

Determinants of Malnutrition (Undernutrition) among Adolescents in
Burayu Woreda, Oromia Region

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ABSTRACT

Background: Malnutrition is the most serious human health and social problems that affect vast population of the world. Malnutrition continues to be a major public health problem throughout the developing world, particularly in southern Asia and sub-Saharan Africa.

OBJECTIVE: To assess determinants of undernutrition among adolescents in Burayu woreda, Oromia Region, May 2011.

METHODS and MATERIALS: Community based unmatched case-control study design was conducted in Burayu woreda, Oromia Region from 10-25 March 2011. Cases comprised undernourished adolescents aged 10-19 years and controls were well-nourished adolescents. The study subjects were selected with probability proportional to size from the six kebeles. Using simple random sampling technique data was collected from 91 cases and 91 controls. Weight was measured in kilogram using digital bath room weighing scale to the nearest 0.1kg and height was measured in centimeter using a portable measuring board to the nearest 0.1 cm. Data was edited, cleaned, coded and entered into a computer using SPSS Version 16.0. Univariate and chi-square analysis was conducted to see the association between independent and dependent variables. Those significant variables were entered to multivariate backward binary logistic regression.

RESULT: It was found that age, sex and type of latrine were found to be independent predictors of adolescent undernutrition. Adolescents in age group 10-12 years were more likely to develop undernutrition compared to adolescents in age group 13-15 years (AOR= 8.7; 95%CI: 2.51, 30.10). Adolescents in age group 13-15 years were more likely to develop undernutrition compared to adolescents in age group 16-19 years (AOR= 7.9; 95%CI: 2.67, 23.82). Male adolescents were more likely to develop undernutrition compared to female adolescents (AOR= 4.3; 95%CI: 1.87, 10.04). Adolescents who used open field defecation were more likely to develop undernutrition compared to adolescents who had ventilated pit latrine (AOR= 8.7; 95%CI: 1.27, 60.03). Adolescents who had pit latrine were more likely to develop undernutrition compared to adolescents who had ventilated pit latrine (AOR= 6.8; 95%CI: 1.18, 39.94).

CONCLUSION and RECOMMENDATION: In conclusion, factors associated with the occurrence of adolescent undernutrition includes age, sex and type of latrine. Therefore, developing and implementing health programs to tackle adolescent malnutrition should take into account such differences that are consequence of socio-demographic, health and environmental related factors.

Key words: Adolescent, Malnutrition and Body Mass Index

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ACRONYMS

AOR	Adjusted Odds Ratio
BMI	Body Mass Index
BSc	Bachelor of Science
CED	Chronic Energy Deficiency
CI	Confidence Interval
COR	Crude Odds Ratio
CSA	Central Statistics Agency
DHS	Demographic and Health Survey
EHNRI	Ethiopian Health and Nutrition Research Institute
FAO	Food and Agriculture Organization
MSc	Masters of Science
MD	Medical Doctor
MPH	Masters of Public Health
NCHS	National Center for Health Statistics
OR	Odds Ratio
PHC	Primary Health Care
SPSS	Statistical Package for Social Sciences
UNICEF	United Nation International Children Fund
WHO	World Health Organization

CHAPTER 1: INTRODUCTION

1.1 Background information

Malnutrition is the condition that results from taking an unbalanced diet in which certain nutrients are lacking, in excess, or in the wrong proportions. Malnutrition is the most serious human health and social problems that affect vast population of the world where, the effect in terms of increased mortality, morbidity, reduction in productivity and reproductive capacity is considerable particularly in the developing countries. Good nutrition during adolescence is critical to cover the deficits suffered during childhood and should include nutrients required to meet the demands of physical and cognitive growth and development. Adolescent represent around 20% of the global world's population and around 84% of them are found in developing countries (1). Adolescent in Ethiopia accounted for 25.2% of the total population according to Demographic and Health Survey, 2005 (2).

The foundation of adequate growth and development is laid before birth, during childhood, and is followed during adolescence. A measurement of physical growth is a key element in evaluating the health of adolescents. The 2007 WHO height-for-age and BMI-for-age charts extend to 19 years, which is the upper age limit of adolescent as defined by National Center for Health Statistics. The weight-for-age charts extend to 10 years for the benefit of countries that routinely measure only weight. Adolescent health and nutritional status reflects the cumulative effect of childhood health and nutrition. Children and adolescents face certain nutritionally related health problems because of their physiological vulnerability (3).

World Health Organization, in 1986 defines adolescent as person age 10 to 19 years old. Adolescents are the future generation of any country and their nutritional needs are critical for the well being of society. Growth during adolescence is faster than at any other time in an individual's life except the first year. 20% of adult height, 50% of adult weight and 50% of adult skeletal mass is attained during adolescence; as a result, nutritional requirements peak in adolescence. Those who survive grow up as undernourished adults, giving rise to an intergenerational cycle of undernourishment (4).

Anthropometric measurements have been used for identification and classification of malnutrition in most part of the world. However, adolescents have been considered to have the lowest mortality among different age groups and have therefore received low priority in terms of nutritional status assessment (5).

Adolescents from developing countries are more vulnerable to nutritional deficiencies due to early childhood nutritional problems, which include underweight, stunting and low dietary intakes. In developing countries where a large segment of the population is involved in low income jobs with large family sizes can't afford to buy good quality food and their diets are mostly restricted to cereals and legumes (6).

1.2 Statement of the problem

There are 1.2 billion adolescents aged 10-19 years old in developing nations, making up one quarter to one fifth of their country's populations. Adolescents have typically been considered a low risk group for poor health, and often receive few healthcare resources and scant attention. However, this approach ignores the fact that many health problems later in life can be improved or avoided by adopting healthy lifestyle habits in adolescence. Undernutrition (being too thin or too short, frequently caused by chronic energy deficiency) in adolescents frequently goes unrecognized by young people or their families (7).

Almost 418 million people are estimated to be affected by emergency situations all over the world; therefore a high number of adolescents may present an increased risk of being exposed to severe malnutrition (8).

The World Health Organization cites malnutrition as the gravest single threat to the world's public health. Improving nutrition is widely regarded as the most effective form of aid. FAO reported that there were 925 million malnourished people in the world in 2010.

According to the United Nations Special Reporter on the Right to Food for 2000 to 2008, mortality due to malnutrition accounted for 58% of the total mortality in 2006, a person dies every second as a direct or indirect result of malnutrition that is 36 million each year of all deaths (9). International Center for Research on Women reported prevalence of undernutrition ranging from 3 to 53%. Adolescents in India, Nepal, and Benin were the most severely affected (10).

Malnutrition remains a widespread problem in developing countries, in particular among the poorest and most vulnerable segments of the population. About one-quarter of the Sub-Saharan African population is unable to secure adequate food to meet their nutritional requirements. The large and increasing incidence of malnutrition in Sub-Saharan Africa impedes the social and economic progress of the continent. In Ethiopia there is a high level of chronic food insecurity and vulnerability to acute food insecurity, due to drought, environmental degradation, as well as poor access to and availability of food. Between 2004 and 2006, 44% of the people in the country were estimated to be undernourished (11).

Adolescents haven't received much attention with respect to their nutritional needs and wellbeing so there is limited information on the determinants of adolescent undernutrition, and the precise mechanisms by which it is linked to other health and social outcomes (12).

To the best of my knowledge, there was no research done on nutritional status of adolescent in the area. Therefore, this study was carried out to assess determinants of undernutrition among adolescents and to fill information gaps and recommend possible intervention in Burayu woreda, Oromia Region.

CHAPTER 2: LITERATURE REVIEW

2.1 Literature Review

Malnutrition is the condition that results from taking an unbalanced diet in which certain nutrients are lacking, in excess, or in the wrong proportions. There are a number of potential disruptions to global food supply that could cause widespread malnutrition. Major causes of malnutrition include poverty and food prices, dietary practices and agricultural productivity, with many individual cases being a mixture of several factors. Malnutrition can also be a consequence of other health issues such as diarrheal disease or chronic illness (11).

A survey conducted on adolescent's age 10-19 years in urban and rural with a total of 756 individuals in a State of Sao Paulo, Brazil in 2002 according to the 1977 National Center for Health Statistics standards, defined malnutrition. Height/age distribution and multivariate analyses were carried out using the stepwise method and low-height as the dependent variable showed low height was associated with age: taking age-group 10-13 as reference, low-height was twice as likely in students aged 14-17 years (OR =2.5). For those aged 17-19 years, low height was three times as likely (OR =3.4). Being unemployed increases the risk for low-height (OR=2.9) when compared to working adolescents. Economical determinants contribute to the risks for chronic malnutrition among students, since these adolescents rely on work to live on. This finding was concluding that Economical determinants contribute to the risks for chronic malnutrition among students (12).

