



**Prevalence and Associated Factors of Overweight and Obesity among Preschool  
Children in Jimma Town, South West Ethiopia.**

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**Jimma, Ethiopia**

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## Abstract

**Background:** In Sub-Saharan Africa, most nutrition efforts have concentrated on under-nutrition in children. However, national surveys rarely report the high prevalence of overweight and obesity among children. Likewise, in Ethiopia there is growing recognition of the emergence of a “double-burden” of malnutrition. Globally, an estimated 43 million preschool children were overweight or obese in 2010, a 60% increase since 1990. The problem affects countries rich and poor, and by sheer numbers, places the greatest burden on the poorest.

**Objective:** To determine the prevalence of overweight and obesity and associated factors among preschool children in Jimma Town, South West Ethiopia.

**Methods:** Community based cross-sectional study was conducted from March 1 to 30, 2017 on 548 preschool children. A multi-stage sampling technique was used to select study kebeles and subjects. A pretested structured questionnaire was used to collect data on socio demographic factor, feeding behavior of child, sedentary behavior and physical activity of the child. Weight and height was measured using standardized techniques and calibrated equipment. Descriptive statistics like percents and mean(SD) were used to summarize the results. Bivariate and multivariable logistic regression models were used for determining the predictors of overweight and obesity.

**Results:** The prevalence rates of overweight, obesity, and overall overweight/obesity among preschool children in Jimma town were 12.8% (95% CI=9.9-15.7%) and 4.9% (95% CI=3.3-6.9%), and 17.7% (95% CI=14.4-21.0%), respectively. The mean dietary diversity score of preschool children was 4.26 ( $\pm 1.51$ ). Cereal based diets (88.5%) and pulses, legumes and nuts (81.2%) are the two common foods of preschool children. Overweight/obesity was significantly associated with family size less than five members [AOR(95% CI)=2.6(1.37-4.94)], age of 48-60 month [AOR(95% CI)=2.2(1.12-4.33)], mothers are employed [AOR(95% CI)=2.3(1.21-4.29)], in higher wealth tertile [AOR(95% CI)=2.7(1.01-7.23)], spending  $\geq 2$  hours/day on sedentary activities [AOR(95% CI)=2.2(1.10-4.54)], and spending  $\leq 1$  hour/day on outdoor activities [AOR(95% CI)=3.2(1.66-6.24)].

**Conclusions and Recommendations:** More than one in ten of preschool children were affected by overweight/obesity with dietary habit and physical activities are important modifiable risk factors. Well tailored nutrition education programme targeting life style and behavioral change should be initiated with more emphases to employed mothers and high wealth tertile households.

**Key words :** Overweight, Obesity, Preschool children, Jimma town.

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## List of Abbreviations and Acronyms

BAZ	Body mass index for Age Z score
BMI	Body Mass Index
DDS	Dietary Diversity Score
DEXA	Dual Energy X-ray Absorption
EDHS	Ethiopian Demographic and Health Survey
EMR	East Mediterranean Region
FANTA	Food And Nutrition Technical Assistance
FFQ	Food Frequency Questionnaires
HEWs	Health Extension Workers
IDDS	Individual Dietary Diversity Score
IOTF	International Obesity TaskForce
MET	Metabolic Equivalent
PPS	Proportionate to Population Size
SD	Standard Deviation
SRS	Simple Random Sampling
SPSS	Statistical Package for Social Science
SSA	Sub-Saharan Africa
UNICEF	United Nation International Children's Fund
USAID	United States Aid International Development
WHO	World Health Organization

## **CHAPTER-ONE: INTRODUCTION**

### **1.1. Background**

Childhood obesity has been called “one of the most serious public health challenges of the 21<sup>st</sup> century” (1). Obesity is defined as disproportionate or too much fat accumulation in our body that may impair health(2). There are different growth reference curves used to define obesity and overweight in children. But WHO recommends the New WHO Child Growth Standard curves. According to this definition a child is defined as obese if BMI for Age Z-score is above +3SD(> 3SD) and overweight if Z-score is between +2SD(>2SD) and +3SD(<3SD)(3). Obesity can harm nearly every system in a child’s body-heart and lungs, muscles and bones, kidneys and digestive tract, as well as the hormones that control blood sugar and puberty-and can also take a heavy social and emotional toll(4). What’s worse, youth who are overweight or obese have substantially higher odds of remaining overweight or obese into adulthood, increasing their risk of disease and disability later in life(5).

Childhood obesity is reaching alarming proportions in many countries and poses an urgent and serious challenge. The Sustainable Development Goals, set by the United Nations in 2015, identify prevention and control of non-communicable diseases as core priorities. Among the non-communicable disease risk factors, obesity is particularly concerning and has the potential to negate many of the health benefits that have contributed to increased life expectancy(2).

Globally, an estimated 43 million preschool children were overweight or obese in 2010, a 60 percent increase since 1990. The problem affects countries rich and poor, and by sheer numbers, places the greatest burden on the poorest: Of the world’s 43 million overweight and obese preschoolers, 35 million live in developing countries. By 2020, if the current epidemic continues unabated, 9 percent of all preschoolers was overweight or obese-nearly 60 million children(6). The problem is global and affecting much low and middle income countries especially in urban settings. Worldwide prevalence has increased at an alarming rate (2). Overweight and obesity are linked to more deaths worldwide than underweight. For example, 65% of the world's populations live in countries where overweight and obesity kill more people than underweight. This includes all high income and most middle income countries(7). The prevalence of overweight and obesity was higher in most low and middle income countries

compared to high income countries. For example, the proportion of overweight in Arab Gulf countries (the richest countries in the EMR) among preschool children ranged from 1.9% to 9.4%, whereas it was 12.3% in Djibouti and 21.9% in Syria(8).

In developing countries overweight and obesity becomes the most glaring outward sign of the changing face of malnutrition increasing the chance of a person falling prey for non-communicable disease. Current evidence revealed that clear transition of increasing proportions of overweight and obesity in children in Sub Saharan Africa, and a similar, but less prominent trend towards increasing proportions of obesity over time. This transition to higher proportions of overweight/obesity is similar to observed trends in developed countries(9).

In Ethiopia, many researchers were interested to study on under nutrition rather than over nutrition. Although, they continue to combat with the problems of under nutrition and infectious diseases but at the same time they are experiencing a rapid increase in risk factors of non-communicable diseases such as obesity, certain cancers, hypertension, diabetes and other coronary artery diseases particularly in urban setting. The documentation of the extent of the problem and associated factors is critically important to prevent the problem and associated health consequences that could accrue throughout the life span.

However, there were no studies regarding the prevalence of childhood obesity and its associated factors in Ethiopia in general and in Jimma city in particular. Published data regarding prevalence and associated factors of overweight and obesity among preschool children aged 3–5 years in Ethiopia is inadequate. Therefore, this study will aim to determine the level of childhood obesity in the study area and identify the most important dietary, physical activity pattern and socio-economic factors which have impact on overweight and obesity among preschool children aged 3-5 years in Jimma city, Ethiopia. It is envisaged that data from this study was useful for health policy makers, educators and other stakeholders in planning appropriate intervention programs targeting preschool children.

## **1.2 Statement of the problem**

The worldwide prevalence of preschool children overweight and obesity increased from 4.2% in 1990 to 6.7% in 2010. This trend is expected to reach 9.1%, or '60 million, in 2020. The estimated prevalence of preschool children overweight and obesity in Africa in 2010 was 8.5% and is expected to reach 12.7% in 2020(10).

Over the past three decades, childhood obesity rates have tripled in the U.S., and today, the country has some of the highest obesity rates in the world: one out of six children is obese, and one out of three children is overweight(11).

Obesity rates are higher in adults than in children. But in relative terms, the U.S., Brazil, China, and other countries have seen the problem escalate more rapidly in children than in adults(12).

Of course, some regions still struggle mightily with child hunger, such as Southeastern Asia and sub-Saharan Africa(13). But globalization has made the world wealthier, and wealth and weight are linked.

As poor countries move up the income scale and switch from traditional diets to Western food ways, obesity rates rise. One result of this so-called "nutrition transition" is that low- and middle-income countries often face a dual burden: the infectious diseases that accompany malnutrition, especially in childhood, and, increasingly, the debilitating chronic diseases linked to obesity and Western lifestyles(14).

Overweight and obesity 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. In addition, 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. Overweight children are more than twice as likely to have high blood pressure or heart disease as children of normal weight later in life(15).

Children in low and middle income countries are more vulnerable to inadequate prenatal, infant and young child nutrition at the same time; they are exposed to high fat, high sugar, high salt, energy dense, micronutrient poor foods, which tend to be lower in cost but also lower in nutrient

quality. These dietary patterns in conjunction with lower levels of physical activity, result in sharp increases in childhood obesity while under nutrition issues remain unsolved(2).

In addition to the ailment and conditions that affect undernourished children, including diarrheal diseases, respiratory and other infections, such children are predisposed towards the comorbidities of obesity, such as high blood pressure, diabetes, respiratory diseases, orthopedic and psychosocial disorders(16).

In Ethiopia, most studies were dealing with under nutrition than over nutrition due to the major problem of the country was under nutrition. But now days due to nutrition transition over nutrition is becoming public problem in urban areas. So that over burden the country both with over nutrition and under nutrition. According to national data in Ethiopia small Proportion of children are classified as overweight or obese. Overall, 2 percent of children below age five years are overweight or obese. But for Addis Ababa, 6 percent of children under five, the highest percentage in all regions, are overweight or obese(17). Although several studies have been conducted in different countries on overweight and obesity among children, a very few studies have been conducted in Ethiopia(18). In Ethiopia many researchers are interested with study of under nutrition. But the epidemics of over nutrition are now increasing worldwide. Even most of the studies of over nutrition conducted in Africa are concentrated on school children, adolescents and adults. But this study focuses on preschool children, so that it will come up with up to date data in the area of study. Early childhood obesity and overweight may result in adulthood overweight/obesity and then chronic disease. So that early identification of the problem is crucial to prevent its impact. However, Preventive treatment is very difficult to plan in developing countries like Ethiopia as data available on its prevalence is insufficient. This study therefore intends to increase the enlightenment of the actual prevalence of childhood obesity in preschool children. However, no study was conducted in study area, in Jimma Town. Therefore, the purpose of this study is to assess the prevalence and associated factors of overweight and obesity among preschool children in Jimma Town, South West Ethiopia.

## **CHAPTER TWO: LITERATURE REVIEW**

### **Overview of Overweight and obesity**

Obesity is now well known as a medical problem among children. Outcomes associated with obesity in adults are now affecting children. The prevalence of overweight status has tripled worldwide in the last 2 to 3 decades, including in developing countries and regions that are increasingly urbanized. An international obesity task force (IOTF) analysis has shown that overweight and obesity affects one in 10 children worldwide, but the rate is double in Europe and three times as great across the entire Americas (19). Over nutrition is an emerging problem in segments of sub-Saharan African society, particularly where lifestyles become urbanized and westernized and data have accumulated on the adverse health effects of obesity in developed and developing nations. Non communicable diseases (NCDs) are imposing a growing burden up on developing countries which have limited resources and are still struggling to meet the challenges of existing infectious disease problems(20). Generally there are multiple factors which are associated with preschool children overweight and obesity including socio-demographic and socio economic factors, child feeding practices, child characteristics, child physical activity and sedentary behaviors of child.

### **2.1 Magnitude of overweight and obesity**

It is a common knowledge that in global society the prevalence of obesity is rather high. It has even increased in the past few decades(21). The World Health Organization (WHO) describes it as one of the most serious health challenges of this century, as there may arise some serious health consequences from this condition. There is even the consideration that there is an obesity epidemic(22).

The prevalence of obesity increased in all age, gender, and ethnic/racial groups during the past three decades worldwide. Obesity in children is expected to continue to increase in the 21<sup>st</sup> century, but the consequences of this disease may be more severe as the duration of obesity was longer(8).

In 2010, 43 million children (35 million in developing countries) were estimated to be overweight and obese; 92 million were at risk of overweight (6). The worldwide prevalence of overweight and obesity in preschool children increased from 4.2% in 1990 to 6.7% in 2010. This trend is expected to reach 9.1%, or '60 million, in 2020. The estimated prevalence of preschool

children overweight and obesity in Africa in 2010 was 8.5% and is expected to reach 12.7% in 2020. The prevalence is lower in Asia than in Africa (4.9% in 2010), but the number of affected children (18 million) is higher in Asia(6).

According to WHO estimates in 2014, about 42 million children under the age of 5 were overweight or obese in 2013. Close to 31 million of these are living in developing countries. The worldwide prevalence of obesity more than doubled between 1980 and 2014(2).

In America among children, one in three (33.2%) are considered to be either overweight or obese, where as 18.2% are obese. More than two in five Black and Hispanic youth (41%) are considered to be overweight and obese, whereas about 25.7% Black, 22.9% Hispanic and 15.2% White are considered to be obese. But among low income families one out of three 2-5years old preschool children are obese or overweight before their fifth birth day(23).

In the kingdom of Bahrain (Middle East), obesity among preschool children aged 2 to 5 years old was investigated in 2009. Researchers reported the results by using the World Health Organization percentile cut-off values. They found that overweight (12.3%) and obesity (8.4%) was higher in females between 2 and < 4 years of age whereas, the proportion of both overweight (8.4%) and obesity (7.2%) were higher in males between 4 and < 6 years of age(24). Additionally cross sectional study from Basrah (Iraq,) has revealed that the frequency of overweight and obesity was 7.6% and 3.6% respectively using Body Mass Index for age Z score(25). Study done in South Eastern European Country among Serbian Preschool Children who enrolled to Kindergartens showed that the prevalence of overweight was 27.3% for total sample, and did not vary among the girls and boys, 27.8% and 26.9% respectively. This finding indicated that childhood obesity become a global epidemic and is threatening to have reached epidemic proportions in Serbia(26).

A review article which aim to assess global patterns in overweight among children and mothers in less developed countries revealed that the prevalence of overweight and obesity is increasing with wide difference in different country. This study was conducted from 1990-2008 in 33 developing countries (17 of which from SSA). Using CDC growth chart overweight and obesity prevalence among under five children ranged from 5.3% in Bangladesh to 41% in Armenia(27).

Overweight and obesity rates at 4 years of age vary quite a bit from country to country, according to a recent systematic review of studies from the 27 countries in the European Union



(EU). Spain had the highest rate-just over 32 percent-and Romania had the lowest rate, about 12 percent(28). While, South Asian countries like Bangladesh, India, and Pakistan have low obesity rates, their large populations add up to large numbers of children who are overweight or obese. Even though child hunger remains the most pressing nutritional concern for much of Asia-n South Asia, for example, one in three preschool children is underweight-the region has also seen dramatic increases in child obesity. Overall in Asia (excluding Japan), nearly 5 percent of preschoolers were estimated to be overweight or obese in 2010, a 53 percent increase in prevalence since 1990. That translates into 17.7 million Asian preschoolers being overweight or obese(10).

In 2010, preschooler obesity rates were far higher in Western Asia (which includes the Middle East) than in Eastern, Southeastern, or South Central Asia (roughly 15, 5, 5, and 4 percent, respectively). But , South Central Asia had the largest number of overweight preschoolers of any region on the world-an estimated 6.6 million children(6).

The major developed countries in Oceania-Australia and New Zealand-have childhood obesity rates in the double digits, but there's some evidence that rates have hit a plateau over the past decade(29).

Hunger, underweight, and stunting have long been the more pressing child nutrition concerns across Africa, and even today, 20 to 25 percent of preschoolers in sub-Saharan Africa are underweight(12). Yet here, too, child obesity rates are on the rise: The percentage of preschoolers in Africa who are overweight or obese more than doubled over the past two decades, from 4 percent in 1990 to 8.5 percent in 2010. A closer look at the numbers, though, shows much higher rates in Northern Africa than the rest of the continent(6).

In Northern Africa, an estimated one in six preschool-aged children is overweight or obese-the highest rate in the world, and triple that in 1990. There's quite a bit of variability from country to country, however: About 20 percent of Egypt's preschoolers were overweight or obese in 2008, compared with 5 percent in Sudan(6).

Study done in Ghana Accra to assess prevalence of childhood overweight and obesity among basic school children revealed that the prevalence rate observed was 10.9% and 7.2% using

WHO BMI for age definition of obesity among boys and girls respectively(30). Another study from Kenya shows 13.4 percent of the pre-school children were overweight, while 6% were obese(31). Similar study from Nigeria revealed that the prevalence of overweight and obesity among preschool children's were 15.0% and 8.6% respectively(32).

In sub-Saharan Africa, meanwhile, overweight and obesity rates among preschoolers are still in the single digits-roughly 9 percent in Middle Africa, 6 percent in Western Africa, 7 percent in Eastern Africa, and 8 percent in Southern Africa(6).But for most of the region, these rates are double or triple what they were two decades ago; only Southern Africa has seen the rate drop slightly since 1990.

Study done in Ethiopia, Southern part of the country in Hawassa city among preschool children of age 3-5 years has revealed that the prevalence of overweight and obesity in the study participants were 7.3% and 3.4%, respectively. About twenty five percent of them were at risk-of-overweight in the study area based on BMI for age classification. The combined prevalence of overweight and obesity was 10.7%. The sex specific prevalence of overweight and obesity in boys were 9% and 3.4% while in girls were 5.5% and 3.3%, respectively(18).

