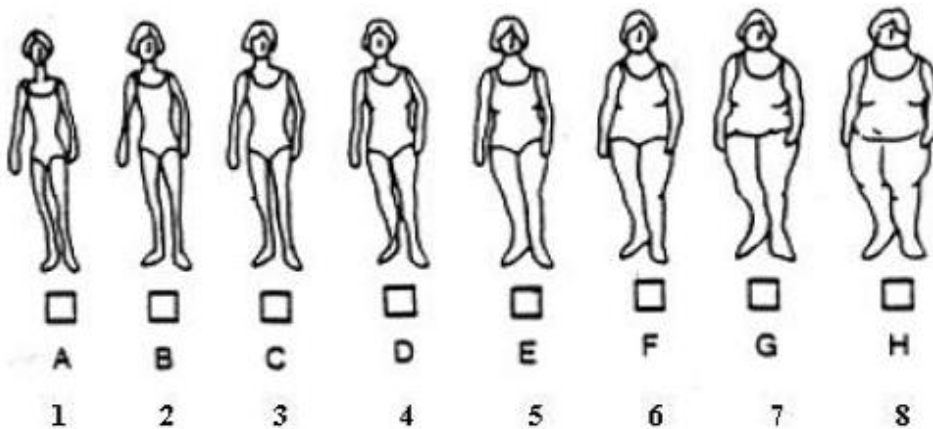
	Anthropometry	Result	Measurement 1	Measurement 2	Measurement 3
69	Height	in(cm)_____	_____	_____	_____
70	Weight If too large for scale 666.6	in (kg)_____	_____	_____	_____
71	Waist circumference	in(cm)_____	_____	_____	_____
72	Hip circumference	In cm_____	_____	_____	_____

H. Body image

73. Which of the image would you like to be?



74. Which of the image is the most healthy and free from disease?



8.2 References

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