A survey conducted on 989 adolescents, aged between 12 and 17 years in Edirne, Turkey in 2004 showed the prevalence of underweight, overweight and obesity among adolescent girls was 11.1%, 10.6% and 2.1%, respectively, while it was 14.4%, 11.3% and 1.6% for adolescent boys. In the urban area the prevalence of underweight, overweight and obesity among adolescent girls was 10.0%, 10.3% and 2.1%, while it was 14.4%, 11.6% and 1.6% for boys, respectively. In the rural area; the prevalence of underweight, overweight and obesity among adolescent girls was 15.7%, 12.4% and 2.2%, while it was 14.5%, 9.6% and 1.2% for boys, respectively (13).

Community based cross-sectional study conducted on 270 adolescent girls between 10-19 years in Varanasi district, India in 2009 showed that as much as 92.65% adolescent girls, belonging to the age group 10-12 years were under-nourished (BMI < 18.5); corresponding value for 13-15 and 16-19 years were 67.42% and 47.14%, respectively. Chronic energy deficiency grade III (BMI < 16 kg/m²) was more in 10-12 years age (69.12%), Hindu (31.54%) and SC (48.72%) subjects. Under-nutrition was significantly (p<0.05) more in unmarried subjects (72.02%) than married subjects (53.85%). As much as 54.82% menstruating and 90.38% non-menstruating adolescent girls were under-nourished (p<0.01). Neither addiction nor nature of diet was significantly (p>0.05) associated with nutritional status of study subjects. Under-nutrition was not significantly (p> 0.05) different in subjects ill (76.19%) and not ill (65.05%) at the time of survey (14).

A cross sectional study had been undertaken among adolescents aged 9-20 years in West Bengal, India in 2009 showed the overall (age-sex combined) rate of undernutrition was 28.60 % among studied population. Present study reveals that rate of undernutrition was significantly higher among boys (37.59 %) than girls (19.43%) counterpart. Boys had greater chance to be an underweight compared to girls (OR=2.49). In conclusion, nutritional status of the studied children is not impressive especially among early adolescent and boys, respectively. There is urgent need intervention strategy through community based nutrition awareness (15).

A Cross-sectional survey conducted on 1942 students age 13-15 years in 2005 comprising in 65 schools in Ramallah and Hebron governorates showed the prevalence of stunting was similar in both governorates, and was higher among boys (9.2% and 9.4% in Ramallah and Hebron, respectively) than among girls (5.9% and 4.2% in Ramallah and Hebron, respectively). Stunting was negatively associated with father's education among boys and with urban residence and onset of puberty among girls (16).

A cross sectional survey conducted on 508 girls in Rawalpindi, Pakistan in 2003 showed 39.7% were 17 year of age, 32.1% was 18 year of age and 29.1 % were 19 year of age. The results revealed that almost all the fathers were literate, among them 20.9% were primary, 28% were intermediate, 35.6%, and 8.9% were graduate and post graduate. Literacy rate among the mothers were also high, 1% were uneducated, 9.8% were primary, 12.8% were middle, 41.5%

were primary, 17.5% were intermediate, 14.6% graduate, and 2.8% were post graduate. 1.7 % of the fathers by occupation were laborers, 29.5 % were government servants, 58.3% were doing private jobs, and 7.3 % were professionals. The average family composition was 6.8 ± 1.8 persons per family. Family size ranged from 2 to 13 members. The Body mass index indicator is based on body weight and height, while age is not included in its measurement. The BMI revealed that 20% of the girls were underweight (BMI <18.5), 77% were within normal limits (BMI >18.5), and 3% were obese (BMI > 30) (17).

Cross sectional survey conducted on 401 adolescents aged 10-19 years in Osun State Nigeria in 2008 showed the prevalence of underweight was 20.1% in the study area, which was higher among the rural adolescents 22.4% than urban 18.7% and 25.8% and 15.1% among boys and girls respectively. The prevalence of overweight was 3.2% with 4.1% from urban and 1.5% from rural, while 1.1% was boys and 5.0% was girls. Only 0.5% urban girls were obese. Prevalence of underweight was significantly higher in boys at mid adolescence 24.2%, boys who were involved in jobs after school hours 13%, and who do not travel regularly 22.5% while among girls who reside with extended family member 11.9% (18).

A cross-sectional survey conducted on 6801 subjects aged 7-18 years in Tanzania showed 52.5% of adolescents were stunted and 43.0% were underweight, with significantly more boys stunted and underweight than girls-scores of height-for-age for both boys and girls decreased progressively between 7 and 12 years. After 12 years the height-for-age z-scores of girls show a marked upturn, whilst z-scores for boys continue to decrease throughout the school-aged years until 16 years when a slight upturn is observed (19).

A cross-sectional survey conducted on 1257 adolescent age 10-15 year in South Africa Showed Stunting was most prevalent in the rural areas (girls 23.7% and boys 26.7%) compared with urban areas (girls 11.6%, boys 17.1%). The odds ratio for the association between stunting and overweight in boys and girls were 0.45 and 0.50) respectively. Stunted children, 10-14-years-old and living in rural areas. This tendency in urban stunted girls is evident at the onset of menarche and could predict possible problems of overweight as they get older (20).

Cross-sectional surveys conducted on 928 randomly selected adolescent school girls aged 12–18 years in Kenya in 2003 showed the Overall prevalence of stunting and thinness was 12.1 and 15.6%, respectively. Of the total, 2% were severely stunted. Menarche and start of puberty were delayed by approximately 1.5–2 years compared to a US reference population. The prevalence of stunting and thinness decreased with age and mean height for age *z*-scores converged towards the median of the US reference curve. Girls who had not yet started menstruating were more likely to be stunted than the girls of the same age who were post-menarche (21).

A Cross-sectional survey conducted on Anthropometric and socio-demographic information to assess nutritional status of 211 rural adolescent 10-19 year old girls in Tigray, Northern Ethiopia showed the prevalence of stunting and thinness was 26.5% and 58.3%, respectively. Lack of latrine facilities was significantly associated with stunting and thinness. Age was strong predictor of stunting and thinness and Lack of latrine facilities (open air defecation) was also a predictor of stunting and thinness (22).

2.2 Significance of the study

Adolescence is the last window of opportunity to implement strategies to correct growth deficits, and knowledge of the main risk factors and risk groups is required to design and target appropriate interventions. So far, most of the nutrition interventions have either focused on children aged 0-5 years or on pregnant women, and, to some extent on lactating women. However, not much attention has been paid to adolescents by nutrition-related Program in developing countries. In spite of the fact that impact of malnutrition on human development, adolescence has been sidelined as a research and policy subject in developing countries. As a result, we know little about young people's lives in these societies. Addressing the nutritional needs of adolescents could be an important step towards breaking the vicious cycle of intergenerational malnutrition (12).

Ethiopia being one of the countries where malnutrition is endemic and Protein energy malnutrition remains one of the major public health problems of the country. However, data on underweight (indicated by low BMI for adolescents) are largely unavailable for both male and female adolescents.

This study therefore; identified determinants of undernutrition among adolescents in Burayu woreda, Oromia Region, particularly those associated to socio-demographic, health and environmental related factors and to consider the policy implications of these findings to enrich the knowledge of all parties in the area of applied nutrition among adolescent and provide information to policy makers take intervention actions on preventive aspects to reduce the risk of undernutrition in Burayu Woreda.