## **2.2 Factors associated with overweight and obesity in children**

In recent decades the rising epidemics of obesity and overweight was the reflection of change in societal feeding and life style(33). Even if the susceptibility of an individual to obesity and overweight is determined by genetics(34), energy balance which could be controlled by calorie intake and physical activity is the major risk factor. Economic growth, modernization, urbanization, and globalization of food markets are also some additional factors which contribute for the development of obesity and overweight epidemics in the world(35). Some of the factors that contribute for development of preschool children over weight and obesity are the following.

### **2.2.1 Socio-demographic and Socio economic Factors**

The majority of obesity in adulthood has its origins in childhood, which makes obesity a pediatric concern and the prevention and treatment of obesity a pediatric goal. A high BMI at a young age implies longer years of excess weight and a higher risk. A rising BMI carries more risk than a stable one. Therefore age is an important consideration(36).

Population based cohort of children followed from birth to 4.5 years (1998-2002) in Canada, to determine which factors exert the most influence in early life revealed that being in the highest quartiles of monthly weight gain between birth and 5 months (OR 1.8) increased the odds of being overweight at 4.5 years(37). Other review study from Europe showed that modifiable risk factors that occur in early postnatal period determine childhood overweight and obesity. According to this study rapid weight gain during the first few months of life is the major determinant of childhood overweight and obesity(38).

Study conducted in Portugal showed that being a single child in the family, belonging to large or small families, and being born later than other siblings showed a statistically significant association with overweight and obesity among preschool children(39). Additionally another study from Kenya reported that overweight/obesity prevalence decreased as the number of siblings increased, and was significantly higher among those without siblings(31).

Study conducted in Bahrain(Arabian Gulf country) Preschool children who categorized in higher age group was three times more likely to develop overweight/obesity as compared to lower age group(AOR= 3[95% CI: 1.58-5.36])(24). Similar results was reported from Ghana, children age group 48-60 months were more likely to be obese/overweight as compared to children from age group 36-47 months(p value <0.001)(30).

In contrast, cross sectional study in Southern parts of Ethiopia showed that the prevalence of childhood obesity/overweight was higher proportion in age groups 36-47 months (16.4%) when compared to 48-60 months (6.9%). Children with age group 36-47 months were 4.6 times more likely to be obese/overweight when compared to children from age group 48-60 months (AOR = 4.59 [95% CI: 1.52-6.46])(18).

Sex of child is another predictor of childhood overweight and obesity even though there is contradicting results of different study. According to cross sectional study in Ghana factors which significantly affect overweight and obesity was sex of subjects (females higher than males, p-value=0.001)(30). Another study done in Iran showed that the prevalence of overweight was higher in boys (23.6%) than girls (19.3%) and this difference was statistically significant (p=0.001). The same is true for the prevalence of obesity it was higher among boys (6.5%) than girls (4.5%)(40).

Study conducted to assess the prevalence and associated factors of Obesity in Children in Kafr Sakr District, Egypt (2013) illustrated that the social factors like parental education and

employment are associated with overweight and obesity. More than half of obese children belong to university educated fathers (54.9%) and employed mothers (58.2%) while most of the normal weight children belong to Pre University educated fathers (60.5%) and unemployed mothers (70%). The difference is statistically significant regarding mother education and father education(41).

Similarly other cross sectional study from Ghana reported that educational level of mothers (increase in educational level was associated with decrease in overweight/obesity,  $B=-0.242$ ,  $P\text{-value}=0.043$ ). Overweight and obesity was however not significantly associated with fathers Educational level ( $p\text{-values}=0.269$ )(42). But inverse to the above, cross sectional study from Western Algeria stated that higher parental education is predictor of childhood overweight ( $p<0.001$ )(43).

Employment of child family is also another predictor of childhood obesity and overweight. Study from Egypt shows that 75.4% of obese and most of overweight children (80.7%) belong to professional, employee and clerical fathers and about 2/3 (61.5%) of normal weight children belong to non-working mothers. The differences are statistically significant regarding father occupation and mother occupation(42).

The result from different study is not similar in reporting association between economic status and childhood overweight. Study from Ghana revealed that household income is not significantly associated with overweight and obesity ( $p\text{-values}=0.625$ )(42). However according to study conducted from 2008-2010 in Western Algeria higher family income significantly predispose to childhood overweight and obesity ( $OR =10.79$  (6.77-17.19),  $p<0.001$ )(43). Similar cross sectional study from France conducted on children reported that the adjusted odds ratios for the association with overweight was: 1.80 (95% CI: 1.37-2.36) for low family affluence(44). Additionally, study conducted in Brazil showed that Prevalence was highest among children of families with higher purchasing power and, consequently, more privileged socioeconomic conditions (higher levels of maternal educational achievement and access to household goods), as well as improved sanitation and living conditions, higher per capita family income, and greater access to health care. The highest prevalence rates of overweight were found in children whose families had a per capita income of  $\geq 0.5$  minimum wages per month (11.9%), owned all household goods of interest (11%), and had access to mains water, sewage treatment, and waste collection (11.4%)(45).

Similarly cross sectional study in Southern parts of Ethiopia showed that the study participants who were categorized in the high socioeconomic status tertiles were 3.5 times more likely to be obese/overweight as compared to the low socioeconomic status tertiles (AOR = 3.51 [95% CI: 1.30-9.50])(18).

## **2.3 Feeding practice**

### **2.3.1 Breastfeeding**

In another way breast feeding of the children may also determine development of childhood obesity and overweight. While some researchers looked at the impact of breastfeeding versus never breastfeeding at all, others examined the effect of breastfeeding duration and initiation time. This makes inconsistency of results obtained from different studies. According to, Ip et al's (2007) extensive review of over 9,000 studies from 2005-2006 in England concerning the relationship between breastfeeding and infant health outcomes, breastfeeding had a protective effect against obesity(46). But other Cross sectional study (2006) carried out in Ifewara South Western Nigeria showed that no statistically significant difference in the prevalence of overweight among children who had exclusive breastfeeding and those that were not exclusively breastfed ( $\chi^2 = 0.324$ ,  $p = 0.569$ )(47).

### **2.3.2 Formula Feeding**

Another factor which may affect childhood over weight and obesity is infant formula feeding. A given study from Nigeria showed that children given infant formula feeds have a lower prevalence of overweight than those not fed infant formula feeds and the difference was statistically significant ( $P = 0.041$ )(47).

### **2.3.3 Consumption of Energy dense food**

Cross sectional analysis was conducted on 354 children from 1999-2002 who completed the 2-years follow up in USA to assess the relationship between Soda Consumption and Overweight Status of two Years Old Mexico American Children in California. This study showed that consumption of sweet beverages like coca cola and sprite (soda drinks) is associated with childhood overweight and obesity even at the year of two. Consumption of greater than or equal to one soda per day was significantly associated with over weight (adjusted odds ratio, 3.39; 95% confidence interval, 1.43, 8.07). In addition to this cross sectional study from Jamaica report similar result to the above study. It revealed that High BMI was associated with the absence of

fruit consumption ( $P=0.043$ ) and overweight with high sweetened beverage consumption ( $P=0.018$ )(48).

#### **2.3.4 Food frequency**

Cross sectional study conducted on 350 randomly selected preschool children attending kindergartens in South Eastern Poland to assess eating habits of preschool children shows that most of the diets analyzed were characterized by low diversity and high share of processed foods and the dietary content of vegetables, raw fruit, dairy products and whole grain products was very low. Those factors are contributing for development of child hood obesity and overweight (49).

#### **2.3.5 Dietary Diversity Score**

In order to have some insight about feeding behavior of an individual different strategies are available, one of which is dietary diversity score (DDS). But it is difficult to assess the diets of children. The methodological issues of gathering dietary data from children are similar to adults, with additional concerns closely linked to the age related abilities of the children to self-report on diet, and whether parents might be reasonable or accurate proxies(50).

Community based cross sectional study done in Tehran, Iran shows that the prevalence of obesity was higher among those in the upper category of DDS compared to lower one. However a higher DDS was associated with a healthier diet, with those in the upper category also consuming less cholesterol and meat and more dietary fiber, fruit, vegetables and vegetable oil. The higher DDS was positively associated with total intakes of dietary fiber ( $r.0.43$ ), calcium ( $r.0.51$ ) and vitamin C ( $r.0.48$ ). Additionally a higher DDS was associated with lower level of systolic and diastolic blood pressure and fasting blood glucose(51).

Another cross sectional study conducted in Oaxaca, one of the poorer states of Mexico has revealed that Dietary diversity was significantly higher among obese individuals as compared to those who have normal BMI. In addition Dietary diversity was positively and significantly correlated with fruit and vegetable intake ( $r . 0.295$ ,  $P= 0.001$ )(52).

Additionally, another cross sectional studies done in southern Ethiopia showed that children who had high dietary diversity score tertiles were 3.5 times more likely to be obese/overweight when compared to low dietary diversity score tertiles(AOR=3.48 [95% CI: 1.50-8.10])(18).

### **2.3.6 Missing Breakfast**

Finally another factor which may be associated with childhood overweight and obesity is breakfast consumption. According to comparative cross sectional study from Netherland Compared to the children whom had breakfast every day, children whom did not eat breakfast daily were more likely to have overweight and obesity (AOR = 1.49,95% CI: 1.13-1.95)(53).

### **2.4 Sedentary behaviors of children**

The increased prevalence of childhood overweight has been previously attributed to reductions in physical activity and increases in sedentary behaviors among children. Television viewing especially is highly prevalent among young children and both cross sectional and longitudinal studies support the association between children's television viewing time and overweight(52).

A cross sectional study conducted in Netherland to assess the associations between lifestyle related behaviors like: - playing outside, watching TV, and overweight in a large sample of 5 years old children (n = 7505) has revealed the following result. Compared to the children whom watched TV  $\leq 2$ hours/day, the OR for having overweight (obesity included) was 1.25 (95% CI 1.03-1.51, adjusted for confounders) for children whom watched TV  $> 2$  hours/day(53).

A Cross sectional data from 5913 six years old ethnically diverse children in Rotterdam, Netherland regarding sedentary behaviors and physical activity behaviors were analyzed and the following results were obtained. Sedentary behaviors like Television viewing ( $p < 0.001$ ) and Computer game use ( $p < 0.05$ ) were positively associated with BMI of the children. Whereas physical activities like sports participation ( $p < 0.001$ ) outdoor play ( $p < 0.001$ ) and Active transport ( $p < 0.01$ ) were inversely associated with BMI for age of the children(53). Similar to this study another cross sectional study done on national data of 2001-2004 among 3-5 years old children in America found that 37.3% (95% confidence interval, 34.1% to 40.4%) had low levels of active play, 65.0% (95% CI, 61.4% to 68.5%) had high screen time, and 26.3% (95% CI, 23.8% to 28.9%) had both these behaviors(54).

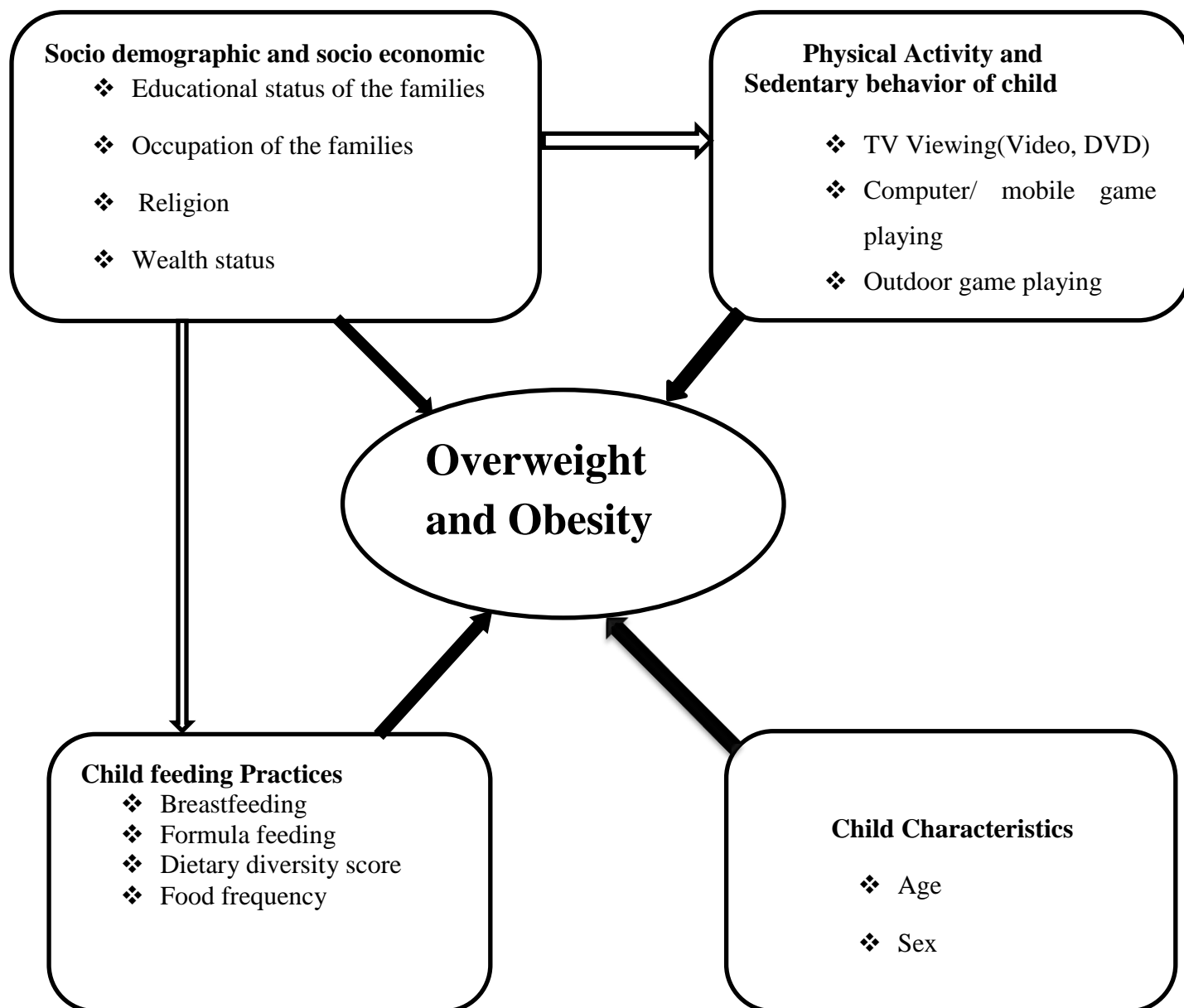
A Review article from Brazil showed that children spent on average 1.8 to 2.8 hours of TV watching almost above limited time (2hour per day). This review has revealed that Children spending more time watching television ( $> 120$  minutes/day) at age six were less active and had higher body mass indices at ages eight and ten(55).

A study conducted in Portugal showed that the number of hours of TV viewing by the children was significantly associated with overweight and obesity in boys and with obesity in girls.

Multivariate logistic regression showed that more hours of TV viewing increases the risk of overweight (OR 1.36, 95% CI 1.21-1.51) or obesity (OR 1.63,95% CI 1.53-1.72)(39).

Generally there are multiple factors which are associated with preschool children overweight and obesity as discussed in above paragraphs. In summary the following conceptual frame work will help to easily identify the common associated factors.





**Figure 1 A conceptual framework constructed from different literatures to assess the magnitude of Overweight and Obesity and associated factors among preschool children in Jimma town.**

## **2.6 Significance of the study**

This study was designed to determine the prevalence of overweight and obesity and associated factors among preschool children in Jimma town which would give a hint about the possibility of a double burden of malnutrition in this age group especially in urban areas in Ethiopia. It will also provide information on the groups at higher risk and the risk factors contributing to overweight and obesity among preschool children in the study area which would be an important input for effective interventions in Jimma town. As a result, this study will have great contribution on designing preventive action of early age overweight and obesity. It will help educational planners, health policy makers, parents or guardians and all other stakeholders to have a clear understanding on magnitude and associated factors of preschool overweight and obesity. On the other hand, enhance health of the children and contributions to the development of the country at large. This study is also used as a base line for researchers to conduct further researches on related issue. Finally the result obtained from this study was a useful baseline against which future data can be compared. Furthermore it was used as an input for any interested body that needs to intervene in this area.

## **CHAPTER THREE: OBJECTIVE**

### **3.1. General Objective**

- ❖ To assess the prevalence of overweight and obesity and associated factors among preschool children in Jimma Town, South West Ethiopia.

### **3.2. Specific Objectives**

- To determine the prevalence of overweight and obesity among preschool children in Jimma Town.
- To identify factors associated with overweight and obesity among preschool children in Jimma Town.

## **CHAPTER FOUR: METHODS AND MATERIALS**

### **4.1 Study Area**

The study was conducted in Jimma town from March 1 to 30, 2017. Jimma is one of the towns in Ethiopia which is located in the south western part of the country. The town is 354 km far from the capital city of Ethiopia. The City is found approximately at 7°40'N latitude and 36°50'E longitude. The town has an area of 44.86sq.km with altitude of 1750-2000m above sea level, temperature range of 20-30°C and average annual rainfall of 800-2500mm<sup>3</sup>. Based on the projection from Ethiopian Central Statistical Agency of 2009, Jimma has estimated population of 194,139. Out of which, 98,967(51%) are females and 95,172(49%) are males. According to the 2016/17 Jimma town Health office Statistics the town has 17 kebeles and 36,333 households with 16,042 preschool children who are in the age range of 3-5 years.

### **4.2 Study period**

This study was conducted in Jimma Town from March 1 to 30, 2017

### **4.3 Study design**

Community based cross-sectional study was employed.