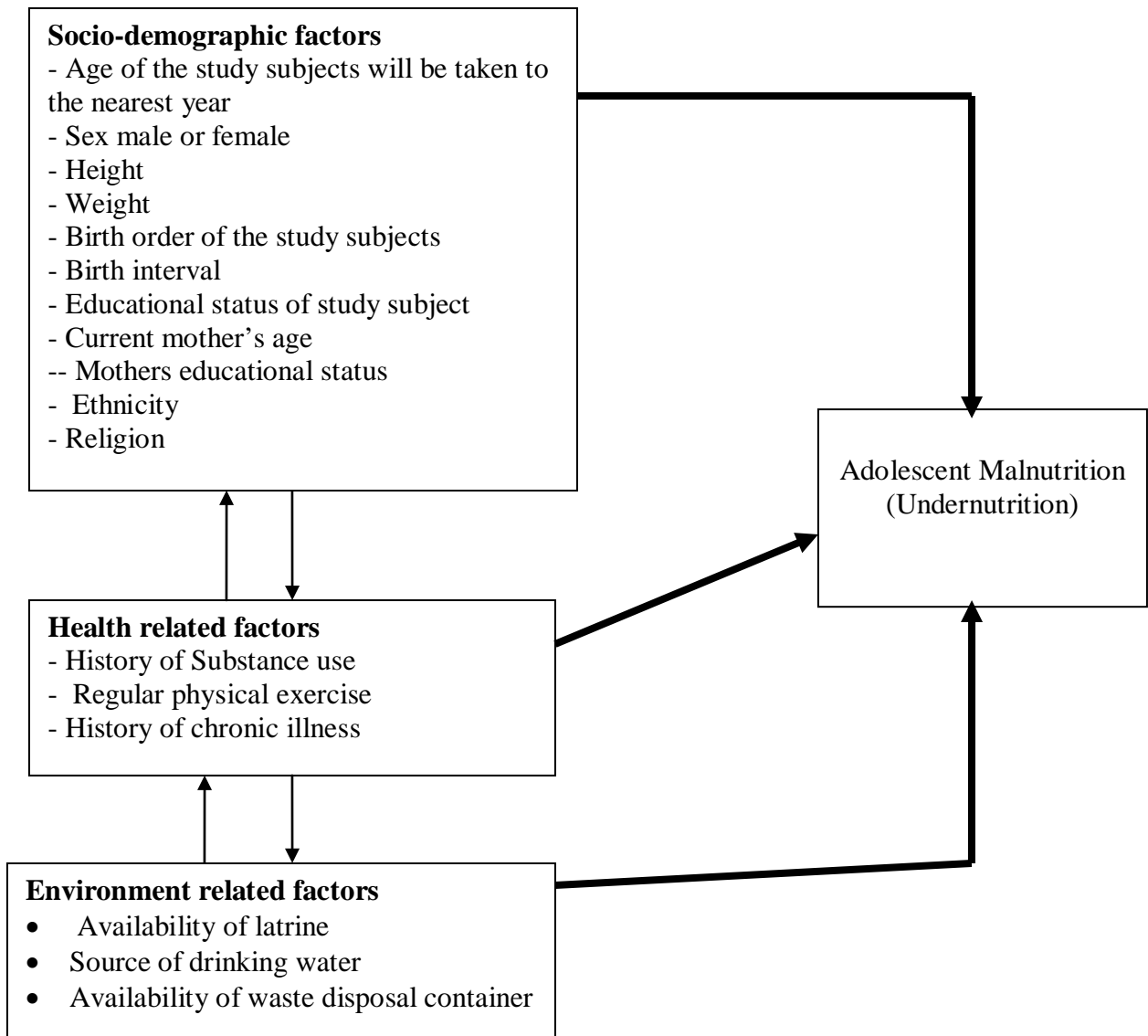


Figure 1: Adopted conceptual framework developed for the study on determinants of Malnutrition among adolescents in Burayu woreda, Oromia Region, May 2011

CHAPTER 3: OBJECTIVE

3.1 General Objective

- To assess determinants of undernutrition among adolescents in Burayu woreda, Oromia Region, May 2011.

3.2 Specific Objectives

- To assess socio-demographic related factors contributing for adolescent undernutrition.
- To identify health related determinants of undernutrition among adolescents.
- To assess environment related detremnants of undernutrition among adolescents.
- To identify independent predictors of undernutrition among adolescents.

CHAPTER 4: METHODS and MATERIALS

4.1 Study area and period

Oromia region is one of the 9 state governments of Ethiopia divided into 18 administrative zones and 180 woredas. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), Oromia has a total population of 27,158,471, consisting of 13,676,159 men and 13,482,312 women; urban inhabitant's number 3,370,040 or 11.3% of the total population with an estimated area of 359,619.8 square kilometers.

The study woreda, Burayu, is found in Oromia Region, which is located 20 km West of Addis Ababa. Burayu woreda is one of the town administration found in Oromia region that is divided into six Kebeles, namely Burayu Keta, Egdu Keta, Geferssa Burayu, Geferssa Guje, Geferssa Nono, and Melka Geferssa. The total population of the woreda is 63,000 with male to female sex ratio 1:1.02 and 25.2% constituted adolescents and estimated total adolescents in the woreda were 15,876.

The woreda is accessible to 24-hours health service, transportation, and postal service. There are 2 high schools, 1 health center, 3 clinics and 4 health posts. The leading economic activity of the people is different levels of business or trading. The study was conducted from 10-25 March 2011.

4.2 Study design

Community based unmatched case-control.

4.3 Population

4.3.1 Source Population

All adolescents aged 10-19 years old residing in Burayu Woreda for more than six months prior to the study.

4.3.2 Study population

Cases: were adolescents with Body Mass Index $< 18.5 \text{ Kg/m}^2$. (91 cases)

Controls: were all adolescents with Body Mass Index $\geq 18.5 \text{ Kg/m}^2$ (91 controls)

4.3.3 Inclusion and Exclusion criteria

Inclusion Criteria

All adolescents aged 10-19 years old who were resident in Burayu Woreda for at least six months.

Exclusion criteria

Pregnant adolescents, severely ill, physically disabled like those with amputated leg were excluded from the study. Also if there were more than one eligible adolescent in the household one adolescent was selected using lottery methods.

4.4 Sample size and sampling technique

Based on DHS 2005, by considering sex (OR=2.5) boys had greater chance to be an underweight compared to girls (15). The prevalence of undernutrition among cases calculated was 77.7% and prevalence of undernutrition among controls was 58.3% (22) with 95% CI and 80% power and case to control ratio 1:1. Sample size was determined using the statistical formula for two population proportions. From 4 urban kebeles 105 households were included and from 2 rural kebeles 77 households were included in the study. The study subjects were selected with probability proportional to size from the six kebeles. In each kebele one data collector was assigned and using simple random sampling technique data was collected until the sample size was fulfilled. If there were more than one eligible adolescent in the household one adolescent was selected using lottery methods. Adolescents with $\text{BMI} < 18.5 \text{ kg/m}^2$ were classified as cases and adolescent with $\text{BMI} \geq 18.5 \text{ kg/m}^2$ were classified as controls.

$$n = \frac{r + 1}{r} \frac{\bar{p}(1 - \bar{p})(Z_{power} + Z_{\alpha/2})^2}{(p_1 - p_2)^2}$$

Where:

n = Sample size

$Z_{\alpha/2}$ = corresponds to two - tailed significance level (1.96 for $\alpha = .05$)

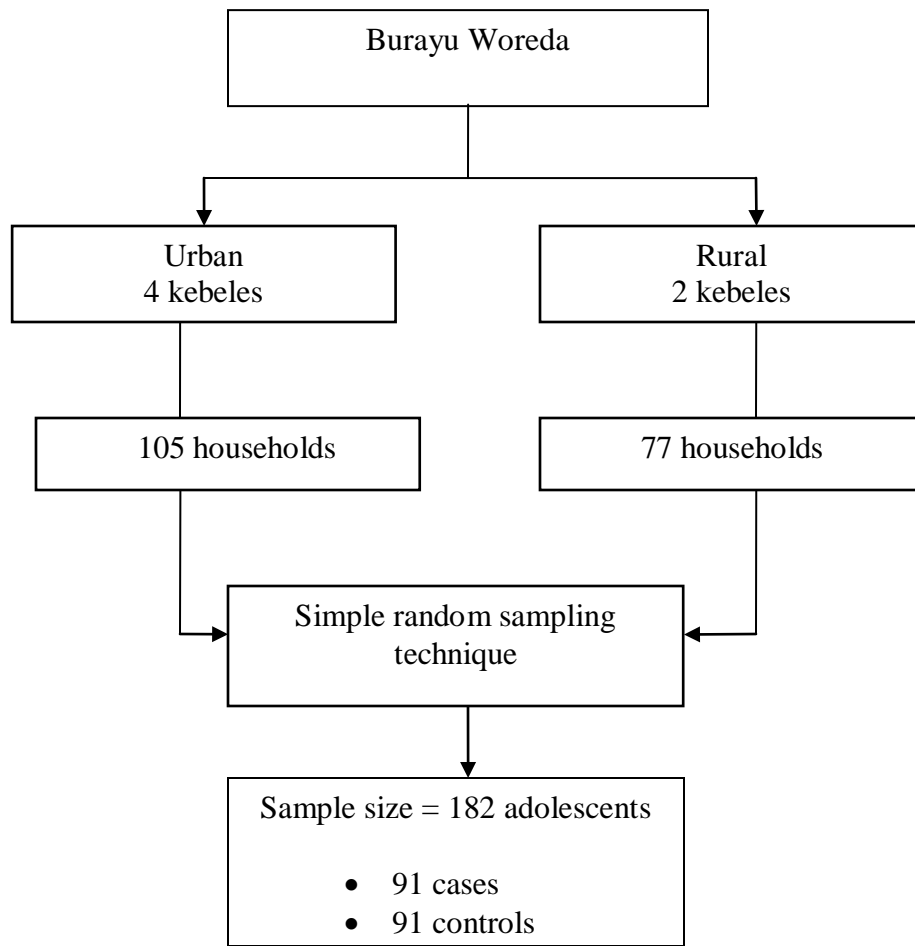
Z_{β} = corresponds to power (.84 = 80% power)

P_1 = Prevalence of undernutrition among adolescent cases = 77.7%

P_2 = Prevalence of undernutrition among adolescent controls = 58.3% (22)

\bar{P} = A measure of variability (similar to standard deviation) = 0.67

r = Ratio of cases to control 1:1



Schematic presentation of the sampling procedure

4.5 Measurements

4.5.1 Dependant Variables

- Adolescent Undernutrition

4.5.2 Independent Variables

➤ Socio-demographic variables

- Anthropometric measurements
- Age of the study subjects will be taken to the nearest year
- Sex
- Birth order
- Birth interval
- Educational status of study subject
- Current mothers age
- Mothers educational status
- Ethnicity
- Religion

➤ Health related variables

- History of substance use
- Regular physical exercise
- History of illness

➤ Environment related factors

- Availability of latrine
- Source of drinking water
- Availability of waste disposal container

4.6 Data collection methods and instrument

Data collection was conducted using a structured questionnaire developed in English and addressed all important variables and translated in to Amharic language and Afan Oromifa by two different people who had experience in translation to ensure consistency. Data collection was carried out by six data collectors and two supervisors 12th grade completed who were recruited based on previous data collection experience and they were trained for two days on the purpose and scope of the study, and the over all procedure of data collection instrument and supervision. The information was obtained both from parents and study subjects. Weight was measured in kilogram using a portable bath room digital weighing scale with the adolescents in light clothing and without shoes to the nearest 0.1 kg. Weighing scale was recalibrated before taking the weight of each study subject. The height was measured in centimeter using portable measuring board standardized by WHO and used by CSA and EHNRI at national level in standing position without shoes to the nearest 0.1 cm. Supervision was conducted by supervisors and principal investigator during data collection and timely data was edited and feed back was given. If there were more than one eligible adolescent in the household one adolescent was selected using lottery methods.

4.7 Pre-test

Pre-test was done on 18 subjects in other woreda with similar socio- demographic background and consistency was ensured and appropriate modifications was made after discussing with the supervisors and data collectors such as skipping patterns and some other corrections two days before starting the actual data collection process.

4.8 Data quality control

All collected data were reviewed daily by supervisor and principal investigator for completeness, accuracy, and clarity carefully. Any error, ambiguity or incompleteness encountered was addressed on the following day before starting next day activities. The questionnaire was pre-tested to ensure consistency of the questionnaire and two days training was provided for data collectors and supervisors. Weight scale was recalibrated after each measurements and labeled place was selected.

4.9 Data management

Data were entered into a computer, edited, cleaned and analysis was done using SPSS version 16.0 packages. Univariate analysis was conducted to check for outliers, consistencies and to identify missed values. Chi-square analysis was used to assess the association between independent and dependant variables under study and the nutritional status of adolescents as measured by OR and 95% CI and p-values less than 0.05 was considered as significant. To identify independent predictors of adolescent malnutrition multivariate backward binary logistic regression analysis was used.

4.10 Dissemination plan

The result of this study will be disseminated to relevant bodies such as Jimma University, college of Public Health and Medical Sciences, Federal Ministry of Health, Ethiopian Health and Nutrition Research Institute, Oromia Regional Health Bureau, and Burayu Woreda Health Office and all other concerned parties. Also the findings of this study will be made ready for possible publication in a reputable journal.

4.11 Ethical consideration

Ethical clearance was initially obtained from Jimma University Faculty of Public Health and Medical Sciences Ethical Committee. Further, written consent was secured from Burayu Woreda Health Office. Each study subjects were informed by data collectors about the objective of the study to obtain their written consent before starting any interview and body measurements. Emphasis to ensure confidentiality and respect of the right of the respondents to refuse answering few or all of the questions was made and name of the study subject was not recorded. All the information collected from the study subjects were used for the research purpose only.

4.12 Strength and limitations

The study was used a sound design a case to control ratio of 1:1, Case-control studies are attractive because they can be performed relatively cheaply and quickly. It was also tried to control many confounding variables; however, it might have some limitation such as selection and recall bias.

4.13 Operational Definitions

“Adolescents” are any person aged 10-19 years (WHO, 1986).

“Early adolescent” is any person aged 10-12 years.

“Middle adolescent” is any person aged 13-15 years.

“Late adolescent” is any person aged 16-19 years.

“BMI” weight in kilogram divided by the square of the height in meter (kg/m^2) (23)

“Normal” BMI $\geq 18.5 \text{ kg}/\text{m}^2$

“Undernutrition” BMI $< 18.5 \text{ kg}/\text{m}^2$

“Physical exercise” physical activity that is planned and repetitive for the purpose of conditioning any part of the body or daily walking, running, or playing foot ball (24).

“Illness” being sick for more than two weeks.

CHAPTER 5: RESULT

5.1 Socio-demographic characteristics

A total of 182 adolescents (91 cases and 91 controls) aged 10-19 years were participated in the study. It was found that 50(86.2%) of cases and 8(13.8%) of controls were between age group 10-12 years. Twenty nine(53.7%) of cases and 25(46.3%) of controls were between age group 13-15 years and 12(17.1%) of cases and 58(82.9%) of controls were between age group 16-19 years. Adolescents in age group 10-12 years were more likely to develop undernutrition compared to adolescents in age group 13-15 years (OR= 5.4; 95%CI: 2.15, 13.49) and adolescents in age group 13-15 years were more likely to develop undernutrition compared to adolescents in age group 16-19 years (OR= 5.6; 95%CI: 2.46, 12.73).

High proportion 47(63.5%) of cases and 27(36.5%) of controls were male while 44(43.8%) of cases and 54(56.2%) of controls were female. Male adolescents were more likely to develop undernutrition compared to female adolescents (OR= 2.5; 95%CI: 1.38-4.66).

Majority 43(61.4%) of cases and 27(38.6%) of controls were first birth order while 42(43.8%) of cases and 54(56.2%) of controls were between 2-6 birth orders. Small proportion 6(37.5%) of cases and 10(62.5%) of the controls had birth order greater than or equal to seven. Adolescents with first birth order were more likely to develop undernutrition compared to adolescents with 2-6 birth order (OR= 2.0; 95%CI: 1.09, 3.83).

On the other hand 21(38.2%) of cases and 34(61.8%) of controls were first birth. Also 17(77.3%) of cases and 5(22.7%) of controls birth interval was less than 24 months. Majority 32(53.3%) of cases and 28(46.7%) of controls birth interval lies between 24-47 months. Twenty one (46.7%) of cases and 34(53.3%) of controls had birth interval 48⁺ months. Adolescents with less than 24 months birth interval were more likely to develop undernutrition compared to adolescents with 48⁺ months birth interval (OR= 3.8; 95%CI: 1.22, 12.35).

Three (37.5%) of cases and 5(62.5%) of controls had no education. Majority 69(66.3%) of cases and 35(33.7%) of controls were educated to the level of primary. Thirteen (34.2%) of cases and 25(65.8%) of controls were educated to the level of junior secondary while small proportion 6(18.8%) of cases and 26(81.2%) of controls were educated to the level of senior secondary/tertiary. Adolescents educated to the level of primary were more likely to develop undernutrition compared to adolescents educated to the level of senior secondary/tertiary (OR= 8.5; 95%CI: 3.21, 22.68).

It was found that current age of mothers of, 13(76.5%) of cases and 4(23.5%) of controls were 25-29 years while current age of mothers of, 32(41.0%) of cases and 46(59.0%) of controls were grater or equal to forty. Adolescents whose mothers age group 25-29 years were more likely to develop undernutrition compared to adolescents whose mothers age greater than or equal to forty years (OR= 4.7; 95%CI: 1.39, 15.4).

Mothers of, 69(66.3%) of cases and 35(33.7%) of controls were educated to the level of primary while mothers of, 19(48.7%) of cases and 20(51.3%) of controls were educated to the level of senior Secondary/collage. Adolescents whose mothers educated to the level of primary were more likely to develop undernutrition compared to adolescents whose mothers educated to the level of secondary/tertiary (OR= 8.5; 3.21, 22.68)

Fifty two (48.6%) of cases and 55(51.4%) of controls were Oromo by ethnicity followed by Gurage 23(69.7%) of cases and 10(30.3%) of controls. Adolescents with Gurage in ethnicity were more likely to develop undernutrition compared to adolescents with Oromo in ethnicity (OR= 2.4; 95%CI: 1.05, 5.59). High proportion 62(38.8%) of cases and 65(51.2%) of controls families were Orthodox by religion followed by Muslim 21(52.5%) of cases and 19(47.5%) of controls. It was found that among socio-demographic factors age, sex, birth order, birth interval, educational status of study subjects, current mother's age, mothers education and ethnicity were significantly associated with adolescent undernutrition (Table 1).