### **4.3. Population**

#### **4.3.1. Source Population**

All preschool children aged 3-5 years who have been living in Jimma Town for at least six months during the time of data collection.

#### **4.3.2. Study population**

Preschool children representatively selected from the source population.

### **4.4. Inclusion and Exclusion Criteria**

#### **4.4.1. Inclusion criteria**

All preschool children in the age range of 3-5 years who have been living in Jimma Town for at least six months.

#### **4.4.2. Exclusion criteria**

Children with skeletal deformities that would make anthropometric measurements difficult or those children with edematous conditions.

## 4.5. Sample size and sampling technique

### 4.5.1. Sample size Determination

**Specific objective 1:** To determine the prevalence of overweight and obesity

Epi Info 7 was used to calculate the sample size using a single population proportion formula with the following assumptions.

$$n = \frac{\left( Z_{1-\alpha/2} \right)^2 P(1 - P)}{d^2}$$

Where:

n=required sample,

z= Standard normal distribution value corresponding to 95% confidence level (1.96)

p= expected prevalence of overweight and obesity 10.7 %(18).

d=Acceptable margin of error (precision of measurement) =5%

A total sample size of 328 preschool children was required to estimate the prevalence of overweight and obesity based on the above formula and after considering for a non-response rate of 10% and a design effect of 2.

**Specific objective 2:** To identify factors associated with overweight and obesity

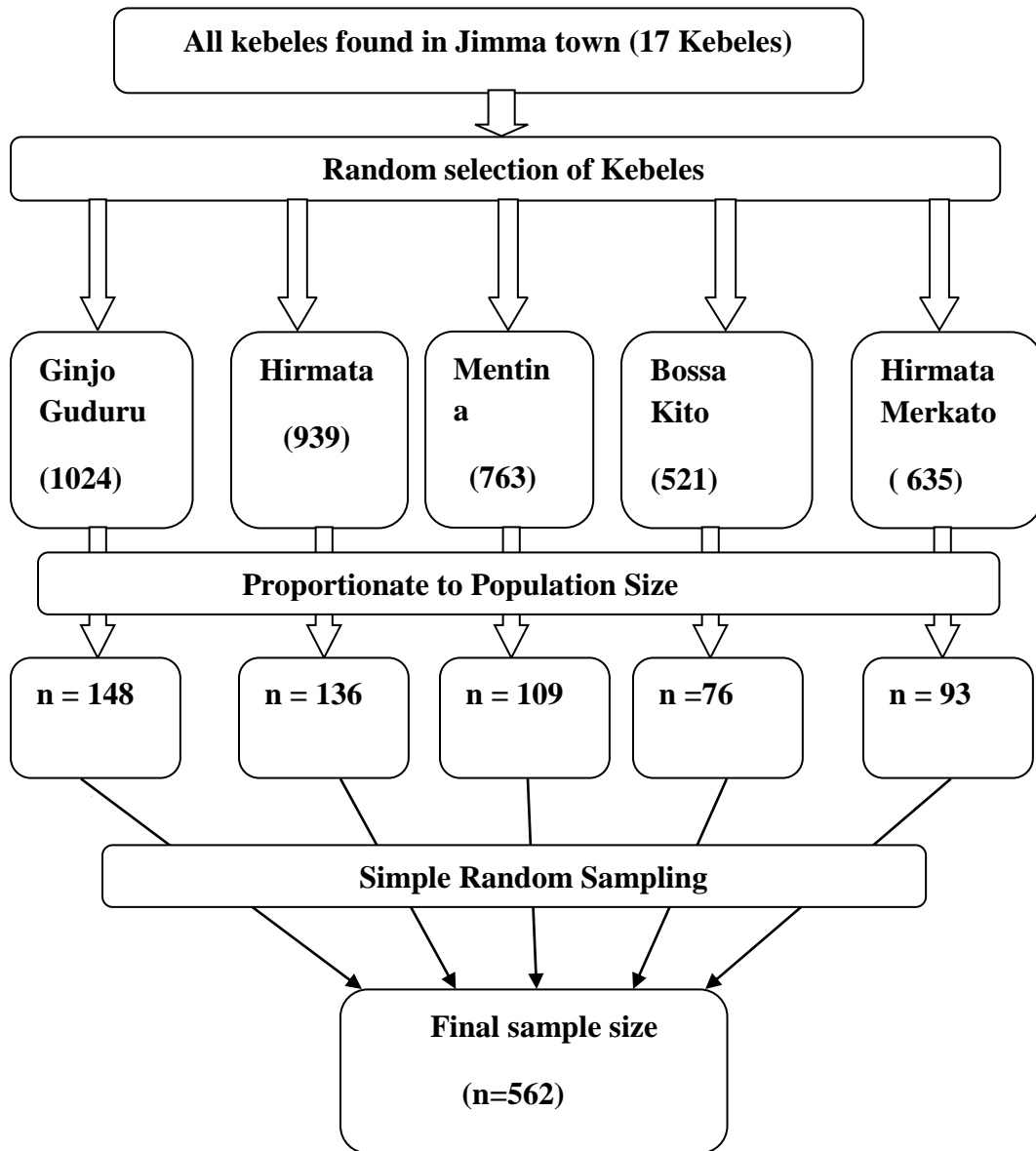
For the second specific objective by using explanatory variables of overweight and according to study conducted in Hawassa city in 2014, Ethiopia report that Socio economic status and Age of children were significantly associated with the dependent factor, overweight and obesity(18). The value of  $Z = 1.96$  at  $\alpha=0.05$  and  $\beta=0.2$  and odds ratio of 3.51 and 4.59 respectively used. Final sample size is presented on the table below after adding 10% for non-response and multiplying the sample by a design effect of 2 for the multi-stage sampling.

Predictor factors	Power	Z $\alpha/2$ of 95% CI	P1	P2	Ratio	AOR	n <sub>1</sub>	n <sub>total</sub>	Design eff.	Final sample size
Socio economic status	80%	1.96	0.18	0.059	1:1	3.51	256	281	2	562
Age of Children	80%	1.96	0.164	0.069	1:1	4.59	144	158	2	306

Generally when we compare sample size calculated for first objective (168) and for second objective (281) the second one is the largest and considering 2 design effects on the largest sample size, final sample was 562. As the total sample size 562 can include all, we decide on the final sample 562 was studied.

#### 4.5.1 Sampling Technique and Procedure

A multi-stage sampling technique was used to select study subjects. First, five study kebeles were selected using a lottery method from the total of 17 kebeles in Jimma town. Then study subjects was allocated to selected kebeles proportion to population size based on number of preschool age children found in each kebeles. Then, simple random sampling method was applied to sample study households from the selected study kebeles using a sampling frame of households with children aged 3-5 years which was prepared based census carriedout by the Jimma town health office during deworming campaign in 2017 prior to data collection. When more than one child of age 3-5 years was encountered per household, we applied the lottery method to select only one study subject per household. .



**Figure 2 Schematic presentation of sampling procedure of study subjects.**

## **4.6 Data collection Procedure**

Data were collected by using structured interview questionnaires and anthropometric measurements. The interviewee's of this study was the mother or primary care takers of the child. The questionnaires are composed of socio demographic and economic factors, feeding practice, physical activity of the child and sedentary behavior of the child. Anthropometric measurements were taken at the end of interview. The data collectors were trained for two days 8 Diploma Nurses and mean while supervision was done by 4 BSc holders. Two data collectors and one immediate supervisor was assigned to each kebele.

### **4.6.1 Data collection Instrument**

Structured interviewer administered questionnaires was adapted from different literatures composed of socio demographic and economic factors, feeding practice, physical activity of the child and sedentary behavior of the child and Anthropometric measurements was used.

#### **Anthropometric measurements**

Measurements were taken by standardized techniques and calibrated equipment. Height was measured by removing the child's shoes and removing any pins and braids from the hair that could affect the measurement. Height then recorded to the nearest 0.1cm by using a portable stadiometer UNICEF SECA (Model; seca 233 Hamburg, Germany). Weight was measured children with minimal clothing and recorded to the nearest 0.1 kg using UNICEF SECA digital weighing scale (Model; SECA; 770 alpha, Hamburg, Germany). Age of the child was asked from the mothers or care takers both the child's date of birth and age on the day measured. If birth dates are not recorded or known with certainty, probe the mother/caregiver for the approximate date of birth based on a local events calendar. Finally the age calculated by subtracting date of birth from date of data collection. Finally WHO 2006 growth standards, was used to transform children's weight and height measurements into BMI-for-age Z-score BAZ.

#### **Assessment of dietary diversity score (DDS)**

Children's dietary diversity score was assessed by asking mothers/caregivers to report the different food groups consumed by child in the last 24 hours preceding the date of survey.



According to USAID/FANTA IDDS(children)(58) the following nutritional food groups were used to calculate DDS: (1) grains, roots and tubers, (2) vitamin A-rich fruits and vegetables, (3) other fruits and vegetables, (4) meat, poultry and fish, (5) eggs, (6) pulses, legumes and nuts, (7) milk and milk products and (8) foods cooked in oil/fat/butter including sweetfoods.

For dietary diversity, a simple count of number of food groups was calculated. The Dietary Diversity Score(DDS) was ranked in to two groups, Four and over food groups(High) and less than four (low) food groups consumed by children in the last 24 hours preceding the date of survey (18).

#### **Assessment of food frequency consumption**

It was adopted and assessed using food frequency questionnaire for the period in past one month by face-to-face interview of mothers/caregivers(59).

#### **Assessment of Household wealth Index**

A household wealth index was grouped by principal component analysis based on household assets and housing quality based on an earlier concept that was developed by Garenne and Hohmann to be used as a proxy indicator for socioeconomic status of households(60). This measurement is appropriate for urban and rural setting in low and middle income countries. First all study participants was asked about the ownership of assets by their respective households with a score “1” given to those who own the asset and score of “0” given to those who did not own. Then, after checking the assumption wealth index was computed by using principal component analysis. Inter-item consistency was checked by Computing Cronbach's Alpha for all the factor loadings of each component and showed to be reliable with a Cronbach's alpha value of greater than 0.7. The first factor that explains the largest variation was taken and ranked into tertiles to give low, medium and high socioeconomic status.

#### **Assessment of physical activity and sedentary behavior**

Children's physical activity and sedentary behavior was assessed by asking mothers/caregivers to estimate the daily time, in hours, that the child usually spends on walking, running, jumping, playing in the yard or street around the house or at a playground and the child usually spends on watching television and playing computer/mobile games(54).

## 4.7 Variables

### 4.7.1 Dependent Variables

- Overweight and Obesity

### 4.7.2 Independent Variables

- **Socio demographic and economic factors**
  - ❖ Religion
  - ❖ Educational status of families
  - ❖ Occupation of families
  - ❖ Family size
  - ❖ Household Wealth status
- **Child Characteristics**
  - ❖ Sex of child
  - ❖ Age of child.
- **Feeding practice of the child**
  - ❖ Breastfeeding
  - ❖ Formula feeding
  - ❖ Dietary diversity score
  - ❖ Food frequency
- **Physical activity and Sedentary behavior of the child**
  - ❖ TV Viewing(Video, DVD)
  - ❖ Computer/ mobile game playing
  - ❖ Outdoor game playing

## 4.8 Operational Definitions of Terms

**Preschool children:** Children who are in age range of 3-5years

**Non Overweight and Obesity:** A preschool child with a value of BMI for Age Z-score less than or equal to two standard deviations ( $\leq 2SDs$ ).

**Overweight and Obesity:** A preschool child with a value of BMI for Age Z-score above two standard deviations (+2SDs).

**Overweight:** A preschool child with a value of BMI for Age Z-score above two standard deviations (+2SDs) but  $\leq 3$  standard deviations ( $\leq 3$ SDs).

**Obesity:** A preschool child with a value of BMI for Age Z-score above three standard deviations (+3SDs)(61).

**Outdoor physical activity:** The activity was estimated by the mothers/care givers as the daily time, in hours, that the child usually spends on walking, running, jumping, playing in the yard or street around the house or at a playground.

**Sedentary time:** The daily time, in hours, estimated by the mothers/care givers that the child usually spends on watching television and playing computer/mobile games.

**High Dietary Diversity Score:** Consuming 4 or more food groups during the previous day.

**Low Dietary Diversity Score:** Consuming less than 4 food groups during the previous day (18).

#### **4.9 Data quality control**

Structured questionnaire was prepared in English and translated into Amharic and Afan Oromo languages and re-translated back to English before data collection and different translator was used to keep the consistency of the questionnaire and for field work purpose. Height and weight measurements were taken twice for each child by different measurer and the mean value was taken. A two days training was given for the data collectors and the instrument was tested on 5% of the sample size(28) on children and mothers out of the selected study kebele at Seto samaro kebele before the actual data collection to examine the questionnaire for consistency and to estimate time needed.

Weight scale was set to zero level with no object on it and placed on a firm and flat floor surface before measurement performed and for validation weighing scales with an object of known weight regularly calibrated. Stadiometer was placed on firm and flat floor surface, the subjects were positioned head at the Frankfurt horizontal plane looking straight ahead( $90^0$ ), knees and legs straight, arms at sides, and the heels, buttocks and the shoulders blades, were touching the vertical surface of the stadiometer before measurement performed. Supervision was made by supervisors on the spot checking and review of all the completed questionnaires to ensure

completeness and consistency of information collected and incorrectly filled or missed questionnaire was given back to the respective data collectors for correction.

#### **4.10 Data processing and Analysis**

The data was checked for completeness and consistency before entered to computer. Then it was entered, edited and coded in the computer using EPI-DATA 3.1 software and then sex, date of birth, date of survey, height and weight transferred with ID number to WHO Anthros version 3.1.0 software to convert anthropometry measurement values into Z-scores of the indices; BAZ using WHO 2006 child growth standard(3). Then entered data was exported to SPSS version 21 for further analysis and descriptive statistics (percentages and means with standard deviations) was computed to summarize the data.

Initially the analysis of data was done by using bivariate logistic regression to determine the association between the dependent variable and potential predictors. Statistical tests at 95% CI were made. Bivariate analysis was carried out to see the association between the dependent and each independent variable, variables with P-value less than 0.25 was selected to be a candidate for multivariable analyses to determine the independent predictors of overweight and obesity. In the multivariable analyses variables having P-values  $<0.05$  was declared as statistically significant. The adjusted odds ratios together with their corresponding 95% confidence intervals were determined to measure the strength and level of significance of the association. Multicollinearity was checked by checking collinearity statistics VIF  $<2$  and tolerance  $>0.1$ . The Hosmer and Lemeshow's goodness of fit test was considered to check model fitness. Hosmer and Lemeshow's test produce chi-square of 13.02 with degree of freedom 8, p value 0.121).

#### **4.11 Ethical considerations**

Formal written letter of Ethical approval was obtained from Jimma University Institutional Review Board. Letter of cooperation and support from the University together with the ethical approval letter was presented to the Jimma town administrative office and health office. Letter of support was written to the selected kebeles to get necessary permission before the start of the data collection. Moreover, all the study participants' families were informed verbally about the purpose and benefit of the study along with their right to refuse and consent was obtained. Confidentiality of study participants was assured that their name will not be stated, data was kept confidential and anonymous and it was used only for research purpose.

#### **4.12 Plan for dissemination of findings**

The final report of this study will be presented to Jimma University Faculty of Public Health, Department of Population and Family Health in Partial Fulfillment for the Requirement for Masters of degree in Human Nutrition. It will also be submitted to Oromia Regional Health Bureau and Jimma town Health office. The finding of this study is also planned to be disseminate to different stakeholders that have a contribution to improve the country health situation. Finally, maximum efforts will be done to present the result in various seminars and workshops and publish on a scientific journal.

## CHAPTER FIVE: RESULTS

In this study, a total of 548 children aged 3-5 years were assessed giving a response rate of 97.2%.

### 5.1 Socio- economic and demographic characteristics of study participants

Among study participants 230(42.0%) were Muslims, 197(35.9%) were orthodox and 83(15.1%) were protestant by their religion. Majorities of mothers occupation was house wife 256(46.7%) followed by government employee 123(22.4%) and daily laborer 116(21.2%) whereas the fathers occupation were merchant 192(35.0%) followed by government employee 182(33.2%) and daily laborers 96(17.2%) respectively.

About 267(48.7%) fathers and 125(22.8%) mothers joined Collage/ University whereas about 22(4%) mothers and 14(2.6%) father were unable to read and write. In the studied household family size ranged from 3-8 with majority 319(58.2%) containing greater or equal to five members. Regarding the sex and age of preschool children, about half of the study participants were females 307(56.1%) and about 299(54.6%) were from 48-60 months years old. The mean ( $\pm$  SD) age of study participants was 48.5 ( $\pm$  6.8) months.