Table 1: Summary of socio-demographic related factors with adolescent undernutrition, Burayu Woreda, Oromia Region, May 2011

Variables	Cases (N=91)		Controls (N=91)		COR
	Number	Percent	Number	Percent	
Age in years					
10-12 years	50	86.2	8	13.8	5.4(CI=2.15-13.49)*
13-15 years	29	53.7	25	46.3	5.6(2.46-12.73)*
16-19 years	12	17.1	58	82.9	1.00
Sex					
Male	47	63.5	27	36.5	2.5(1.38-4.66)*
Female	44	40.7	64	59.3	1.00
Birth order					
First birth	43	61.4	27	38.6	2.0(1.09-3.83)*
2-6	42	43.8	54	56.2	1.00
7+	6	37.5	10	62.5	0.8(0.25-2.29)
Birth interval					
First birth	21	38.2	34	61.8	0.7(0.37-1.57)
< 24 months	17	77.3	5	22.7	3.8(1.22-12.35)*
24 -47 months	32	53.3	28	46.7	1.3(0.60-2.83)
48+ months	21	46.7	24	53.3	1.00
Adolescent education					
No education	3	37.5	5	62.5	2.6(0.48-14.01)
Primary	69	66.3	35	33.7	8.5(3.21-22.68)*
Junior secondary	13	34.2	25	65.8	2.3(0.74-6.85)
Senior secondary/Tertiary	6	18.8	26	81.2	1.00
Current mothers age					
25-29	13	76.5	4	23.5	4.7(1.39-15.4)*
30-34	17	50.0	17	50.0	1.4(0.64-3.23)
35-39	29	54.7	24	45.3	1.7(0.86-3.51)
≥40	32	41.0	46	59.0	1.00
Mothers education					
No education	3	37.5	5	62.5	2.6(0.48-14.01)
Primary	69	66.3	35	33.7	8.5(3.21-22.68)*
Junior Secondary	13	34.2	25	65.8	2.3(0.74-6.85)
Secondary/collage	6	18.8	26	81.2	1.00
Ethnicity					
Oromo	52	48.6	55	51.4	1.00
Amhara	13	41.9	18	58.1	0.76(0.34-1.71)
Gurage	23	69.7	10	30.3	2.4(1.05-5.59)*
Others	3	27.3	8	72.7	0.39(0.10-1.57)
Religion					
Orthodox	62	48.8	65	51.2	1.00
Muslim	21	52.5	19	47.5	1.2(0.56-2.36)
Others	8	53.3	7	46.7	1.2(0.41-3.50)

* Variables which shown significant association during the multivariate analysis PV<0.05

5.2 Summary of health related determinants of undernutrition among adolescent

Thirteen (41.9%) of cases and 18(58.1%) of controls had history of addictive substance used. Among substance users 1(25.0%) of cases and 3(75.0%) of controls had used Khat while 12(44.4%) of cases and 15(55.6%) of control had used Alcohol. Nine (45.0%) of cases and 11(55.0%) of controls had used addictive substance for grater than or equal to six months.

Forty eight (59.3%) of cases and 33(40.7%) of controls were practicing regular physical exercise. Adolescents practicing physical exercise were more likely to develop undernutrition compared to adolescent that did not practicing physical exercise (OR= 1.9; 95%CI: 1.08, 3.55). Among adolescents practicing physical exercise 6(66.7%) of cases and 3(33.3%) of controls were practicing physical exercise daily. Twenty nine (59.3%) of cases and 15(40.7%) of controls were practicing physical exercise twice a week while 13(46.4%) of cases and 15(53.6%) of controls were practicing physical exercise once a week while high proportion 43(42.6% of cases and 58(57.4%) of controls were not practicing physical exercise. Adolescents practicing physical exercise twice a week were more likely to develop undernutrition compared to adolescent's not practicing physical exercise (OR= 2.6; 95%CI: 1.24, 5.45).

Twenty six (46.4%) of cases and 30(53.6%) of controls had history of illness for more than two weeks. Proportion of cases and controls with three or more frequency of illness were 13(56.5%) and 10(43.5%) respectively. History of substance use and illness were not significantly associated with adolescent undernutrition (Table 2).

Table 2: Summary of health related factors with adolescent undernutrition, Burayu Woreda, Oromia Region May 2011

Variables	Cases(N=91)%	Controls(N=91)%	COR(95%CI)
History of substance use			
Yes	13(41.9)	18(58.1)	0.67(0.31-1.47)
No	78(51.7)	73(48.3)	1.00
Khat			
Yes	1(25.0)	3(75.0)	0.3(0.01-3.61)
No	90(50.6)	88(49.4)	1.00
Alcohol			
Yes	12(44.4)	15(55.6)	0.7(0.31-1.88)
No	79(51.0)	76(49.0)	1.00
Duration of use			
< 6 months	4(40.0)	6(60.0)	1.00
≥ 6 months	9(45.0)	11(55.0)	1.4(0.32-6.49)
Regular physical exercise			
Yes	48(59.3)	33(40.7)	1.9(1.08-3.55)*
No	43(42.6)	58(57.4)	1.00
Frequency of exercise			
Daily	6(66.7)	3(33.3)	2.7(0.63-11.39)
Once a week	13(46.4)	15(53.6)	1.2(0.56-2.71)
Twice a week	29(59.3)	15(40.7)	2.6(1.24, 5.45)*
No exercise	43(42.6)	58(57.4)	1.00
History of illness			
Yes	26(46.4)	30(53.6)	0.8(0.43-1.52)
No	65(51.6)	61(48.4)	1.00
Frequency of illness			
< 3 times	13(39.4)	20(60.6)	1.00
≥3 times	13(56.5)	10(43.5)	1.6(0.78-3.64)

* Variables which shown significant association during the multivariate analysis PV<0.05

5.3 Environment related factors with adolescent undernutrition

Families of, 56(47.9%) of cases and 61(52.1%) of controls had latrine. Twenty seven (46.6%) of cases and 31(53.4%) of controls used open field defecation while 61(58.1%) of cases and 44(41.9%) of controls used pit latrine. Also 3(15.8%) of cases and 16(84.2%) of controls had ventilated pit latrine. Adolescents who used open field defecation were more likely to develop undernutrition compared to adolescents who had ventilated pit latrine (OR= 4.6; 95%CI: 1.22, 17.68). Adolescents who had pit latrine were more likely to develop undernutrition compared to adolescents who had ventilated pit latrine (OR= 7.3; 95%CI: 2.03-26.93)

Eighteen (60.0%) of cases and 12(40.0%) of controls used river as a source of drinking water while 73(48.0%) of cases and 79(52.0%) of controls used pipe as a source of drinking water.

Families of, 50(54.3%) of cases and 42(45.7%) of controls used open field waste disposal while 32(68.1%) of cases and 15(31.9%) of controls used communal waste disposal container and 9(20.9%) of cases and 34(79.1%) of controls used private waste disposal container. Adolescents who used open field waste disposal were more likely to develop undernutrition compared to adolescents who had private waste disposal container (OR= 2.5; 95%CI: 1.22, 5.21). Adolescents who used communal waste disposal container were more likely to develop undernutrition compared to adolescents who had private waste disposal container (OR= 3.5; 95%CI: 1.47, 8.48). Only source drinking water was not significantly associated with adolescent undernutrition (Table 3).

Table 3: Summary of environment related factors with adolescent undernutrition, Burayu Woreda, Oromia Region, May 2011

Variables	Cases (N=91)		Controls (N=91)		COR
	Number	Percent	Number	Percent	
Availability of latrine					
Yes	56	47.9	61	52.1	1.00
No	35	53.8	30	46.2	1.3(0.69-2.33)
Type of latrine					
Open field	27	46.6	31	53.4	4.6(1.22-17.68)*
Pit toilet	61	58.1	44	41.9	7.3(2.03-26.93)*
Ventilated pit latrine	3	15.8	16	84.2	1.00
Source of drinking water					
River	18	60.0	12	40.0	1.6(0.73-3.60)
Pipe	73	48.0	79	52.0	1.00
Waste disposal					
Open field	50	54.3	42	45.7	2.5(1.22-5.21)*
Communal container	32	68.1	15	31.9	3.5(1.47-8.48) *
Private container	9	20.9	34	79.1	1.00

* Variables which shown significant association during the multivariate analysis $PV < 0.05$

The final model was constructed using backward binary logistic regression method. All variables which had shown statistically significant association during chi-square analysis such as age, sex, birth order, birth interval, educational status of study subjects, practicing regular physical exercise, frequency of physical exercise, current mother's age, mothers educational status, ethnicity, type of latrine and availability of waste disposal container were included. However, on multivariate backward binary logistic regression analysis, out of these twelve independent variables only age, sex and type of latrine were found to be independent predictors for the occurrence of adolescent undernutrition.

Adolescents in age group 10-12 years were more likely to develop undernutrition compared to adolescents in age group 13-15 years (AOR= 8.7; 95%CI: 2.51, 30.10). Adolescents in age group 13-15 years were more likely to develop undernutrition compared to adolescents in age group 16-19 years (AOR= 7.9; 95%CI: 2.67, 23.82).

Male adolescents were more likely to develop undernutrition compared to female adolescents (AOR= 4.3; 95%CI: 1.87, 10.04).

Adolescents who used open field defecation were more likely to develop undernutrition compared to adolescents who had ventilated pit latrine (AOR= 8.7; 95%CI: 1.27, 60.03). Adolescents who had pit latrine were more likely to develop undernutrition compared to adolescents who had ventilated pit latrine (AOR= 6.8; 95%CI: 1.18, 39.94) (Table4).