Table 1 Socio- demographic characteristics of preschool children, Jimma, Ethiopia 2017.(n=548)

<b>Variables</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Religion</b>	Muslim	230	42
	Orthodox	197	35.9
	Protestant	83	15.1
	Catholic	21	3.8
	Others <sup>1</sup>	17	3.1
<b>Sex of Child</b>	Male	241	43.9
	Female	307	56.1
<b>Age of Child (in months)</b>	36-47	249	45.4
	48-60	299	54.6

Table 1 Continued

<b>Occupation of the mother</b>	House wife	256	46.7
	Government employee	123	22.4
	Daily laborer	116	21.2
	Merchant	48	8.8
	Others <sup>2</sup>	5	0.9
<b>Occupation of the father</b>	Government employee	182	33.2
	Daily laborer	96	17.5
	Merchant	192	35.0
	Others <sup>3</sup>	78	14.2
<b>Educational status of the mother</b>	Not read and write	22	4
	Only read and write	30	5.5
	Grade 1-4	42	8.9
	Grade 5-8	131	23.9
	Grade 9-12	191	34.9
	College/University	125	22.8
<b>Educational status of the father</b>	Not read and write	14	2.6
	Grade 5-8	62	11.3
	Grade 9-12	205	37.4
	College/University	267	48.7
<b>Family size</b>	Less than 5	229	41.8
	Greater or equal to 5	319	58.2
<b>Household Wealth status</b>	Low	184	33.6
	Medium	175	31.9
	High	189	34.5

Others<sup>1</sup> Religion (Adventist, Wakefata)

Others<sup>2</sup> Mother Occupation (Non-Government employed, private workers)

Others<sup>3</sup> Father Occupation (Non-Government employed, private workers)

## 5.2 Magnitude of overweight and obesity

The mean ( $\pm$  SD) of the BAZ score of study participants was 0.56( $\pm$ 1.32). The prevalence of overweight and obesity in the study area were 12.8% (95% CI=9.9-15.7%) and 4.9% (95% CI=3.3-6.9%), respectively.

The sex specific prevalence of overweight and obesity were 4% and 2.9% in male children while 8.8% and 2.0%, in female children respectively (**Figure 2**).

Age specific prevalence of overweight and obesity were 3.5% and 2.2% in children 36-47 months old and 9.3% and 2.7% in children 48-60 months old, respectively (**Figure 3**).

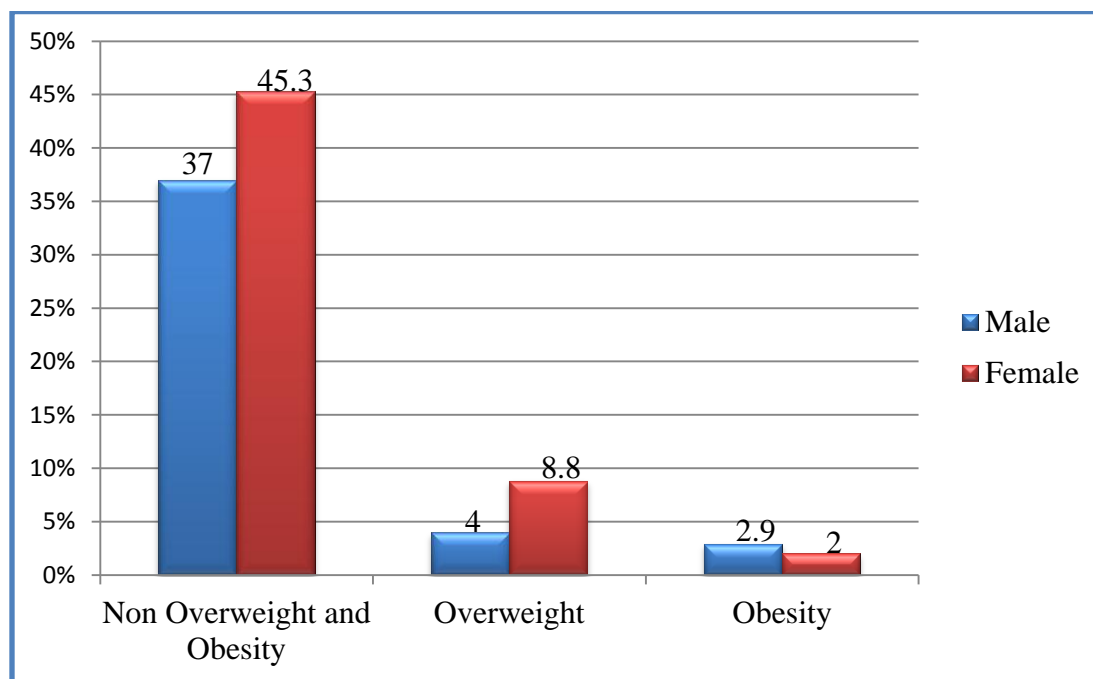


Figure 2 Prevalence of childhood overweight and obesity by sex among children 3-5 years old in Jimma town, 2017 (n=548)



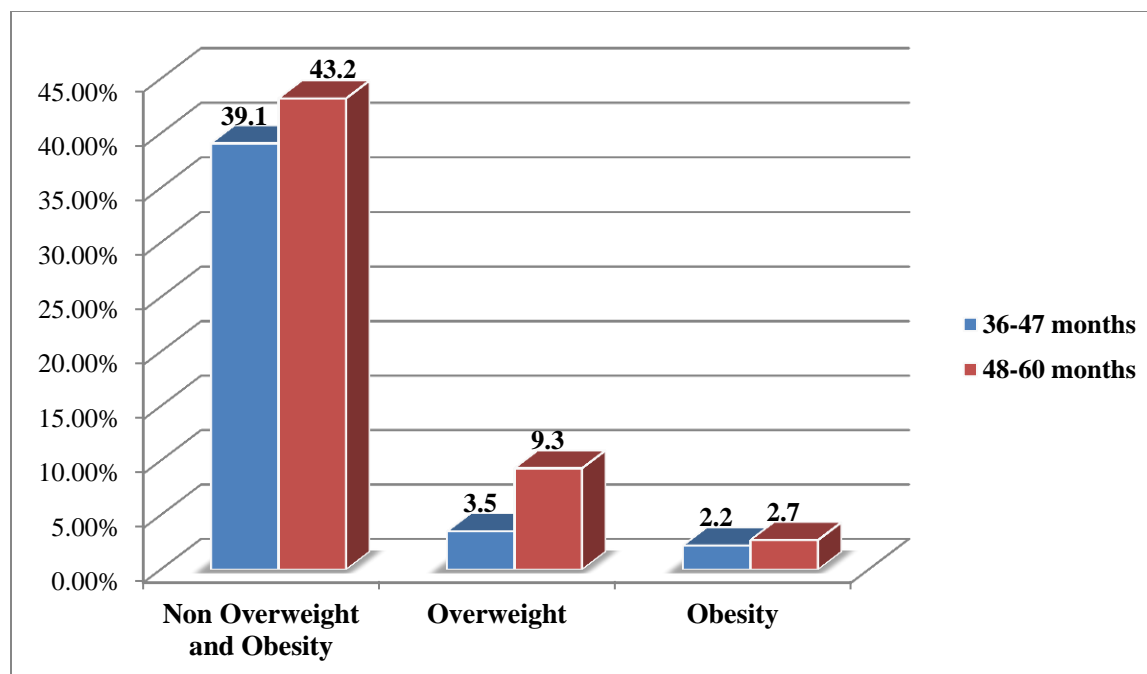


Figure 3 Prevalence of childhood overweight and obesity by age category among children 3-5 years old in Jimma town, 2017 (n=548).

### 5.3 Child feeding practices

In this study, majority of the participants 359(65.6%) were exclusive breastfed while 189(34.4%) was not exclusively breastfed. The majority of study participants 286(60.1%) were continued breastfeeding for greater than 25 months. (**Table 2**)

About 244(44.5%) fed infant formula while 304(55.5%) were never fed on infant formula. The age of introduction of feeding infant formula was 4-6 months and  $\leq 3$  months for 101(41.4%) and 88(36.1%) of the children who consumed infant formula, respectively. The median (25th, 75th percentile) age duration of infant formula feeding was 28 months (IQR 24-36 months). The majority of children who consumed infant formula for more than or 25 months were 155(63.5%).

Table 2 Feeding practices of children 3-5 years old in Jimma town, 2017 (n=548)

<b>Variables</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Exclusive breastfeeding</b>	Yes	359	65.6
	No	189	34.4
<b>Duration of continued breastfeeding</b>	≤ 18months	3	0.6
	19-24months	187	39.3
	>25 months	286	60.1
<b>Infant formula feeding</b>	Yes	244	44.5
	No	304	55.5
<b>Age of started infant formula feeding</b>	0-3 months	88	36.1
	4-6 months	101	41.4
	>6 months	55	22.5
<b>Duration of infant formula feeding</b>	≤18 months	13	5.4
	19-24 months	76	31.1
	>25 months	155	63.5

#### 5.4 Dietary diversity score by preschool children

The Dietary Diversity Score of preschool children in the study area were reported by mothers/care takers in the last 24 hours. The minimum and maximum DDS were 1 and 8 respectively with the mean ( $\pm$ SD) intake of dietary diversity score was 4.26 ( $\pm$ 1.51). Foods from grains, tubers and roots were consumed by majorities (88.5%) whereas meat, poultry, fish and sea foods were least consumed (29.9%) food groups in this study.

Table 3 Proportion of preschool children aged 3-5yrs who consume different food groups in the last 24 hours preceding the date of survey in Jimma town, 2016 (n=548)

Food groups	Frequency	Percentage
	Yes	
Foods made from grains, roots and tubers	485	88.5
Vitamin A-rich fruits and vegetables	182	33.2
Other fruits and vegetables	237	43.2
Meat, poultry, fish and sea foods	164	29.9
Eggs	217	39.6
Food made from pulses, legumes and nuts	445	81.2
Milk and milk products	370	67.5
Foods cooked in oil/fat/butter	196	35.7
<b>Children dietary diversity score</b>		
	<b>mean ± SD</b>	<b>4.26 (±1.51)</b>

### 5.5 Food frequency patterns by preschool children

Majorities of the children about 225(46.5%) consumed more than once per day foods made of cereals and grains like Injera, bread, macaroni, and pasta while 206(37.6%) of them consumed once per a day. Meat and fish are least frequently consumed food groups about 3(0.5%) consumed once per a day.(Table 4)

About 308(56.2%) consumed roots and tubers based foods such as sweet potato, potato & carrot at least ones/twice per week and about 7(1.3 %) consumed more than once per day. About

316(57.7%) and 349(63.7%) consumed vegetables and fruits at least ones/twice per week, respectively.

The majority of the study participants 284(51.8%) and 275(50.2%) consumed meat and eggs at least ones/twice per week, respectively and about 11(2%) and 33(6%) never consumed meat and eggs, respectively. About 113(20.6%) and 159(29.0%) consumed milk & milk products more than once per day and at least once per day, respectively and majority 306(55.8%) of the participants never consumed fish and 249(45.4%) consumed legumes food made from peas and beans at least once per day.

Table 4 Food frequency patterns by preschool children aged 3-5yrs in the last one month prior to survey in Jimma, Ethiopia 2017 (n=548).

Frequency of food groups	More than once/day	Once per day	3-6 times per week	Once/twice per week	Twice per month/less	Never
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
<b>Cereals and grains</b>	255(46.5)	206(37.6)	65(11.9)	18(3.3)	4(0.7)	0
<b>Roots &amp; tubers</b>	7(1.3)	76(13.9)	128(23.4)	308(56.2)	29(5.3)	0
<b>Vegetables</b>	4(0.7)	38(6.9)	107(19.5)	316(57.7)	75(13.7)	8(1.5)
<b>Fruits</b>	6(1.1)	36(6.6)	103(18.8)	349(63.7)	49(8.9)	5(0.9)
<b>Meats</b>	10(1.5)	3(0.5)	109(19.9)	284(51.8)	131(23.9)	11(2.0)
<b>Eggs</b>	11(2.0)	61(11.1)	123(22.4)	275(50.2)	45(8.2)	33(6.0)
<b>Legumes</b>	212(38.7)	249(45.4)	65(11.9)	18(3.3)	4(0.7)	0
<b>Fish</b>	8(1.5)	3(0.5)	31(5.7)	63(11.5)	137(25.0)	306(55.8)

Table 4 Continued

<b>Milk &amp; Milk products</b>	<b>113(20.6)</b>	<b>159(29.0)</b>	<b>74(13.5)</b>	<b>95(17.3)</b>	<b>86(15.7)</b>	<b>21(3.8)</b>
<b>Sweet foods</b>	11(2.0)	55(10.0)	113(20.6)	188(34.3)	164(29.9)	17(3.1)
<b>Soft drinks</b>	11(2.0)	62(11.3)	88(16.1)	242(44.2)	134(24.5)	11(2.0)
<b>Junk foods</b>	6(2.0)	87(15.9)	148(27.0)	187(34.1)	112(20.4)	8(1.5)
<b>Food cooked with oil, fat/butter</b>	11(2.1)	15(2.7)	50(9.1)	147(26.8)	282(51.5)	43(7.8)

### 5.6 Sedentary and physical activities of preschool children

Majority of study participants 358(81.4%) were spends less than two hour per day on sedentary activities like TV viewing and computer/mobile game playing. About 82(18.6%) spends greater or equal to two hour per day on sedentary activities.

Majority of study participants 377(76.6%) were spends greater or equal to one hour per day on out door activities and about 115(23.4%) spends less than one hour per day on outdoor activities.

Table 5 Sedentary and physical activities of preschool children aged 3-5 years in Jimma town, Ethiopia 2017. (n=548)

<b>Variables</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Sedentary Activities</b>	< 2 hours per day	358	81.4
	≥ 2 hours per day	82	18.6
<b>Physical Activities</b>	< 1 hour per day	115	23.4
	≥ 1 hours per day	377	76.6

## 5.7 Factors associated with overweight and obesity

On bivariate analysis, variables that were significantly associated with overweight and obesity were family size, child age in months, wealth index, educational status of mother, occupation of mother, Age Start Infant formula feeding, DDS, spending  $\geq 2$  hours/day on sedentary activities and spending  $\leq 1$  hour/day on outdoor activities.

Table 6 Bivariate logistic regression analysis of factors associated with Overweight and Obesity among preschool children in Jimma town,south west, Ethiopia ,2017 (n=548)

<b>Variables</b>	<b>Category</b>	<b>Overweight and Obesity<sup>1</sup></b>	<b>Non Overweight and obesity</b>	<b>COR (95% C.I.)</b>	<b>P</b>
<b>Family size</b>	Less than Five	57(10.4%)	172 (31.4%)	2.31(1.48-3.61)	0.001
	Greater or equal to Five	40 (7.3%)	279(50.9%)	1	1
<b>Child Age</b>	36-47 months	66(12.0%)	237(43.2%)	1.92(1.21-3.06)	0.006
	48-60 months	31(5.7%)	214(39.1%)	1	1
<b>Educational status of Mother</b>	No Education	6(1.1%)	47(8.6%)	1	1
	Primary Education	18(3.3%)	162(29.6%)	1.14(0.97-5.70)	0.158
	Secondary and Above	73(13.3%)	242(44.2%)	0.87(0.32-2.31)	0.780
<b>Occupation of mother</b>	Employed	60(10.9%)	232(42.3%)	3.3(1.68-7.24)	0.043
	Unemployed	37(6.8%)	219(40.0%)	1	1
<b>Wealth Index</b>	Low	9(1.7%)	150(27.4%)	1	1
	Medium	26(4.7%)	117(21.4%)	3.7(1.67-8.21)	<0.001
	High	62(11.3%)	184(33.5%)	5.6(2.70-11.67)	<0.001

Table 6 Continued

<b>Age Start Infant formula feeding</b>	0-3 months	37 (15.2%)	51(20.9%)	4.6(1.80-10.08)	0.058
	4-6 months	13(67.2%)	88 (36.1%)	0.86(0.34-2.24)	0.776
	>6 months	8(3.3%)	47(19.3%)	1	1
<b>Sedentary activities</b>	< 2 hours per day	37(8.4%)	45(10.2%)	1	1
	≥ 2 hours per day	60(13.6%)	298(67.7%)	4(2.44-6.84)	<0.001
<b>Physical exercise(outdoor activities)</b>	< 1 hour per day	50(10.2%)	188(38.2%)	3.7(2.07-6.64)	< 0.001
	≥ 1 hour per day	17(3.5%)	237(48.2%)	1	1
<b>DDS</b>	low	45(8.2%)	126 (23.0%)	1	1
	High	52(9.5%)	325(59.3%)	2.23(1.42-3.49)	<0.001

1: Overweight including obesity, BMI-for-age >2 standard deviations (+2SD) of the WHO Growth Standard (49).

However, the result of multivariate analysis revealed that dietary diversity score (DDS) of  $\geq 4$  food groups[AOR (95% CI)=3.3(1.78-6.24)],family size less than five members[AOR (95% CI)=2.6(1.37-4.94)], child age of 48-60 months[AOR (95% CI)=2.2(1.12-4.33)],mothers are employed[AOR (95% CI)=2.3(1.21-4.29)],in higher wealth tertile[AOR (95% CI)=2.7(1.01-7.23)] , spending  $\geq 2$  hours/day on sedentary activities[AOR (95% CI)=2.2(1.10-4.54)],and spending  $\leq 1$  hour/day on outdoor activities[AOR (95% CI)=3.2(1.66-6.24)] were independently and significantly associated with overweight and obesity (Table 7).

### Determinants of Overweight and Obesity

On multivariable logistic regression model, the variables that independently predicted overweight and obesity were family size, child age in months, wealth index, occupation of mother, DDS, spending  $\geq 2$  hours/day on sedentary activities and spending  $\leq 1$  hour/day on outdoor activities.

There was a significant association between overweight & obesity and family size. Children from family size less than five members were 2.6 times more likely to be overweight and obese

as compared to children from family size greater than five members (AOR = 2.6 [95% CI: 1.37-4.94], p value 0.003) (Table 8)

The prevalence of childhood obesity/overweight was higher in the age group 48-60 months (12.0%) when compared to the age group 36-47 months (5.7%). Children with age group 48-60 months were 2.2 times more likely to be obese/overweight when compared to children from age group 36-47 months (AOR =2.2 [95% CI: 1.12-4.33])

Study participants in the highest wealth tertiles were 2.7 times more likely to be overweight and obese as compared to those in the lowest wealth tertiles (AOR = 2.7 [95% CI: 1.01-7.23], p value 0.049). Those children who spend less than one hour per day on outdoor activities were 3.2 times more likely to be overweight and obese as compared to those who spend more than one hour per day (AOR = 3.2 [95% CI: 1.66-6.24], p value < 0.001)

Children who had high dietary diversity score ( $DDS \geq 4$ ) were 3.3 times more likely to be overweight/obese when compared to those with low dietary diversity score (AOR=3.3 [95% CI: 1.78-6.24]). There was a significant association between overweight & obesity and occupation of mother. The odds of being overweight and obese was 2.3 times higher for children whose mothers were employed as compared to those children whose mothers were unemployed (AOR = 2.3 [95% CI: 1.21-4.29], p value 0.011).

Sedentary activities of the preschool children were also another factor associated to overweight and obesity. The odds of being overweight and obese was 2.2 times higher in children who spend greater than two hours per day on sedentary activities like watching TV and playing computer and mobile game than those children who spend lesser time (AOR=2.2 [95% CI: 1.21-4.29]), p value 0.026 (Table 7).



Table 7 Multivariable logistic regression analysis of factors associated with Overweight and Obesity among preschool children in Jimma town,south west, Ethiopia ,2017 (n=548)

<b>Variables</b>	<b>Category</b>	<b>Overweight and Obesity</b>	<b>Non Overweight and obesity</b>	<b>AOR (95% C.I)</b>	<b>P</b>
<b>Family size</b>	Less than Five	57(10.4%)	172 (31.4%)	2.6(1.37-4.94)	0.003
	Greater or equal to Five	40 (7.3%)	279(50.9%)	1	1
<b>Child Age</b>	36-47 months	31(5.7%)	214(39.1%)	1	1
	48-60 months	66(12.0%)	237(43.2%)	2.2(1.12-4.33)	0.021
<b>Occupation of mother</b>	Employed	60(10.9%)	232(42.3%)	2.3(1.21-4.29)	0.011
	Unemployed	37(6.8%)	219(40.0%)	1	
<b>Wealth Index</b>	Low	9(1.7%)	150(27.4%)	1	1
	Medium	26(4.7%)	117(21.4%)	3.2(1.12-9.61)	0.030
	High	62(11.3%)	184(33.5%)	2.7(1.01-7.23)	0.049
<b>Sedentary activities</b>	< 2 hours per day	37(8.4%)	45(10.2%)	1	1
	≥ 2 hours per day	60(13.6%)	298(67.7%)	2.2(1.10-4.54)	0.026
<b>Physical exercise(outdoor activities)</b>	< 1 hour per day	50(10.2%)	188(38.2%)	3.2(1.66-6.24)	0.001
	≥ 1 hour per day	17(3.5%)	237(48.2%)	1	1
<b>DDS</b>	Low	45(8.2%)	126 (23.0%)	1	1
	High	52(9.5%)	325(59.3%)	3.3(1.78-6.24)	0.001

## CHAPTER SIX: DISCUSSION

The present study demonstrated that the combined prevalence of overweight and obesity among preschool children in Jimma town was 17.7% (95% CI=14.4-21.0%), of which 12.8% (95% CI=9.9-15.7%) and 4.9% (95% CI=3.3-6.9%) were overweight and obese, respectively.

This finding is consistent with studies from Kenya and Nigeria where the prevalence of overweight and obesity were reported to be 13.4% and 6.9% & 15.0% and 8.6%, respectively (31, 32).

A study from the Kingdom of Bahrain (Middle East) reported that the prevalence of overweight and obesity were 12.3% and 8.4%, respectively (24). Similarly in Ghana Accra about 10.9% and 7.2% preschool children were overweight and obese respectively (30). These findings are little bit higher than the result of this study in respect of obesity. This difference could be difference in cultural and socio economic status. Likewise the prevalence of overweight was about 27.3% in Serbian preschool Children who enrolled to Kindergartens (26) which was more than double the prevalence of this study. The possible reason for the difference may be socio economic variation among the two countries (i.e. Ethiopia in SSA & Serbia in Europe).

The prevalence of overweight and obesity in Basrah (Iraq) were 7.6% and 3.6% respectively which were lower than the magnitude in this study (25). One reason may be time gap between this study and the previous study and there may be good prevention strategies against childhood overweight and obesity in middle income countries than SSA country like Ethiopia.

According to review article by VanHook, Altmana et al. 2013, study conducted from 1990-2008 in 33 developing countries (17 of which from SSA). Using CDC growth chart overweight and obesity prevalence among under five children ranged from 5.3% in Bangladesh to 41% in Armenia (27). The result of this study was in the range stated, even though the stated range was very wide and the review was conducted few years back (1990-2008).

When compared to the study done in Southern Ethiopia, Hawassa town, the current prevalence of overweight and obesity was higher than the report (the Overall prevalence was 10.7%) (18). Generally possible explanation for these differences would be due to socio cultural, study setting differences and this might be due to the time gap between the previous studies and this study.

This study revealed that family size less than five was associated with increased risk of overweight and obesity among children compared to family size larger than five. Similar results were reported among preschool children in Kenya(31) and Portugal(39).A smaller family size might imply less sharing of available food and other family resources and allows families to tender better nutrition, which may well contribute to excessive energy intake and obesity.

The prevalence of childhood obesity/overweight was higher proportion in age groups 48-60 months (12.0%) when compared to 36-47 months (5.7%). Children with age group 48-60 months were 2.2 times more likely to be obese/overweight when compared to children from age group 36-47 months (AOR =2.2 [95% CI: 1.12-4.33]). Similar results have been reported from Ghana, children age group 48-60 months were more likely to be obese/overweight as compared to children from age group 36-47 months(30).Additionally similar results were reported from Bahrain which shows statistically significant(24).

In contrast, studies from Ethiopia, Hawassa city showed that the prevalence of overweight was higher proportion in age groups 36-47 months (16.4%) when compared to 48-60 months (6.9%)(18).As WHO (2000) indicated that body weight increases are especially prevalent after three years of age, leading to an early adiposity rebound a physiological increase in the percentage of body fat at 5 or 6 years of age. Therefore, the first under five years of life may well be the best period for intervention regarding primary or targeted obesity prevention.

There was a significant association between overweight & obesity and occupation of mother. The odds of being overweight and obese was 2.3 times higher for children whose mother was employed as compared to those children whose mother was unemployed (AOR = 2.3 [95% CI: 1.21-4.29]).This finding is consistent with a study from Egypt showed that more than half of obese children belong to employed mothers (58.2%) while most of the normal weight children belong to unemployed mothers (70%)(41). This similarity might be due to the fact that employed mothers may have a ready and higher flow of disposable income which leads to probably by having more access to more food including fatty, sweet and junk foods.

This study revealed that there was a statistically higher magnitude of overweight/obesity among preschool children from households with high economic status compared to those from households with lower economic status.

Study participants who were categorized in the high socioeconomic status tertiles were 2.7 times more likely to be overweight and obese as compared to the low socioeconomic status tertiles (AOR = 2.7 [95% CI: 1.01-7.23]. This is consistent with results from a study in the Hawassa town that showed children from highest wealth tertiles were 3.5 times more likely to be obese/overweight as compared to children in the lowest wealth tertile (AOR = 3.51 [95% CI: 1.30-9.50]) (18). Additionally, the result was also consistent with study conducted in Algeria, France and Brazil [(43), (44) (45)]. One of the reason could be that those who are from high socioeconomic status will tend more to less-active lifestyle, as well as consumption of unhealthy foods, such as those foods which are high energy dense, high in saturated fats and processed foods, and low in fiber instead of the healthy traditional diet such as plant based food sources, low in fat, high fiber, fruits and vegetables. Another explanation might be, in present study Ethiopian societies, a fat child is thought to be belongs to a high socio-economic status family.

In contrast the present finding, in most industrialized countries the prevalence of overweight and obesity has increased in children specifically among minorities and low socioeconomic status (19). The reason might be low energy dense food were relatively more expensive than less healthy energy dense food, therefore low SES groups leading to the consumption of a more energy-dense diet. In another study showed that children from Mexico in families with low SES are at risk of becoming overweight/obesity compared to children from medium & high SES families (52).

Sedentary activities of the preschool children were also another factor associated to overweight and obesity. The odds of being overweight and obese was 2.2 times higher in children who spend greater than two hours per day on sedentary activities like watching TV and playing computer and mobile game than those children who spend lesser time (AOR=2.2 [95% CI: 1.21-4.29]), p value 0.026). This finding is in line with the study finding from Netherland that showed compared to the children whom watched TV  $\leq 2$  hours/day, the OR for having overweight (obesity included) was 1.25 (95% CI 1.03-1.51, adjusted for confounders) for children whom watched TV  $> 2$  hours/day (53). In addition, cross sectional studies conducted in Portugal showed that more hours of TV viewing increases the risk of overweight/obesity (AOR 1.36, 95% CI 1.21-1.51) (39). One of the possible reason for this similarity might be television viewing requires little energy beyond the resting metabolic rate, and also replaces time spent in more vigorous

activity. And might be also related to lack of energy expenditure because of lack of physical activity.

Those children who spend less than one hour per day on outdoor activities were 3.2 times more likely to be overweight and obese as compared to those who spend more than one hour per day (AOR = 3.2 [95% CI: 1.66-6.24], p value < 0.001). Similar result were reported from Netherland showed that physical activities like sports participation (p < 0.001) outdoor play (p < 0.001) and Active transport (p < 0.01) were inversely associated with BMI for age of the children(53). One possible explanation is that decreasing outdoor activities are less energy consuming and one of the main factors that contributing to increased adiposity is lower energy expenditure caused by decreased outdoor physical activities(8).

In this study, the odd of overweight and obesity was higher among children who had high dietary diversity score compared to children with low dietary diversity score or children who had high dietary diversity score ( $DDS \geq 4$ ) were 3.3 times more likely to be overweight/obese when compared to those with low dietary diversity score (AOR=3.3 [95% CI: 1.78-6.24]). This finding was supported with another study report in southern Ethiopia revealed that children who had high dietary diversity score tertiles were 3.5 times more likely to be obese/overweight when compared to low dietary diversity score tertiles (AOR=3.48 [95% CI: 1.50-8.10])(18).

Similar finding, a study showed in Mexico a higher prevalence of obesity in the study participants with higher dietary diversity score. An increased prevalence and risk of obesity in the individuals with high dietary diversity due to the consumption of fruits and vegetables with oils and inclusion of the high sugar and fat as part of their diet in diversifying their diet(52). The possible reason could be an increased intake of high-energy dense foods as the dietary diversity score increases which will have a significant influence on weight gain of children.

### **Strength of the study**

- ❖ This study was community based showing real nutritional condition among preschool children and could allow us to infer our results to the general population under the study.
- ❖ This study was the first in its kind and investigate this is problem in this area, it can serve as a reference for further researcher and can stimulate professional for further investigation.

### **Limitation of the study**

Although this study addressed very important issues, significant limitations were acknowledged.

- ❖ Used cross-sectional survey to assess the prevalence of childhood obesity/overweight and its associated factors which did not allow us to determine cause and effect relationship.
- ❖ In this study other factors which may affect excess body weight gain such as birth weight, health status of child, genetic factor and parent weight status and nutritional knowledge were not included.
- ❖ Despite the data was collected by experienced and trained data collectors and supervisors, recall bias and social desirability bias by participants on variables like the dietary habits(dietary diversity), food frequency ,breastfeeding and formula feeding relies on memory of the respondents might be happened and was not validated. But, Recall bias was minimized by intensive training was given for data collectors on how to probe mothers/caregivers to report by associating with different life events may not remember events occurred in the past.

## **CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION**

### **7.1 Conclusion**

Our results showed that the prevalence of overweight and obesity among preschool children in Jimma town is 12.8% and 4.9% respectively considerably high compared to previous studies done in Hawasa town, Ethiopia. With the world-wide increases in overweight and obesity being observed and this region being understudied. Ethiopia has long been considered one of the countries in Africa with very low rates of overweight, yet the present study suggests in this one capital town, at least, urban children are at risk of excessive weight gain. This study found overweight and obesity was hidden problem of preschool children in Jimma town. The associated factors that have been identified as predictors of preschool children overweight and obesity were family size, child age, occupation of mother, household wealth status, dietary diversity score (DDS), sedentary activities and physical activities.

## 7.2. Recommendation

Based on the finding of this study the following recommendations were forwarded:

### ❖ **Jimma town Health Office**

- ✚ The health office should initiate awareness through mass media and prepare trainings for health extension workers, school teachers and community leaders on preventive measures like adjustment of dietary intake (education regarding nutrition and developing healthy eating and lifestyle habits on healthy dieting), increasing the physical activities, reduction of sedentary behavior through behavioral change communication.
- ✚ The health office should work in collaboration with the education office, other sectors and NGOs to increase awareness on the importance of prevention measures and make facilities available at schools and public areas to support physical activities of children and should aim to improve the child's level of activity, and to enable them to engage in activities they will enjoy and be able to incorporate into their lifestyle.

### ❖ **Researchers**

- ✚ Further research should be done on addressing factors like birth weight, genetic factor health status of child, parent weight status and nutritional knowledge contributing to the occurrence of overweight and obesity among preschool children.



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## Annex I Subject information sheet

Jimma University

Institute of Health

Faculty of Public Health

- ❖ Tools to Assess the Prevalence and associated factors of overweight and obesity among preschool children in Jimma Town, South West Ethiopia, 2017

**Dear sir/madam:**

My name is \_\_\_\_\_, I am working as data collector for the study being conducted in this town by Tolera Hinsene and who is now studying for his Master's degree in Human Nutrition at Jimma University College of Public Health. I kindly beseech you to give me your attention to brief you about study and you and your child being selected as the study participant. Really thank you very much!

**Study title-** the Prevalence and associated factors of overweight and obesity among preschool children in Jimma Town, South West Ethiopia, 2017.

**Purpose-** the study will be helpful to assess the prevalence and associated factor of overweight and obesity among preschool children in this town. Thus it will be used by policy makers and other concerned bodies to design appropriate strategies. Moreover the major aim of this study is to write a thesis for partial fulfillments of Masters in Human Nutrition.

### **Procedure and duration**

First of all you and your child have been included in this study randomly. Providing as with pertinent data is helpful for the study. There are questions to answer where other data collectors and I will fill by interviewing you. The interview will take 30 minutes and weight and height measurements takes around 10 minutes.

### **Confidentiality**

The information that you and your child provide us will be confidential. There will be no information that will identify you and your child in particular. The questionnaires will be coded to hide showing of names; no reference will be made in oral or written reports that could link participant to research. Are you willing to participate?

A. Agreed \_\_\_\_\_ (tick and proceed to fill the questionnaire)

B. Not agreed \_\_\_\_\_ (tick and go to the next respondent)

**Annex II The questionnaire**

This is a questionnaire set to collect information on the prevalence and associated factors overweight and obesity among preschool children in Jimma town, 2017.