Table 4: Independent predictors of undernutrition among adolescent, Burayu Woreda, Oromia Region, May 2011

Variables	Cases (N=91)%	Controls (N=91)%	COR (95%CI)	AOR (95%CI)
Age in years				
10-12 years	50(86.2)	8(13.8)	5.4(2.15-13.49)*	8.7(2.51-30.10)*
13-15 years	29(53.7)	25(46.3)	5.6(2.46-12.73)*	7.9(2.67-23.82)*
16-19 years	12(17.1)	58(82.9)	1.00	1.00*
Sex				
Male	47(63.5)	27(36.5)	2.5(1.38-4.66)*	4.3(1.87-10.04)*
Female	44(40.7)	64(59.3)	1.00	1.00
Type of latrine				
Open field	27(46.6)	31(53.4)	4.6(1.22-17.68)*	8.7(1.27-60.03)*
Pit latrine	61(58.1)	44(41.9)	7.3(2.03-26.93)*	6.8(1.18-39.94)*
Ventilated pit latrine	3(15.8)	16(84.2)	1.00	1.00

* Variables which shown significant association during the multivariate analysis PV<0.05

CHAPTER 6: DISCUSSIONS

Adolescence is an important stage of growth and development that requires increased nutrition. But it has often failed to get increased attention as observed in childhood with regards to health related uses and interpretation of anthropometry (15). This study showed that the determinants of undernutrition among adolescents in Burayu Woreda, Oromia region were age, sex and type of latrine.

According to the current study among the socio-demographic characteristics, age, sex, birth order, birth interval, educational status, current mothers age, maternal education, ethnicity were found significantly associated with the occurrence of adolescent undernutrition.

Majority 61.4% of cases and 38.6% of controls were first birth order while 43.8% of cases and 56.2% of controls were between 2-6 birth orders. Adolescents with first birth orders were 2 times more likely to develop undernutrition compared to adolescents with 2-6 birth orders. This can be explained by the fact that most of first birth orders were unplanned.

On the other hand 77.3% of cases and 22.7% of controls birth interval was less than 24 months while 46.7% of cases and 53.3% of controls had birth interval 48⁺ months. Adolescents with less than 24 months birth interval were 3.8 times more likely to develop undernutrition compared to adolescents with 48⁺ month's birth interval. This can be attributed to inadequate child spacing and early starting of weaning diet which can lead to childhood infection that can affect growth and development in adolescence.

Majority 66.3% of cases and 33.7% of controls were educated to the level of primary while 18.8% of cases and 81.2% of controls were educated to the level of senior secondary/tertiary. Adolescents educated to the level of primary were 8.5 times more likely to develop undernutrition compared to adolescents educated to the level of senior secondary/tertiary.

It was found that current age of mothers of, 76.5% of cases and 23.5% of controls were in age group 25-29 years while current age of mothers of, 41.0% of cases and 59.0% of controls were greater or equal to forty. Adolescents whose mothers in age group 25-29 years were 4.7 times more likely to develop undernutrition compared to adolescents whose mothers age greater than or equal to forty years and this can be explained by the fact that early marriage and unplanned pregnancy can lead to inadequate diet for the mothers as well as the fetus which can predispose to chronic energy deficiency during adolescence.

Literacy status of mothers was found to play an important role on nutritional status of adolescent. The highest nutritional problem was found among adolescents whose mothers were educated to the level of primary. Mothers of, 66.3% of cases and 33.7% of controls were educated to the level of primary while mothers of, 48.7% of cases and 51.3% of controls were educated to the level of senior Secondary/collage. Adolescents whose mothers were educated to the level of primary were 8.5 times more likely to develop undernutrition compared to adolescents whose mothers were educated to the level of secondary/tertiary. The possible reason could be being literate may result in higher awareness about nutritional services.

It was found that 59.3% of cases and 40.7% of controls were practicing regular physical exercise. Adolescents practicing physical exercise were 1.9 times more likely to develop undernutrition compared to adolescent that did not practicing physical exercise. Among adolescents practicing physical exercise 59.3% of cases and 40.7% of controls were practicing physical exercise twice a week while 42.6% of cases and 57.4% of controls were not practicing physical exercise. Adolescents practicing physical exercise twice a week were 2.6 times more likely to develop undernutrition compared to adolescent's not practicing physical exercise. This can be explained by the fact that physical exercise requires more energy replacement which is impossible in our case.

Substance use and illness were not significantly associated with adolescent malnutrition. This study was similar with a survey conducted in India in 2009 which showed addiction was not significantly associated with nutritional status of study subjects at the time of survey and also illness or frequency of illness was found not significantly associated with malnutrition (13, 14).

Among environmental related factors type of toilet and availability of waste disposal container were found significantly associated with the occurrence of adolescent undernutrition while source of drinking water was not significantly associated with adolescent undernutrition.

When we look at predictors of adolescent undernutrition age group 10-12 years were 8.7 times higher at risk of developing undernutrition compared to age group 13-15 years and age group 13-15 years were 7.9 times higher at risk of developing undernutrition compared to age group 16-19 years. This finding is consistent with reports from a study conducted on nutritional status of rural adolescent girls in Tigray in 2009 that showed age the predictors of malnutrition (22).

Male adolescents were 4.3 times higher at risk of developing undernutrition compared to female adolescents. This can be explained as it was identified in this study male did more physical exercise than females and hence can demand more energy replacement. This was in line with Turkey, Ramallah, Nigeria, Tanzanian and South Africa study that documented significantly more boys underweight than girls (12, 15, 17,18, 19).

Adolescents who used open filed defecation were 8.7 times higher at risk of developing undernutrition compared to respondents who used ventilated pit latrine. Also adolescents who used pit latrine were 6.8 times higher at risk of developing undernutrition compared to adolescents who used ventilated pit latrine. This finding is consistent with reports from a study conducted on nutritional status of rural adolescent girls in Tigray in 2009 that showed lack of latrine the predictors of malnutrition (22).

Finally, this study was used a sound study design a case to control ratio of 1:1, Case-control studies are attractive because they can be performed relatively cheaply and quickly. It was also tried to control many confounding variables; however, it might have some limitation such as selection and recall bias.

CHAPTER 7: CONCLUSION and RECOMMENDATIONS

In conclusion, this study was conducted with the objective of identifying determinants of undernutrition among adolescents. According to the current study it was found that age group 10-15 years, male sex, open field defecation and pit latrine were found to be independent predictors for the occurrence of adolescent undernutrition.

The result of this study gives a clue on the factors contributing to malnutrition and provide a base line data for other investigators and policy makers. Addressing the nutritional needs of adolescents could be an important step towards breaking the vicious cycle of intergenerational malnutrition (12).

Based on this fact, it is recommended that:

1. Especial attention should be sought to early and middle adolescents and male sex in Particular in nutrition.
2. Prevention of communicable diseases through improveing environmental hygiene and sanitation especialy increasing latrine covarage.

Therefore, developing and implementing health programs to tackle malnutrition among adolescents should take into account such differences that are consequence of socio-demographic, health and environment related factors.

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CHAPTER 8: ANNEXES

Informed Consent prepared to participate in a study

A questionnaire prepared to assess Determinants of Malnutrition among adolescents.

Burayu Woreda, Oromia Region, Ethiopia.

Jimma 2011 Questionnaire

Region: Oromia

Site: Burayu Woreda

INTRODUCTION: My name is _____. I am working as data collectors with a research entitled, Determinants of Malnutrition among adolescents in Burayu Woreda, Oromia Region. You have been selected to participate in this study. The finding of the study will be used for better planning & intervention on prevention of malnutrition among adolescents in our country. Therefore, I am going to ask you some questions and measure your body weight and height. Your response is completely confidential. Your name will not be written in this form and will never be used in connection with any of the information you tell me. You are kindly requested to answer every question and you may refuse to respond at any time you want. However, your honest answers to these questions will help us better understand problems of adolescent malnutrition. According to the questions their might be more than one answer. We would greatly appreciate your help in responding to these questions and subjected to body measurements. The survey will take about 20-30 minutes. Would you be willing to participate? [√]

Yes -----

No -----

If Yes, Signature _____

Date _____

8.1 Questionnaire

JIMMA UNIVERSITY, COLLEGE OF PUBLIC HEALTH and MEDICAL SCIENCES, DEPARTMENT OF EPIDEMIOLOGY

A form required for general information, body measurements of the study subjects and their family, Burayu woreda, Oromia; 2011.