**Instruction for data collectors**

1. Collect data from Preschool children aged 3-5years in the household who are avail during the study
2. Check the completeness of the questionnaire before ending the interview with the respondent

Questionnaire identification number\_\_\_\_\_

Interviewer name\_\_\_\_\_

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

Name of kebele\_\_\_\_\_

**PART ONE- SOCIO-DEMOGRAPHIC AND ECONOMIC FACTORS**

Sr. No	Questions	Response	Skip
A.1	What is your religion?	1. Muslim 2. Orthodox 3. Protestant 4. Catholic 5. Other (specify_____	
A.2	Family size (how many people live in your household?)	In number_____	
A.3	Educational status of the mother	1. Not read and write 2. Read and write only 3. Grade 1-4 4. Grade 5-8 5. Grade 9-12 6. Collage / university	
A.4	Educational status of father	1. Not read and write 2. Read and write only 3. Grade 1-4 4. Grade 5-8 5. Grade 9-12 6. Collage / university	
A.5	Occupation of mother	House wife Gov,t employee Daily laborer Merchant Others specify_____	

<b>A.6</b>	Occupation of father	1. Farmer 2. Government employee 3. Daily laborer 4. Merchant 5. Others specify _____	
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**PART TWO- CHILD CHARACTERISTICS**

<b>B.1</b>	Child's sex	1. Male 2. Female	
<b>B.2</b>	Child's Date of birth	dd/mm/yyyy _____	
<b>B.3</b>	Child's age	In months _____	
<b>B.4</b>	Date of Data Collection	dd/mm/yyyy _____	

**PART-THREE- CHILD FEEDING PRACTICES**

<b>C.1</b>	Have you ever breastfed your child?	1. Yes 2. No	If no skip To C4.
<b>C.2</b>	If yes, for how long do you exclusively breastfed?	In months _____	
<b>C.3</b>	For how long do you continuous breastfeeding?	In months _____	
<b>C.4</b>	Have you ever formula fed your child?	1. Yes 2. No	If no skip to <b>D.1</b>
<b>C.5</b>	At what age do start formula feeding your child?	In months _____	
<b>C.6</b>	For how long do you continuous formula feeding your child?	In months _____	

**PART FOUR-DIETARY DIVERSITY SCORE IN THE LAST 24 HOUR**

**Now I would like to ask you about the types of foods that your child ate yesterday during the day and at night (in the last 24hr).**

<b>D.1</b>	Grains, roots or tubers (bread, <i>injera</i> (prepared from maize, sorghum, millet, wheat, barley, teff), macaroni, pasta, rice, sweet potato, potato, carrot,	1. Yes 0. No
<b>D.2</b>	Vitamin A rich foods (carrot, cabbage, mango, papaya....)	1. Yes 0. No
<b>D.3</b>	Fruit and vegetables (banana, orange, apple, kale, other dark green leafs ,avocado	1. Yes 0. No
<b>D.4</b>	Meat, poultry, fish, (organ meat, muscle meat, <i>Doro wot, asa tibsi</i> , )	1. Yes 0. No
<b>D.5</b>	Eggs ( <i>enqulal firfir, xibsi, qiqil</i> ...)	1. Yes 0. No
<b>D.6</b>	Pulses/legumes/nuts ( <i>telba, shiro wot, ocholoni qibe</i> , lentil, half grinded beans or <i>kiki</i> ,peas)	1. Yes 0. No

**D.7** Milk and milk products (cheese, yogurt, milk, butter, )

1. Yes  
0. No

**D.8** Foods cooked in oil/fat/butter ((like porridge, *caccabsa* , *cuko*, Sweet foods (like ice cream, cake, honey, ))

1. Yes  
0. No

**PART FIVE - FOOD FREQUENCY QUESTIONNAIRES**

**Now I would like to ask you about the types of foods that your child ate during the last 30 days.**

**E.1** How often your child does eat foods made of Cereals and grains like bread, *injera*?

1. More than once/day
2. Once per day
3. 3-6 times per week
4. Once/twice per week
5. Twice per month/less
6. Never

**E.2** How often your child eats foods made of Roots & tubers like potato, sweet potato?

1. More than once/day
2. Once per day
3. 3-6 times per week
4. Once/twice per week
5. Twice per month/less
6. Never

**E.3** How often does your child eat Vegetables like cabbage, lettuce?

1. More than once/day
2. Once per day
3. 3-6 times per week
4. Once/twice per week
5. Twice per month/less
6. Never

**E.4** How often does your child eat Fruits? (like banana, mango, avocado, orange, grape, apple, pineapple, )

1. More than once/day
2. Once per day
3. 3-6 times per week
4. Once/twice per week
5. Twice per month/less
6. Never

**E.5** How often does your child eat Meat?

1. More than once/day
2. Once per day
3. 3-6 times per week
4. Once/twice per week
5. Twice per month/less
6. Never

**E.6** How often does your child eat eggs?

1. More than once/day
2. Once per day
3. 3-6 times per week
4. Once/twice per week
5. Twice per month/less
6. Never



<b>E.7</b>	How often does your child eat legumes like beans,peas, shiro wat	<ol style="list-style-type: none"> <li>1. More than once/day</li> <li>2. Once per day</li> <li>3. 3-6 times per week</li> <li>4. Once/twice per week</li> <li>5. Twice per month/less</li> <li>6. Never</li> </ol>	
<b>E.8</b>	How often does your child eat fish?	<ol style="list-style-type: none"> <li>1. More than once/day</li> <li>2. Once per day</li> <li>3. 3-6 times per week</li> <li>4. Once/twice per week</li> <li>5. Twice per month/less</li> <li>6. Never</li> </ol>	
<b>E.9</b>	How often does your child use Milk and milk products? (cheese, yogurt,Butter)	<ol style="list-style-type: none"> <li>1. More than once/day</li> <li>2. Once per day</li> <li>3. 3-6 times per week</li> <li>4. Once/twice per week</li> <li>5. Twice per month/less</li> <li>6. Never</li> </ol>	
<b>E.10</b>	How often does your child eat Sweet foods? (like ice cream, cake, honey, )	<ol style="list-style-type: none"> <li>1. More than once/day</li> <li>2. Once per day</li> <li>3. 3-6 times per week</li> <li>4. Once/twice per week</li> <li>5. Twice per month/less</li> <li>6. Never</li> </ol>	
<b>E.11</b>	How often does your child use Soft drinks? (like mirinda,coca cola, fanta, sprite)	<ol style="list-style-type: none"> <li>1. More than once/day</li> <li>2. Once per day</li> <li>3. 3-6 times per week</li> <li>4. Once/twice per week</li> <li>5. Twice per month/less</li> <li>6. Never</li> </ol>	
<b>E.12</b>	How often does your child eat junk foods? (like chips, sanbusa, koker, )	<ol style="list-style-type: none"> <li>1. More than once/day</li> <li>2. Once per day</li> <li>3. 3-6 times per week</li> <li>4. Once/twice per week</li> <li>5. Twice per month/less</li> <li>6. Never</li> </ol>	
<b>E.13</b>	How often does your child eat Food cooked with oil, fat or butter ?(like porridge, <i>caccabsa</i> , <i>cuko</i> , )	<ol style="list-style-type: none"> <li>1. More than once/day</li> <li>2. Once per day</li> <li>3. 3-6 times per week</li> <li>4. Once/twice per week</li> <li>5. Twice per month/less</li> <li>6. Never</li> </ol>	

**PART SIX- SEDENTARY BEHAVIOR OF THE CHILD**

F.1	Does your child view TV including video show or DVD?	1. Yes 2. No	If no skip to F.6
F.2	How many days in week days (Monday-Friday) your child view TV/ DVD	Days in number _____	
F.3	For Qn F.2 how many hours per day does your child view TV/ DVD?	In hours _____	
F.4	How many days in weekend days (Saturday and Sunday) your child view TV/ DVD?	Days in number _____	
F.5	For Qn F.4 how many hours per day does your child view TV/ DVD?	In hours _____	
F.6	Does your child play any computer/mobile games?	1. Yes    2. No	If no skip to G.1
F.7	How many days in week days (Monday-Friday) your child plays any computer/mobile games?	Days in number _____	
F.8	If yes to Qn F.7, how many hours per day do your child plays any computer/mobile games?	In hours _____	
F.9	How many days in weekend days (Saturday and Sunday) your child plays computer/mobile games?	Days in number _____	
F.10	If yes to Qn F.9, how many hours per day do your child plays any computer/mobile games?	In hours _____	

**PART SEVEN- PHYSICAL ACTIVITY OF THE CHILD**

G.1	Does your child play outdoor games?	1. Yes    2. No	If no skip to H.1
G.2	How many days in week days (Monday-Friday) your child plays out door games?	Days in number _____	
G.3	If yes to Qn G.2, how many hours per day do your child plays out door games?	In hours _____	
G.4	How many days in weekend days (Saturday and Sunday) your child plays out door games?	Days in number _____	

G.5

If yes to Qn G.4, how many hours per day do your child plays out door games?

In hours\_\_\_\_\_

### H. HOUSEHOLD WEALTH

Does the household have any of the following properties? (Circle)		Yes	No
H1	Functioning CD player/ Radio/IPod/G-bass	1	0
H2	Functioning Flat screen Television	1	0
H3	A mobile telephone	1	0
H4	Refrigerator( fridge)	1	0
H5	Electric stove / Gas Stove/Cylinder	1	0
H6	Bicycle	1	0
H7	Motor Cycle	1	0
H8	Cart/Gari	1	0
H9	Sofa	1	0
H10	Spring mattress	1	0
H11	Car	1	0
H12	Bajaj	1	0
H13	Taxi	1	0
H14	Home ownership	1	0
H15	Chest drawer/ biffe/ comadienno	1	0
H16	Chair/Table	1	0
H17	Digital Camera/ Video camera	1	0
H18	Washing machine	1	0
H19	Household have a bank or microfinance saving account	1	0
H20	Cemented type of floor	1	0
H21	Corrugated with iron sheet type of roof	1	0
H22	Livestock	1	0

H23	Horse, Mule and Donkey	1	0
H24	Sheep and goats	1	0
H26	Farmland owned by family	1	0

**PART -SEVEN ANTHROPOMETRIC MEASUREMENTS OF THE CHILD**

Weight of the child	In kilograms_____
Height of the child	In centimeters_____

**THANK YOU VERY MUCH!**

Data Collectors Name \_\_\_\_\_ Sig \_\_\_\_\_ Date \_\_\_\_\_

Supervisor Name \_\_\_\_\_ Sig \_\_\_\_\_ Date \_\_\_\_\_

### Annex III Amharic version of Participant Information Sheet and Informed consent

#### ጥናቱ ላይ ለሚሳተፉ የመረጃ ላይ የስምምነት ማረጋገጫ ፎርም በአማርኛ

ጅም ዩኒቨርሲቲ  
ማህበረሰብ ጤና ኮሌጅ

ስነ-ህዝብና ቤተሰብ ጤና ት/ት ክፍል

ከመጠን በላይ ክብደት መጨመር ለተያዣ ነገሮች በቅድመ ትህምርት ቤት ህፃናት እድሜያቸው ከ 3-5 ዓመት የሆኑ በጅም ከተማ ለማጥናት የተዘጋጁ።

**መግቢያ**

ስሜ.....ይባላል። አሁን እየሰራኝ ያለሁት በዚህ ከተማ ለሚደረገው ጥናት መረጃ ሰብሳቢ ሆኜ ለአቶ ቶሌራ ህንጫ በጅም ዩኒቨርሲቲ በማህበረሰብ ጤና በማስተርስ ደረጃ ለመመረቅ የሚሆን ጥናት ለማካሄድ ነው። ስለዚህ እንዴት አርሶና ልጅ ተሳታፊ መሆን እንደቻሉና ስለጥናቱ በተመለከተ ማብራሪያ እንድትሰጡት የተወሰነ ጊዜ እንዲሰጡኝ በአክብሮት አጠይቃለሁ።

**የጥናቱ ርዕስ**

ከመጠን በላይ ክብደት መጨመር ለተያዣ ህፃናት ተያዣ ነገሮች በቅድመ ትህምርት ቤት ህፃናት እድሜያቸው ከ 3-5 ዓመት በጅም ከተማ

**የጥናቱ ዓላማ**

የዚህ ጥናት ዋና ዓላማ ለመመረቅ የሚሆን ጥናት ማካሄድ ሲሆን የጥናቱ ውጤት ደግሞ የሚመለከታቸው አካላት መረጃው ከደረሳቸው በኋላ ጥናቱን ውጤት ተመለክተው ለበለጠ ዕቅድ ለማቀድ ይጠቅማቸዋል።

**የጥናቱ ሂደትና ጊዜ**

አርሶና ልጅ ለዝህ ጥናት የተመረጡት በ እጣ ነው። ለጥናቱ የሚያገለግሉና መረጃ ሊሰጡ የሚችሉ ጥያቄዎች ተዘጋጅተዋል። በቃለ ምልልስ ጥያቄዎቹን ለመመለስ በግምት 30 ደቂቃ ይፈጃል.ክብደት ለመለካት በግምት 10 ደቂቃ ይፈጃል. ስለዚህ አሁንም በድጋሚ ጊዜዎትን እንዲሰጡኝ በአክብሮት አጠይቃለሁ።

**ምስጢር አጠባበቅ**

የሚሰጡን መረጃ ሁሉ ምስጢርነቱ የተጠበቀ ነው። ለዚህም አርሶምንና ልጄን የሚገልጽ ምንም ነገር የለም። ለምሳሌ የአርሶ ስም መጠይቁ ላይ ወይም ደግሞ የስምምነት ማረጋገጫ ፎርም ላይ አይጻፍም። የጥናቱ ውጤት ለግለሰብ ወይም ደግሞ ለቤቱሳብ ሳይሆን አጠቃላይ ነው።

**የተሳታፊው መብት**

በዚህ ጥናት ለመሳተፍ ሙሉ ፈቃደኝነት ያስፈልጋል።በዚህ ጥናት የመሳተፍ ወይም ያለመሳተፍ ሙሉ-መብት አለዎት። ለመሳተፍ ካልፈለጉ ደግሞ በማንኛውም ጊዜ በመሀል ራስዎን ለልጅን ከጥናቱ ማግለል(ማቋረጥ) ይችላሉ። ካቋረጥኩኝ ጥቅም ይጎልብኛል ብለው አያስቡ። መመለስ የማይፈልጉትን ማንኛውም ጥያቄ ለመመለስ አይገደዱም። የስምምነት ማረጋገጫ

ከተስማሙ ይቀጥሉ.....

ካልተስማሙ ያቋርጡ.....

የጥያቄ መለያ ቁጥር.....

የመረጃ ሰብሳቢ ስም.....

ቀን \_\_\_\_\_ የቀበሌ ስም \_\_\_\_\_

<b>ክፍል አንድ፣ የቤተሰብ ሁኔታ፣ ማህበራዊና ኢኮኖሚያዊ ጉዳዮች</b>			
<b>ተ.ቁ</b>	<b>ጥያቄ</b>	<b>መልስ</b>	<b>ወደ ቀጣዩ</b>
			<b>እለፍ/ዝለል</b>

A.1	ሀይማኖት	1. ሙስሊም 2. ኦርቶዶክስ 3. ፕሮቴስታንት 4. ካቶሊክ 5. ሌላ ካለ ይጠቀስ _____	
A.2	እርሶዎን ጨምሮ የቤተሰብ ብዛት ስንት ነው?	ቁጥር _____	
A.3	የልጁ እናት የትምህርት ደረጃ	1. ማንበብና መጻፍ የማይችሉ 2. ማንበብና መጻፍ የሚችሉ 3. 1 ኛ -4 ኛ ክፍል 4. 5 ኛ-8 ኛ 5. 9 ኛ-12 ኛ 6. ኮለጅ/ዩኒቨርሲቲ	
A.4	የልጁ አባት የትምህርት ደረጃ	1. ማንበብና መጻፍ የማይችሉ 2. ማንበብና መጻፍ የሚችሉ 3. 1 ኛ -4 ኛ ክፍል 4. 5 ኛ-8 ኛ 5. 9 ኛ-12 ኛ 6. ኮለጅ/ዩኒቨርሲቲ	
A.5	የእናት ስራ	1. የቤት አመቤት 2. የመንግስት ሰራተኛ 3. የቀን ሰራተኛ 4. ነጋዴ 5. ሌላ(ይገለጹ) _____	
A.6	ያባት ስራ	1. ገበሬ 2. የመንግስት ሰራተኛ 3. የቀን ሰራተኛ 4. ነጋዴ 5. ሌላ(ይገለጹ) _____	

**ክፍል ሁለት: የህጻናት ሁኔታ**

B.1	የህጻኑ ጾታ	1. ወንድ 2. ሴት	
B.2	ህጻኑ የተወለደበት ቀን	ቀ/ወ/ሃሃሃ _____	
B.3	የህጻኑ ዕድሜ	በወር _____	
B.4	መረጃ የተሰበሰበበት ቀን	ቀ/ወ/ሃሃሃ _____	

**ክፍል ሦስት: የህጻናት አመጋገብ**

C.1	ልጅዎ ጡት ጠብተው ያዉቃል	1. ሳዎ 2. ዐያዉቅም	ዐያዉቅም ከ ሆነ ወደ C4. ዝለል
C.2	ጡት ብቻ ለ ስንት ወር ጠባ	በወር _____	
C.3	ልጅዎ ጡት ባጠቃላይ ለስንት ወር ጠባ	በወር _____	
C.4	ልጅዎ የላም/የዱቄት ወተት ተጠቅመዉ ያዉቃል	1. ሳዎ 2. ዐያዉቅም	ዐያዉቅም ከ ሆነ ወደ D.1 ዝለል

C.5	ልጅዎ የላም/የዱቄት ወተት መጠቀም የጀመረዉ በስንተኛ ወሩ ነዉ?	በወር _____	
C.6	ልጅዎ የላም/የዱቄት ወተት ባጠቃላይ ለስንት ወር	በወር _____	

**ክፍል ዐራት፡ ያለመጋብ ዐይነት በቀን (ባለፉ ት 24 ሰዓታት ዉስጥ)**

ዐሁን የምጠይቅዎት ልጅዎ ባለፈዉ 24 ሰዓት ዉስጥ የተመገበዉን የምግብ አይነት ይሆናል

D.1	ዐዝርትና ስራ-ስር (ዳቦ፡አንጀራ፡መኮቸኒ፡ ፐስታ፡ ሩዝ፡ ጣፋጭ ድንች፡ድንች፡ከሮት፡ሸንኮራ	1. አዎ 0. አይደለም	
D.2	በቪታሚን ኤ የ በለፀጉ አተክልቶች (ከሮት፡ ጎመን፡ማንጎ...)	1. አዎ 0. አይደለም	
D.3	አተክልት ና ፍራፍሬ(መዝ፡ብርትካን፡አፕል፡አቮካዶ)	1. አዎ 0. አይደለም	
D.4	ሲፓ፡የዶሮ ሲፓ፡አሳ፡ጉበት፡ኩላልት(የዶሮ ወጥ፡ አሳ ፕብስ...)	1. አዎ 0. አይደለም	
D.5	እንቁላል (እንቁላል ፍርፍር፡ጥብስ፡ ቅቅል...)	1. አዎ 0. አይደለም	
D.6	ተልባ፡ባቄላ፡አተር፡ነግ፡አቾሎኒ(ሸሮ ዎጥ፡ የአቾሎኒ ቅቤ፡ምስር፡ክክ ....)	1. አዎ 0. አይደለም	
D.7	ወተት ና የወተት ተዋጾአ(አርጎ፡አይብ፡ቅቤ፡አጋት...)	1. አዎ 0. አይደለም	
D.8	በቅቤ/በዘይት/የተሰሩ ምግቦች(ገንፎ፡ጨጨብሳ፡ቹኮ፤ጣፋጭ ምግቦች አይስከሬም ,ኬክ ,ብስኩት፡ቸኮሌት ,ማር)	1. አዎ 0. አይደለም	

**ክፍል አምስት ፡ የምግብ ድግግሞሽ**

አሁን የምጠይቅዎት ልጅዎ ባለፈዉ አንድ ወር(30 ቀን) ዉስጥ የተመገበዉን የምግብ ድግግሞሽ ይሆናል

E.1	ልጅዎ ከአዝርት የተሰሩ ምግቦችን (እንደ ዳቦ ና እንጀራ(ጉበስ፡ማሽላ፡ቦቆሎ፡ስን፡አይነቶችን) ስንቴ ተመግበዋል	1. በቀን ከአንድ በላይ 2. በቀን አንዴ 3. ከ 3-6 ጊዜ በሳምንት 4. አንዴ/ሁለቴ በሳምንት 5. ሁለቴ/ ከዝያ በታች በወር 6. እንደዉም አልበላም	
E.2	ልጅዎ ከ ስራ-ስር የተሰሩ ምግቦችን እንደ ጣፋጭ ድንች፡ድንችና ካሮት ስንቴ ተመግበዋል?	1. በቀን ከአንድ በላይ 2. በቀን አንዴ 3. ከ 3-6 ጊዜ በሳምንት 4. አንዴ/ሁለቴ በሳምንት 5. ሁለቴ/ ከዝያ በታች በወር 6. እንደዉም አልበላም	
E.3	ልጅዎ እንደ ጎመን ና ሰላጣ ያሉትን አተክልት ስንቴ ተመግበዋል	1. በቀን ከአንድ በላይ 2. በቀን አንዴ 3. ከ 3-6 ጊዜ በሳምንት 4. አንዴ/ሁለቴ በሳምንት 5. ሁለቴ/ ከዝያ በታች በወር 6. እንደዉም አልበላም	

E.4	<p>ልጅዎ ፍራፍሬን አንደ ሙዝ፡ብርተካን፡ አፕል፡ ዌይን፡ አናናስ፡አቮካዶ ና የመሳሰሉትን ስንቴ ተመግብዋል</p>	<ol style="list-style-type: none"> <li>1. በቀን ከአንድ በላይ</li> <li>2. በቀን አንዴ</li> <li>3. ከ 3-6 ጊዜ በሳምንት</li> <li>4. አንዴ/ሁለቴ በሳምንት</li> <li>5. ሁለቴ/ ከዝያ በታች በወር</li> <li>6. እንደወም አልበላም</li> </ol>	
E.5	<p>ልጅዎ ስጋን ስንቴ ተመግብዋል</p>	<ol style="list-style-type: none"> <li>1. በቀን ከአንድ በላይ</li> <li>2. በቀን አንዴ</li> <li>3. ከ 3-6 ጊዜ በሳምንት</li> <li>4. አንዴ/ሁለቴ በሳምንት</li> <li>5. ሁለቴ/ ከዝያ በታች በወር</li> <li>6. እንደወም አልበላም</li> </ol>	
E.6	<p>ልጅዎ እንቁላልን ስንቴ ተመግብዋል?</p>	<ol style="list-style-type: none"> <li>1. በቀን ከአንድ በላይ</li> <li>2. በቀን አንዴ</li> <li>3. ከ 3-6 ጊዜ በሳምንት</li> <li>4. አንዴ/ሁለቴ በሳምንት</li> <li>5. ሁለቴ/ ከዝያ በታች በወር</li> <li>6. እንደወም አልበላም</li> </ol>	
E.7	<p>ልጅዎ አሳን ስንቴ ተመግብዋል?</p>	<ol style="list-style-type: none"> <li>1. በቀን ከአንድ በላይ</li> <li>2. በቀን አንዴ</li> <li>3. ከ 3-6 ጊዜ በሳምንት</li> <li>4. አንዴ/ሁለቴ በሳምንት</li> <li>5. ሁለቴ/ ከዝያ በታች በወር</li> <li>6. እንደወም አልበላም</li> </ol>	
E.8	<p>ልጅዎ ወተት ና የወተት ተዋ ሃ አ(አንደ አይብ፡ቀቤ፡ ) ስንቴ ይጠቀማል</p>	<ol style="list-style-type: none"> <li>1. በቀን ከአንድ በላይ</li> <li>2. በቀን አንዴ</li> <li>3. ከ 3-6 ጊዜ በሳምንት</li> <li>4. አንዴ/ሁለቴ በሳምንት</li> <li>5. ሁለቴ/ ከዝያ በታች በወር</li> <li>6. እንደወም አልበላም</li> </ol>	
E.9	<p>ልጅዎ ጣፋጭ ምግቦችን (አንደ፡ማር፡ኬክ፡ብሰኩት፡አይስከሬም...የመሳሰሉትን) ስንቴ ተመግብዋል</p>	<ol style="list-style-type: none"> <li>1. በቀን ከአንድ በላይ</li> <li>2. በቀን አንዴ</li> <li>3. ከ 3-6 ጊዜ በሳምንት</li> <li>4. አንዴ/ሁለቴ በሳምንት</li> <li>5. ሁለቴ/ ከዝያ በታች በወር</li> <li>6. እንደወም አልበላም</li> </ol>	
E.10	<p>ልጅዎ ለሰላሳ መጠጦችን(አንደከካኮላ፣እስፕራይት፣ፋንታ የመሳሰሉትን)ስንቴ ይጠቀማል</p>	<ol style="list-style-type: none"> <li>1. በቀን ከአንድ በላይ</li> <li>2. በቀን አንዴ</li> <li>3. ከ 3-6 ጊዜ በሳምንት</li> <li>4. አንዴ/ሁለቴ በሳምንት</li> <li>5. ሁለቴ/ ከዝያ በታች በወር</li> <li>6. እንደወም አልበላም</li> </ol>	
E.11	<p>ልጅዎ ጃንክ ምግቦችን (አንደ ችፕስ፣ሳንቡሳ፣ቆቆር) ስንቴ ይጠቀማል</p>	<ol style="list-style-type: none"> <li>1. በቀን ከአንድ በላይ</li> <li>2. በቀን አንዴ</li> <li>3. ከ 3-6 ጊዜ በሳምንት</li> </ol>	



		4. አንዴ/ሁለቴ በሳምንት 5. ሁለቴ/ ከዝያ በታች በወር 6. እንደወም አልበላም	
E.12	ልጅዎ ከ ቅቤና ዘይት የተሰሩ እንደ ጭኮ፣ጨጨብ፣ጎንጮ፣በስኩት፣ፋሰቲኒ የመሳሰሉ ምግቦችን ስንቴ ይበላል፤	1. በቀን ከአንድ በላይ 2. በቀን አንዴ 3. ከ 3-6 ጊዜ በሳምንት 4. አንዴ/ሁለቴ በሳምንት 5. ሁለቴ/ ከዝያ በታች በወር 6. እንደወም አልበላም	

**ክፍል ስድስት: የ ሕፃናት የመቀመጥ ፀባይ መጠየቅያ**

F.1	ልጅዎ ቲቪ፣ቪዲዮና የመሳሰሉ ድራማዎችን ያያል	1. ሳም 2. አያይም	አያይም ከሆነ ወደ F.6 ዝለል
F.2	በስራ ቀናት(ከ ሰኞ-አርብ)ልጅዎ ቲቪ ና ቪዲዮ ስንት ቀን ያያል	ቀን በ ቁጥር_____	
F.3	በጥያቄ F.2 ላይ ልጅዎ ቲቪ ና ቪዲዮ በቀን ለስንት ሰአት ያያል	ሰአት_____	
F.4	በአረፈፍት ቀን(አሁኑና ቅዳሜ)ልጅዎ ቲቪ ና ቪዲዮ ስንት ቀን ያያል?	ቀን በ ቁጥር_____	
F.5	በጥያቄ F.4 ላይ ልጅዎ ቲቪ ና ቪዲዮ በቀን ለስንት ሰአት ያያል?	ሰአት_____	
F.6	ልጅዎ የኮምፕዩተርና የሞባይል ጌም ይጫወታል?	1. ሳም 2. አይለም	አይለም ከሆነ ወደ G.1 ዝለል
F.7	በስራ ቀናት(ከ ሰኞ- አርብ)የኮምፕዩተርና የሞባይል ጌም ስንት ቀን ይጫወታል	ቀን በ ቁጥር_____	
F.8	በጥያቄ F.7 ላይ ልጅዎ የኮምፕዩተርና የሞባይል ጌም በ ቀን ለስንት ሰአት ይጫወታል	ሰአት_____	
F.9	በአረፈፍት ቀን(አሁኑና ቅዳሜ)ልጅዎ የኮምፕዩተርና የሞባይል ጌም ስንት ቀን ይጫወታል	ቀን በ ቁጥር_____	
F.10	በጥያቄ F.9 ላይ ልጅዎ የኮምፕዩተርና የሞባይል ጌም በቀን ስንት ሰአት ይጫወታል?	ሰአት_____	

**ክፍል ሰባት የሕፃናት የአካል እንቅስቃሴ መጠየቅያ**

G.1	ልጅዎ ከቤት ወጪ ያለውን ጨዋታ ይጫወታል?	1. ሳም 2. አይጫወትም	አይጫወትም ከ ሆነ ወደ H.1 ይለፉ
G.2	በስራ ቀናት(ከ ሰኞ-አርብ) ልጅዎ ለስንት ቀን ከቤት ወጪ ያለውን ጨዋታ ይጫወታል?	ቀን በቁጥር_____	
G.3	በጥያቄ G.2 ላይ ልጅዎ በ ቀን ለ ስንት ሰዓት ከቤት ወጪ ያለውን ጨዋታ ይጫወታል?	ሰአት_____	
G.4	በአረፈፍት ቀን(አሁኑና ቅዳሜ)ልጅዎ ለስንት ቀን ከቤት ወጪ ያለውን ጨዋታ ይጫወታል?	ቀን በቁጥር_____	
G.5	በጥያቄ G.2 ላይ ልጅዎ በ ቀን ለ ስንት ሰዓት ከቤት ወጪ ያለውን ጨዋታ ይጫወታል?	ሰአት_____	
G.6	በስራ ቀናት(ከ ሰኞ-አርብ) ልጅዎ ት/ቤት ሲሄድ/ሲመለስ በእግር/በሳይክል የሚሄደው ለ ስንት ቀን ነው?	ቀን በቁጥር_____	

**ዘ. የቤት ሀብት**

ቤት ውስጥ የሚከተለው ዕቃዎች ይገኛሉ አላችሁ?	አዎ	አይደለም
H1 የሚሰራ ሲዲ ፒሊሀር/ ሬድዮ/ አህጉር/ጅግስ	1	0
H2 የሚሰራ ፍላጎት ቴሌቪዥን	1	0
H3 ተንቀሳቃሽ ስልክ	1	0
H4 ፍሪጅ	1	0
H5 ኤሌክትሪክ አስተኝ	1	0
H6 ባይሳይክል	1	0
H7 ሞተር ሳይክል	1	0
H8 ጋሪ	1	0
H9 ሶፋ	1	0
H10 እስፖንጅ ፍራሽ	1	0
H11 መኪና	1	0
H12 ባጃጅ	1	0
H13 ታክሲ	1	0
H14 የግል ቤት	1	0
H15 ብሬ፣ ኮመዲኖ፣ ቸስት ዲሮይር	1	0
H16 ጠረጴዛ	1	0
H17 ዲጂታል ካሜራ/ቪዲዮ ካሜራ	1	0
H18 የልብስ ማጠቢያ ማሽን	1	0
H19 የባንክ ወይም የአክቲቫ ብድር ተቋም የተቀማጭ ደብተር	1	0
H20 ወለሉ ሲሚንቶ ቤት	1	0
H21 ጣራው ቆርቆሮ ቤት	1	0
H22 ከብቶች	1	0
H23 ፈረስ፣አህያ፣በቅሎ	1	0
H24 በግ፣ ፍየል	1	0
H26 የሚታረስ መሬት	1	0

**ክፍል ሰባት የህፃናት አንትሮፖሜትሪ መለኪያ**

የህፃኑ ከብደት

በኪሎግራም

የህፃኑ ቁመት

በሴንትሜትር

**አመሰግናለሁ!**

## Annex IV Afaan Oromoo version of tool

### Yuunivarsitii Jimmaa Muummee Fayyaa Faakaaltii Fayyaa Hawaasummaa

#### Guca Ragaan Ittin funaanamu

Qorannaa sadarkaa barbaadamuun ol dabaluu ulfaatinaa ijoollee barumsaaf hin gahin fi sababoota isaan walqabatan kan umurii 3-5 magaalaa Jimmaa, Kibba lixa Itoophiyaa, 2017

#### Guca waliigaltee Qorannoo

##### Seensa

Akkam bultan/ooltan, Maqaankoo \_\_\_\_\_ jedhama. Ani kan hojjachaa jiru ragaa qorannaa Yuunivarsitii Jimmaa, faakaaltii fayyaatti Muummee fayyaa hawaasummaa walin ta'uun mata duree “sadarkaa barbaadamuun ol dabaluu ulfaatinaa ijoollee barumsaaf hin gahin fi sababoota isaan wal qabatan kan umurii 3-5 magaalaa Jimmaa” irratti geggeeffamuuf ragaa oolu funanuu dha.

##### Mata duree Qorannoo

Sadarkaa barbaadamuun ol dabaluu ulfaatinaa ijoollee barumsaaf hin gahin fi sababoota isaan wal qabatan magaalaa Jimmaa, Kibba lixa Itoophiyaa, 2017

##### Kaayyoo

Kaayyoon qorannaa kanaa inni duraa waraqaa eebbaa digirii lammaffaaf qopheessuu yeroo tahu, kan biraan bu'aan qorannoo kanaa erga qaama ilaallatuuf dhihaatee booda qaamni dhimmi isaa ilaallatu akka itti karoorfatan gargaara.

##### Yeroo fudhatuu fi tartiibasaa

Hunda dursa isin fi daa'imni keessan qorannoo kanaaf kan filatamtan carraatu isin gaheetu. Ragaa sirrii tahe nuu kennuun keessan qorannoo kanaaf gaariidha. Gaaffiin isin gaafadhu daqiiqaa 30 fudhata, akkasumas ulfaatinaa fi hojjaa daa' imaa safaruuf daqiiqaa 10 fudhata.

##### Iccitii eeguu

Maqaan keessan guca kana irratti hin-barreeffamu, akkasumas ragaa naa kennitan waliin qabsiifamees itti hin-fayyadamamu.

##### Mirga diduu yookiin addaan kutanii keessaa bahuu

Yoo fedha hin qabaanne qorannoo kana keessatti hirmaachuu hin qabdu. Gaaffiin isin deebisuu hin-barbaanne yoo jiraate dhiisuun mirga keessan ta'ee yeroo barbaaddanittis gaaffii fi deebii geggeessinu dhaabuu ni dandeessu.

Hirmaachuudhaaf fedhii qabduu?