Instruction

- A. Get informed consent from each study subject
- B. Translate each question to the respondent properly
- C. Put “√” or fill the correct records
- D. Regularly check for accuracy of height and weight measurements instrument
- E. Check the questionnaire for completeness at the end

Date of data collection _____ Data collector's code _____

House No _____ Family Identification code _____

A. Anthropometric measurements of the study subjects

No.	Question	Responses	Skip to
Q1	Height in (cm)	_____	
Q2	Weight in (kg)	_____	
Q3	BMI (kg/m ²)	_____	

B. Questions on general information of the study subjects

No.	Question	Responses	Skip to
Q4	How old are you? in completed years	_____	
Q5	Sex	1. Male _____ 2. Female _____	
Q6	What is your birth order in your family?	1. First birth _____ 2. 2– 6 birth _____ 3. 7+ birth _____	
Q7	What is your birth interval between you're younger or elder in months if any?	.1. First birth _____ 2. < 24 _____ 3. 24 – 47 _____ 4. 48+ _____	
Q8	Do you tell me your marital status?	1. Single _____ 2. Married _____ 3. Divorced/ Widowed _____ 4. Others (specify) _____	
9	Do you tell me your educational Status?	1. No education _____ 2. Primary (1 st -6 th) _____ 3. Junior Secondary (7 th and 8 th) _____ 4. Senior secondary (9 th to 12 th) _____ 5. College/University _____	

C. Questions on Substance use, physical exercise and health characteristics of the study subjects

No.	Question	Responses	Skip to
Q10	Have you ever used any addictive substance? /If no	1. Yes _____ 2. No _____	14
Q11	Type of addictive Substance used? more than one answer is possible.	1. Khat _____ 2. Alcohol _____ 3. Cocaine/Shisha _____ 4. Cigarette _____ 5. Others (specify) _____	
Q12	How long did you use the above addictive substance?	1. For < 6 months 2. For ≥ 6 months	
Q13	Are you working before or after school to get money?	1. Yes _____ 2. No _____	
Q14	Do you practice regular	1. Yes _____	16

	physical Exercise? If no skip to	2. No _____	
Q15	Do you tell me your frequency of physical exercise?	1. Daily _____ 2. Once a week _____ 3. Twice a week _____ 4. Others (specify) _____	
Q16	Did you get sick for more than two weeks before six months?	1. Yes _____ 2. No _____	
Q17	Number of Sickness	1. <3 × _____ 2. 3-5 × _____ 3. > 5 × _____	

D. Family Socio-demographic factors

No.	Question	Responses	Skip to
Q18	Do you tell me your current age?	_____	
Q19	Do you tell me your current marital status?	1. Single _____ 2. Married _____ 3. Divorced/widowed _____ 4. Others (Specify) _____	
Q20	What is your total family size?	_____	
Q21	Who is the head of household?	1. Male _____ 2. Female _____	
Q22	Where is your residence?	1. Urban _____ 2. Rural _____	
Q23	What is your educational Status?	1. No education _____ 2. Primary (1 st -6 th) _____ 3. Junior Secondary (7 th and 8 th) _____ 4. Senior secondary (9 th to 12 th) _____ 5. College/University _____	
Q24	What is your occupation?	1. House wife _____ 2. Govn't employee _____ 3. Merchant _____ 4. Others (specify) _____	
Q25	How much is your family monthly income (in Birr)?	_____	
Q26	What is your religion?	1. Orthodox _____ 2. Catholic _____ 3. Muslim _____ 4. Protestant _____ 5. Others (specify) _____	
Q27	What is your ethnicity?	1. Oromo _____ 2. Amhara _____ 3. Tigre _____ 4. Gurage _____ 5. Others (specify) _____	
Q28	Do you have Latrine? If no	1. Yes _____ 2. No _____	32

No.	Question	Responses	Skip to
Q29	Type of Latrine	1. Pit toilet _____ 2. Ventilated Pit toilet _____ 3. Pour Flush toilet _____	
Q30	What is your Source of water for drinking?	1. River _____ 2. Pipe _____ 3. Well _____ 4. Others (specify) _____	
Q31	Where do you dispose waste?	1. Open field _____ 2. Communal container _____ 3. Private container _____ 4. Burring _____ 5. Burning _____ 6. Others (specify) _____	

በጥናት ለመሳተፍ የተዘጋጀ የስምምነት ሰነድ

በወጣቶች የምግብ እጥረት ዙሪያ ዋና ዋና ጠቋሚ መረጃዎች ላይ በቡራዩ ወረዳ ምርምር ለማካሄድ የተዘጋጀ ቃለ መጠይቅ፡ ቡራዩ ወረዳ, ኦሮሚያ ክልል, ኢትዮጵያ፡፡

ጅማ 2003 የቃለ መጠይቅ ቅጽ

ክልል: ኦሮሚያ
ቦታ: ቡራዩ ወረዳ

መግቢያ: ስሜ_____ እኔ የምሰራው በወጣቶች የምግብ እጥረት ዙሪያ ዋና ዋና ጠቋሚ መረጃዎች ላይ በቡራዩ ወረዳ, ኦሮሚያ ክልል በሚካሄደው ምርምር በመረጃ ሰብሳቢነት ነው፡፡ አንተ/አንቺ በዚህ ጥናት እንድትሳተፍ/ፊ ተመርጠሃል/ሻል፡፡ የጥናቱ ውጤት የወጣቶች ምግብ እጥረት ዙሪያ በአገራችን የተሻለ እቅድ ለማዘጋጀትና ተግባራዊ ለማድረግ ይረዳል፡፡ ስለዚህ አሁን አንዳንድ ጥያቄዎችን ሊጠይቅህ/ሽና የሰውነት ክብደትና ቁመት ሊለካህ/ሽ ነው፡፡ መልስህ/ሽ ሙሉ በሙሉ በሚስጥር ይያዛል፡፡ ስምዎ በዚህ ፎርም ውስጥ አይጻፍም ከሰጡን መረጃ ጋር በተያያዘ በዚህ ቅጽ ውስጥ በፍፁም አንጠቀምም፡፡ ሁሉንም ጥያቄዎች እንዲትመልስ/ሽ በትህትና እጠይቃለሁ እና በማንኛውም ሰዓት ጥያቄውን መመለስ ካልፈለክ/ሽ መተውትችላለህ/ሽ፡፡ የወጣቶችን የምግብ እጥረት ችግር ለመረዳት ለጥያቄዎቹ የንተ/ቺ ታማኝ ምላሽ መስጠት ይጠቅመናል፡፡ እንደጥያቄው ሁኔታ ከአንድ መልስ በላይ ሊኖረው ይችላል፡፡ ለዚህ ይህንን ጥያቄ ለመመለስ, የሰውነትህን/ሽን ክብደት እና ቁመት ለመለካት ጥናቱ ከ20-30 ደቂቃ ሊወስድ ይችላል፡፡ ስለዚህ አንተ/ቺ በጥናቱ ለመሳተፍ ፈቃደኛ ነህ/ሽ? [✓]

አዎ -----
አይደለሁም -----

መልሱ አዎን ከሆነ, ፊርማ _____
ቀን _____

**ጅማ ዩኒቨርሲቲ፣ የህብረተሰብ ጤና ኮሌጅ እና የሕክምና ሳይንስ፣
የኢ.ፒ.ደ.ሞ.ሎጂ ትምህርት ክፍል**

7.2 የቃለ መጠይቅ እና የሰውነት ልኬት መሙያ ቅጽ

የጥናቱ ተሳታፊዎች እና የቤተሰብ አጠቃላይ መረጃ ማሰባሰቢያ ቅጽ፣ ቡራዩ ወረዳ፣ አሮሚያ ክልል፣ 2003.

መመሪያ

ሀ. ከእያንዳንዱ የጥናቱ ተሳታፊዎች የስምምነቱን ሰነድ በማንበብ ፈቃደኛነታቸውን በፊርማ አረጋግጥ፡

ለ. ለጥናቱ ተሳታፊዎች እያንዳንዱን ጥያቄ በአግባቡ ተርጉምላቸው፡

ሐ. ትክክለኛውን መልስ ይሙሉ ወይም “√” ምልክት አስቀምጥ/ጩ፡

መ/ የክብደትና ቁመት መለኪያ መሣሪያ በየጊዜው ትክክለኛነቱን አረጋግጥ/ጩ፡

ሰ/ በመጨረሻ ቅጹ በትክክል መሞላቱን አረጋግጥ/ጩ፡

መረጃ የተሰበሰበበት ቀን _____ የመረጃ ሰብሳቢ ኮድ _____

የቤት ቁጥር _____ የቤተሰብ መለያ ኮድ _____

ሀ/ በጥናቱ ተሳታፊ ሰውነት በመለካት የተሰበሰበ መረጃ

ተ.ቁ	ጥያቄ	መልስ	ዝላል
1	ቁመት (በሴ.ሜ)	_____	
2	ክብደት (በኪ.ግራም)	_____	
3	የሰውነት የስብ መጠን ተቋማ/ BMI (in Kg/m ²)	_____	

ለ/ የጥናቱ ተሳታፊዎች አጠቃላይ መረጃ

ተ.ቁ	ጥያቄ	መልስ	ዝላል
4	እድሜህ/ሽ ስንት ነው?	_____	
5	ጾታ	1. ወንድ _____ 2. ሴት _____	
6	አንተ/አንቺ ለቤተሰቦችህ/ሽ ስንተኛ ልጅ ነህ/ሽ?	1. የመጀመሪያ ልጅ _____ 2. ከ2-6 _____ 3. 7+ _____	
7	ታናሽ ወይም ታላቅ ካለህ/ሽ በመሐላችሁ ያለው ልዩነት ስንት ወራት ነው?	1. የመጀመሪያ ልጅ _____ 2. ከ24 ወራት በታች _____ 3. ከ24 -47 _____ 4. 48+ _____	
8	አሁን ያለውን የጋብቻህ/ሽ ሁኔታ ትነግረኛለህ/ሽ?	1. ያላገባ _____ 2. ያገባ _____ 3. የተፋታ/የሞተበት _____	
9	የትምህርት ደረጃህ/ሽ ስንት ነው?	1. አልተማርኩም _____ 2. መለስተኛ ሁለተኛ ደረጃ (7-8) _____ 3. ከፍተኛ ሁለተኛ ደረጃ (9-12/ _____ 4. ኮሌጅ/ዩኒቨርሲቲ _____	