Eeyyee \_\_\_\_\_ (cuqaasitii, hirmaataa galateeffadhuu gaafannoo guuti)

Lakkii \_\_\_\_\_ (cuqaasitii, gara gaafatamaa biraatti darbi)

Lakkoofsa waraqaa gaaffii \_\_\_\_\_

Maqaa nama gaafatuu \_\_\_\_\_

Guyyaa gaaffii fi deebii \_\_\_\_\_

Maqaa Ganda \_\_\_\_\_

## KUTAA-1- GAAFANNOO DHIMMA HAWAASUMMAA FI DINAGDEE

T/L

Gaaffilee

Deebii

Tari

<b>A.1</b>	Amantaan kee maali?	1. Islaama 2. Ortodoksii 3. Pirotestaantii 4. Kaatolikii 5. Kan biroo(ibsi)_____	
<b>A.2</b>	Baayyina miseensa maatii (miseensa dhaabbataa)	lakkoofsaan_____	
<b>A.3</b>	Sadarkaa barumsa haadhaa	1.Dubbisuu fi barreessuu hin dandeessu 2.Dubbisuu fi barreessuu ni dandeessi 3.Kutaa1-4 4.Kutaa 5-8 5.Kutaa 9-12 6. Kolleejjii /Yunivarsitii	
<b>A.4</b>	Sadarkaa barumsa Abbaa	1.Dubbisuu fi barreessuu hin dandaha 2.Dubbisuu fi barreessuu ni dandaha 3.Kutaa1-4 4.Kutaa 5-8 5.Kutaa 9-12 6. Kolleejjii /Yunivarsitii	
<b>A.5</b>	Hojii haaadhaa	1.Mana keessa 2.Hojjettuu mootummaa 3.Hojjettuu guyyaa 4.Daldaltuu 5. Kan biroo(ibsi)_____	
<b>A.6</b>	Hojii Abbaa	1.Qonnaan bulaa 2. Hojjetaa mootummaa 3.Hojjetaa guyyaa 4.Daldalaa 5. Kan biroo(ibsi)_____	

### KUTAA - 2 – GAAFANNOO HAALA DAA’IMAA

<b>B.1</b>	Saala daa’imaa	1. Dhiira 2.Dhalaa	
<b>B.2</b>	Guyyaa Daa’imni dhalate	gg/jj/www_____	
<b>B.3</b>	Umurii Daa’imaa	Ji’aan_____	
<b>B.4</b>	Guyyaa guci kun guutame	gg/jj/www_____	

### KUTAA- 3- GAAFANNOO SHAAKALA NYAATAA FI KUNUUNSA DAA’IMMANII

<b>C.1</b>	Daa’imakee harma hoosiftee beektaa?	1. Eeyyee	Yoo lakkii
------------	-------------------------------------	-----------	------------

		2.Lakkii	ta'e gara C4 tti tari.
<b>C.2</b>	Eeyyee yoo ta'e hagamiif harma haadhaa qofa hoosifte?	Ji'aan _____	
<b>C.3</b>	Hagamiif itti fufiinsaan harma hoosifte?	Ji'aan _____	
<b>C.4</b>	Daa'imnikeef aannan daakuu/horii kenniteefii beektaa?	1. Eeyyee 2.Lakkii	Yoo lakkii ta'e gara D.1 tti tari.
<b>C.5</b>	Yoo eeyyee ta'e Umurii meeqatti aannan daakuu/horii eegalsiifte?	Ji'aan _____	
<b>C.6</b>	Hagamiif daa'imakee aannan daakuu/horii itti fufiinsaan kenniteef ?	Ji'aan _____	

#### **KUTAA-4-GAAFANNOO GARTUU GOSA NYAATAA SA'A 24 KEESSATTI DAA'IMNI SOORATE**

**Kanatti aansee kanan si gaafadhu ammo gosa nyaataa daa'imni kee kaleessa ganamaa kaasee haga har'a ganamaatti halkan edaa dabalatee nyaate natti himta.**

<b>D.1</b>	Gosa midhaani fi hiddaa(fknf buddena,daabboo,macaroni, pasta,dinnicha,midhaan boollaa,kkf)	1. Eeyyee 0. Lakkii	
<b>D.2</b>	Kuduraalee fi fuduraalee vaayitaamina A dhaan badhaadhan kannen akka kaarootii,raafuu maraa,qaaraa,kkf)	1. Eeyyee 0. Lakkii	
<b>D.3</b>	Kuduraalee fi fuduraalee kanneen biroo (fknf muuzii,avokaadoo,burtukaana,kkf)	1. Eeyyee 0. Lakkii	
<b>D.4</b>	Gosa Foonii (foon,qurxummii,lukkuu,booyyee,tiru u fi foon qaama garaagarii)	1. Eeyyee 0. Lakkii	
<b>D.5</b>	Hanqaaquu	1. Eeyyee 0. Lakkii	
<b>D.6</b>	Gosa baaqelaa fi loozii,shiroo,kiikkii gosa adda addaa kan shiroof oolan	1. Eeyyee 0. Lakkii	
<b>D.7</b>	Gosa aannanii fi bu'aa isaa(fknf aannan,baaduu,itittuu,ittoo)	1. Eeyyee 0. Lakkii	
<b>D.8</b>	Nyaata zaayitaa fi dhaadhaa waliin qophaahan kanneen akka marqaa,caccabsaa,cuukoo,fi kkf), Nyaata mimmi'ahoo tahan kanneen akka keekii,kireemii cabbie,biskutii fi	1. Eeyyee 0. Lakkii	

#### **KUTAA -5- GAAFANNOO AMMAMTAA NYAATAA DAA'IMMANII**

**Kanatti aansee kanan si gaafadhu ammoo nyaata daa'imni kee guyyoota 30n darban keessa soorate ammamtaasaa natti himta**

<p><b>E.1</b></p>	<p>Daa'imni keessan nyaata gosa midhaani(fknfbuddena,daabboo,macaroni, pasta ,kkf) si'a meeqa soorate?</p>	<ol style="list-style-type: none"> <li>1. Guyyaatti si'a tokkoo ol</li> <li>2. Guyyaatti si'a tokko</li> <li>3. Torbanitti si'a 3-6</li> <li>4. Torbanitti si'a tokko/lama</li> <li>5. Ji'atti si'a lama</li> <li>6. Gonkumaa</li> </ol>	
<p><b>E.2</b></p>	<p>Daa'imni keessan nyaata gosa midhaan boollaa ykn hiddaa (fknf dinnicha dinnicha sukkaaraa, kkf) si'a meeqa soorate?</p>	<ol style="list-style-type: none"> <li>1. Guyyaatti si'a tokkoo ol</li> <li>2. Guyyaatti si'a tokko</li> <li>3. Torbanitti si'a 3-6</li> <li>4. Torbanitti si'a tokko/lama</li> <li>5. Ji'atti si'a lama</li> <li>6. Gonkumaa</li> </ol>	
<p><b>E.3</b></p>	<p>Daa'imni keessan nyaata gosa kuduraalee kanneen akka raafuu, qoosxaa, qaaraa, baala magariisaa fi kkf si'a meeqa soorate?</p>	<ol style="list-style-type: none"> <li>1. Guyyaatti si'a tokkoo ol</li> <li>2. Guyyaatti si'a tokko</li> <li>3. Torbanitti si'a 3-6</li> <li>4. Torbanitti si'a tokko/lama</li> <li>5. Ji'atti si'a lama</li> <li>6. Gonkumaa</li> </ol>	
<p><b>E.4</b></p>	<p>Daa'imni keessan nyaata gosa fuduraalee kanneen akka avokaadoo, burtukaana, muuzii, paappayyaa, appilii, maangoofi kkf si'a meeqa soorate?</p>	<ol style="list-style-type: none"> <li>1. Guyyaatti si'a tokkoo ol</li> <li>2. Guyyaatti si'a tokko</li> <li>3. Torbanitti si'a 3-6</li> <li>4. Torbanitti si'a tokko/lama</li> <li>5. Ji'atti si'a lama</li> <li>6. Gonkumaa</li> </ol>	
<p><b>E.5</b></p>	<p>Daa'imni keessan nyaata gosa foonii si'a meeqa soorate?</p>	<ol style="list-style-type: none"> <li>1. Guyyaatti si'a tokkoo ol</li> <li>2. Guyyaatti si'a tokko</li> <li>3. Torbanitti si'a 3-6</li> <li>4. Torbanitti si'a tokko/lama</li> <li>5. Ji'atti si'a lama</li> <li>6. Gonkumaa</li> </ol>	
<p><b>E.6</b></p>	<p>Daa'imni keessan nyaata Hanqaaquu si'a meeqa soorate?</p>	<ol style="list-style-type: none"> <li>1. Guyyaatti si'a tokkoo ol</li> <li>2. Guyyaatti si'a tokko</li> <li>3. Torbanitti si'a 3-6</li> <li>4. Torbanitti si'a tokko/lama</li> <li>5. Ji'atti si'a lama</li> <li>6. Gonkumaa</li> </ol>	
<p><b>E.7</b></p>	<p>Daa'imni keessan nyaata Qurxummii si'a meeqa soorate?</p>	<ol style="list-style-type: none"> <li>1. Guyyaatti si'a tokkoo ol</li> <li>2. Guyyaatti si'a tokko</li> <li>3. Torbanitti si'a 3-6</li> <li>4. Torbanitti si'a tokko/lama</li> <li>5. Ji'atti si'a lama</li> <li>6. Gonkumaa</li> </ol>	

<b>E.8</b>	Daa'imni keessan nyaata Gosa aannanii fi bu'aa isaa(fknf aannan,baaduu,itittuu,ittoo) si'a meeqa soorate?	<ol style="list-style-type: none"> <li>1. Guyyaatti si'a tokkoo ol</li> <li>2. Guyyaatti si'a tokko</li> <li>3. Torbanitti si'a 3-6</li> <li>4. Torbanitti si'a tokko/lama</li> <li>5. Ji'atti si'a lama</li> <li>6. Gonkumaa</li> </ol>	
<b>E.9</b>	Daa'imni keessan nyaata mimmi'ahoo tahan kanneen akka keekii,kireemii cabbii,biskutii,damma si'a meeqa soorate?	<ol style="list-style-type: none"> <li>1. Guyyaatti si'a tokkoo ol</li> <li>2. Guyyaatti si'a tokko</li> <li>3. Torbanitti si'a 3-6</li> <li>4. Torbanitti si'a tokko/lama</li> <li>5. Ji'atti si'a lama</li> <li>6. Gonkumaa</li> </ol>	
<b>E.10</b>	Daa'imni keessan nyaata dhugaatii lallaafaa kanneen akka mirindaa,faantaa,kokaakollaa,ispirayit ii fi kkf) si'a meeqa fayyadame/te?)	<ol style="list-style-type: none"> <li>1. Guyyaatti si'a tokkoo ol</li> <li>2. Guyyaatti si'a tokko</li> <li>3. Torbanitti si'a 3-6</li> <li>4. Torbanitti si'a tokko/lama</li> <li>5. Ji'atti si'a lama</li> <li>6. Gonkumaa</li> </ol>	
<b>E.11</b>	Daa'imni keessan nyaata kanneen akka saanbuusaa,qoqorii,chiipsii si'a meeqa soorate?	<ol style="list-style-type: none"> <li>1. Guyyaatti si'a tokkoo ol</li> <li>2. Guyyaatti si'a tokko</li> <li>3. Torbanitti si'a 3-6</li> <li>4. Torbanitti si'a tokko/lama</li> <li>5. Ji'atti si'a lama</li> <li>6. Gonkumaa</li> </ol>	
<b>E.12</b>	Daa'imni keessan nyaata zaayitaa fi dhaadhaa waliin qophaahan kanneen akka marqaa,caccabsaa,cuukko,fi kkf) si'a meeqa soorate?	<ol style="list-style-type: none"> <li>1. Guyyaatti si'a tokkoo ol</li> <li>2. Guyyaatti si'a tokko</li> <li>3. Torbanitti si'a 3-6</li> <li>4. Torbanitti si'a tokko/lama</li> <li>5. Ji'atti si'a lama</li> <li>6. Gonkumaa</li> </ol>	

**KUTAA-6- GAAFANNOO AMALOOTAA TAA'UMSAA DAA'IMMANII**

<b>F.1</b>	Daa'imni keessan TV ni daawwataa fknf kanneen akka vidiyoo,DVD	<ol style="list-style-type: none"> <li>1. Eeyyee</li> <li>2. Lakkii</li> </ol>	Yoo lakkii ta'e gara F.6 tti tari.
<b>F.2</b>	Daa'imni keessan guyyaa hojii guyyaa meeqa (wiixataa-jimaataa) TV/ DVD daawwata?	Guyyaa lakkoofsaan _____	
<b>F.3</b>	Gaaffii F.2 tiif Daa'imni keessan guyyaatti sa'atii meeqaaf TV/ DVD daawwata?	Sa.atii _____	
<b>F.4</b>	Daa'imni keessan guyyaa (sanbataa-Dilbataa) guyyaa meeqa TV/ DVD daawwata?	Guyyaa lakkoofsaan _____	

F.5	Gaaffii F.4 tiif Daa'imni keessan guyyaatti sa'atii meeqaaf TV/ DVD daawwata?	Sa.atii_____	
F.6	Daa'imni keessan tapha mobaayilaa/kompuuyuteraa ni taphataa?	1. Eeyyee 2. Lakkii	Yoo lakkii ta'e gara G.1 tti tari.
F.7	Daa'imni keessan guyyaa hojii guyyaa meeqa(wiixataa-jimaataa) tapha mobaayilaa/kompuuyuteraa taphata?	Guyyaa lakkoofsaan _____	
F.8	Gaaffii F.7 tiif Daa'imni keessan guyyaatti sa'atii meeqaaf tapha mobaayilaa/kompuuyuteraa taphata?	Sa.atii_____	
F.9	Daa'imni keessan guyyaa (sanbataa-Dilbataa) guyyaa meeqa tapha mobaayilaa/kompuuyuteraa taphata?	Guyyaa lakkoofsaan _____	
F.10	Gaaffii F.9 tiif Daa'imni keessan guyyaatti sa'atii meeqaaf tapha mobaayilaa/kompuuyuteraa taphata?	Sa.atii_____	

### KUTAA- 7-GAAFANNOO SOSOCHII QAAMAA DAA'IMMANI

G.1	Daa'imni keessan tapha balbalaan alaa ni taphataa?	1. Eeyyee 2. Lakkii	Yoo lakkii ta'e gara H.1 tti tari.
G.2	Daa'imni keessan guyyaa hojii guyyaa meeqa (wiixataa-jimaataa) tapha balbalaan alaa taphata?	Guyyaa lakkoofsaan _____	
G.3	Gaaffii G.2 tiif Daa'imni keessan guyyaatti sa'atii meeqaaf tapha balbalaan alaa taphata?	Sa.atii_____	
G.4	Daa'imni keessan guyyaa (sanbataa-Dilbataa) guyyaa meeqa tapha balbalaan alaa taphata?	Guyyaa lakkoofsaan _____	
G.5	Gaaffii G.4 tiif Daa'imni keessan guyyaatti sa'atii meeqaaf tapha balbalaan alaa taphata?	Sa.atii_____	

### H. GAAFANNOO QABEENYA MANAA

Mana keessan keessa meeshaaleen armaan gadii ni argamuu? (Itti mari)		Eeyyee	Lakkii
H1	CD player/ Radio/IPod/G-bass dalagu	1	0
H2	Televijinii dalagu	1	0
H3	Mobaayilii ykn bilbila socho'u	1	0
H4	Firiijii	1	0



H5	Elektiriikii istoovii,istoovii gaasii	1	0
H6	Biskilitii	1	0
H7	Dokdokkee ykn Mootorsaayikilii	1	0
H8	Gaarii	1	0
H9	Soofaa	1	0
H10	Ispoonjii siree ykn ispoonjii firaashii	1	0
H11	Konkolaataa	1	0
H12	Baajaajii	1	0
H13	Taaksii	1	0
H14	Mana ofii	1	0
H15	Chesti diraweerii/ biiffee/ komadinoo	1	0
H16	Taa'umsa/Xarapheezzaa	1	0
H17	Dijitaalaa kaameeraa/ Vidiyoo kaameeraa	1	0
H18	Maashinii uffata miicu	1	0
H19	Galmee qusannoo herrega baankii	1	0
H20	Simmintoo ta'uu hudee lafa mana keessaa	1	0
H21	Irri keessi manaa qorqorroo	1	0
H22	Loon	1	0
H23	Farda,Gaangee,Harree	1	0
H24	Re'ee fi Hoolaa	1	0
H26	Lafa Qonaaf oolu	1	0
<b>KUTAA-8- SAFARTUULEE ANTIROPOMEETEERII DAA'IMMANII</b>			
	Ulfaatina Daa'imaa	Kiiloogiraamiidhaan _____	
	Hojjaa Daa'imaa	Seentimeetiriidhaan _____	

**Galatoomaa!!!**

## Annex V Principal Component Analysis of Wealth Index

### KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.720
Bartlett's Test of Sphericity	Approx. Chi-Square	2273.507
	df	105
	Sig.	.000

### Communalities

Items	Initial	Extraction
Functioning CD player/ Radio/iPod/G-bass	1.000	.569
Does the house hold has Electric stove / Gas Stove/Cylinder	1.000	.527
Does the house hold has Bicycle	1.000	.581
Does the house hold has Motor cycle	1.000	.651
Does the house hold has Sofa	1.000	.549
Does the house hold has Spring mattress	1.000	.563
Does the house hold has Car	1.000	.795
Does the house hold has Bajaj	1.000	.639
Does the house hold has Taxi	1.000	.756
Does the house hold has Home ownership	1.000	.667
Does the house hold has chest drawer/bife/comedin	1.000	.616
Bank or microfinance saving account	1.000	.633
Spring mattress	1.000	.639
Bajaj	1.000	.867

Corrugated with iron sheet type of roof	1.000	.870
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Extraction Method: Principal Component Analysis.

**Total variance explained**

Comp onent	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation sums of squared loadings		
	Total	% of Variance	Cumulativ e %	Total	% of Variance	Cumul ative %	Total	% of Var iance	Cumulative %
1	3.745	24.965	24.965	3.745	24.965	24.965	2.609	17.395	17.395
2	1.501	10.008	34.973	1.501	10.008	34.973	1.896	12.640	30.035
3	1.339	8.928	43.902	1.339	8.928	43.902	1.499	9.991	40.026
4	1.193	7.953	51.855	1.193	7.953	51.855	1.375	9.169	49.195
5	1.129	7.529	59.383	1.129	7.529	59.383	1.335	8.897	58.092
6	1.014	6.757	66.140	1.014	6.757	66.140	1.207	8.048	66.140
7	.908	6.057	72.197						
8	.794	5.296	77.493						
9	.712	4.744	82.237						
10	.668	4.456	86.693						
11	.620	4.133	90.825						
12	.531	3.543	94.368						
13	.437	2.912	97.280						
14	.314	2.094	99.374						
15	.094	.626	100.000						

Extraction Method: Principal Component Analysis.

**Rotated Component Matrix<sup>a</sup>**

Items	Component					
	1	2	3	4	5	6
Corrugated with iron sheet type of roof	.906					
Cemented type of floor	.893					
Home ownership	.598					
Electric stove / Gas Stove/Cylinder	.500					
Taxi		.862				
Car		.837				
Functioning CD player/ Radio/iPod/G-bass			.726			
Chest drawer/biffe/comadieno			.659			
Bank or microfinance saving account				.707		
Spring mattress				.669		
Bicycle					.834	
Sofa					.671	
Motorcycle						.715
Digital camera/Vedio camera						-.574
Taxi						.503

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.