ሐ/ የጥናቱ ተሳታፊዎች የባህሪ እና የጤንነት እንቅስቃሴ ሁኔታ መረጃዎች

ተ.ቁ	ጥያቄ	መልስ	ዝለል
10	እስካሁን ማንኛውንም ሱስ አምጪ ነገሮችን ተጠቅመህ/ሽ ታውቃለህ/ሽ? መልሱ አልተጠቀምኩም ከሆነ ወደ	1. አዎን _____ 2. አልተጠቀምኩም _____	ጥ13
11	ከሚከተሉት የትኛውን ተጠቅመሃል/ሻል? (ከአንድ በላይ መመለስ ይቻላል)	1. ጫት _____ 2. አልኮል _____ 3. ሐሽሽ/ ሸሻ _____ 4. ሲጋራ _____ 5. ሌሎች (ይጥቀሱ) _____	
12	ከላይ የጠቀስከውን/ሽን ሱስ አምጪ ነገር ለምን ያህል ጊዜ ተጠቅመሃል/ሻል?	1. ለ6 ወራትና ከዛ በታች 2. ከ6 ወራት በላይ	
13	ገንዘብ ለማግኘት ከትምህርት በፊት ወይም ከትምህርት ቤት መልስ ሥራ ትሰራለህ/ሽ?	1. አዎ _____ 2. አልሰራም _____	
14	በተከታታይ አካላዊ እንቅስቃሴ ትሰራለህ/ሽ? መልሱ አልሰራም ከሆነ ወደ...	1. አዎ _____ 2. አልሰራም _____	ጥ16
15	በየሰንት ጊዜ ነው አካላዊ እንቅስቃሴ የምትሰራው/ሪው?	1. በየቀኑ _____ 2. በሳምንት አንድ ጊዜ _____ 3. ሌላ (ይጥቀሱ) _____	
16	ከስድስት ወራት በፊት ከሁለት ሳምንታት በላይ የቆየ ህመም አሞህ/ሽ ያውቃል? አያውቅም ከሆነ ወደ ጥያቄ	1. አዎ _____ 2. የለም _____	
17	ሰንት ጊዜ ታመህ/ሽ ታውቃለህ/ቂያለሽ?	1. ከ3 ጊዜ በታች _____ 2. ከ3-5 ጊዜ _____ 3. ከ5 ጊዜ በላይ _____	

መ/ የቤተሰብ ማህበራዊና ኢኮኖሚያዊ መረጃ

ተ.ቁ	ጥያቄ	መልስ	ዝለል
18	የቤተሰብ ኃላፊ ማነው?	1. ወንድ _____ 2. ሴት _____	
19	የመኖሪያ አድራሻ የት ነው?	1. ከተማ _____ 2. ገጠር _____	
20	የእናትህ/ሽ እድሜ ስንት ነው?	_____	
21	የእናትህ/ሽ የትምህርት ደረጃ ስንት ነው?	1. አልተማርኩም _____ 2. መለስተኛ ሁለተኛ ደረጃ (7-8) _____ 3. ከፍተኛ ሁለተኛ ደረጃ (9-12/ _____ 4. ኮሌጅ/ዩኒቨርሲቲ _____	
22	ጠቅላላ የቤተሰብህ/ሽ ብዛት ስንት ነው?	_____	
23	የእናትህ/ሽ ሥራ ምንድነው?	1. የቤት እመቤት _____ 2. የመንግስት ሰራተኛ _____ 3. ነጋዴ _____ 4. ሌላ (ይጥቀሱ) _____	
24	የቤተሰብ የወር ገቢዎ ስንት ነው (በብር)? (ከቤተሰብ)	_____	
25	አሁን ያለውን የጋብቻ ሁኔታ ይገልጹልኛል?	1. ያላገባ _____ 2. ያገባ _____ 3. የተፋታ/የሞተበት _____ 4. ሌላ (ይጥቀሱ) _____	
26	ሀይማኖቱ ምንድነው?	1. ኦርቶዶክስ _____ 2. ካቶሊክ _____ 3. ሙስሊም _____ 4. ፕሮቴስታንት _____ 5. ሌላ (ይጥቀሱ) _____	

ተ.ቁ	ጥያቄ	መልስ	ዝለል
27	ብሄርዎ ምንድነው?	1. አሮሞ _____ 2. አማራ _____ 3. ትግሬ _____ 4. ጉራጌ _____ 5. ሌላ (ይጥቀሱ) _____	
28	የመፀዳጃ ቤት አልዎት? መልሱ ለም ከሆነ ወደ ጥያቄ	1. አዎ _____ 2. የለም _____	32
29	የመፀዳጃ ቤቱ አይነት ምንድነው?	1. ሽታ አልባ ያልሆነ ሽንት ቤት__ 2. ሽታ አልባ ሽንት ቤት_____ 3. በውሃ የሚሰራ_____	
30	ውሃ ከቤት ነው የሚጠቀሙት?	1. ከወንዝ _____ 2. ከቧንቧ _____ 3. ከጊድጓድ _____ 4. ከሌላ (ይጥቀሱ) _____	
31	ቆሻሻ የት ነው የሚጥሉት?	1. ሜዳ ላይ _____ 2. የጋራ ማጠራቀሚያ _____ 3. የግል ማጠራቀሚያ _____ 4. በማቃጠል _____ 5. በመቅበር _____ 6. ሌላ (ይጥቀሱ) _____	

Ragaa walii galaa

Qo'annaaf waliigaltee qophaahe

Qo'annaaf waliigaltee qophaahe

Dargagotaaf Hanqinaa nyaataa ilaalchisee ragaa barbaachisan sasaabuuf kan qophaahee Aanaa Buraayuu ,naanno oromiyaa ,Gidugala Ethiopia.

Jimma 2003 kan ragaan itti sasaabamu

Nannoo: Oromiyaa

Aanaa:Buraayuu

Sensa: Ani maqaan koo _____kaniin jedhamu hojii Hanqinaa nyaataa **dargagotaa**

Aanaa Buraayuu ,naanno oromiyaa ilaalchisee ragaa barbaachisan sasaabuu irrattii kanin hojadhudha. Kanaafu ati qorannoo kan irrattii raga kennuun hurmachuuf filatamtee jirta.

Bu'aan qorannoo kanaa wa'ee hanqina nyaataa dargagootaatiif akka biyaatis ta'e akka nannootti karoora basuufi hojii irra olchuuf gahee ol'annaa qaba. Kanaaf amma gaafifwwan sigaafadhuufi safari ulfina fi dheerina fedhii kee sigaafachaa ragaan siraa fudhanuu hundii iciitiin kan egamuudha akasumas maqaan kee as keesa hin galu.

Amma gafiwwan hunda akka naaf debistu kabajaan si gaafachaa yeroo kamituu gafii deebisuu yoo hin barbaanee dhisuu mirga keetii.

Rakkoo hanqina nyataa dargagootaa gadifageenyaan hubachuuf ragaan atii dhugaa irratti hundoftee nuuf deebistu murteesaadha

Raga kana gutuuf waligala daqiqaa 20-30 fudhachuu danda'a.kanaaf hurmaanaa keetiif nu haayamta [✓]

Eye -----

Lakii -----

Guyyaa _____

Univarsiitii jimmaa kollejjii fayyaa haawwasaa fi saayiinsii yaalaa kutaa barrnoota Ipidimooloogy.

7.2 Unkaa ragaa gafatamuu fi safari dherinaa fi ulfina ittii gutamu Hubachisa

- A. Hirmaatoonii hundinuu waligaluu isaanii waligaltee armaan oliti ibsamee dubisuu mallatoon mirkaneesuu.
- B. Hirmatotaaf gaffiiwwan hunda siritti ibsiif
- C. Gaaffii sirii gutii yookiin mallattoo “√” kaahii
- D. Meshaa ulfinaa fi dheerini ittin safaramu yeroo hunda sirii hojachuu isaa mirkaneefadhuu.
- E. Dhumaratii unkaan qophahee hundii siriitii gutamuu isaa mirkaneefadhuu.

Guyyaa ragaan itti kenamee _____ koodii raga sasaabaa/du _____

Lakk manaa _____ koodii raga kenaa _____

A) Ragaa qaama safaruun guutaman

Lak.	Gaaffii	Deebii	Irra darbuu
1	1.Dhhrina (sm)	_____	
2	2.Ulfaatina (Kg)	_____	
3	3. Ulfaatina Kg/ dhhrina m ² / “BMI” (Kg/M ²)	_____	

B) Ragaa walii galaa

Lak.	Gaaffii	Deebii	Irra darbuu
4	Umrii/ganni kee meeqa?	_____	
5	Saala	1. Dhiira _____ 2. Dubartii _____	
6	Ati maati keetiif ijoollee meeqaaffaati?	1. Kan jalqabaati _____ 2. 2-6 gidduu _____ 3. 7+ _____	
7	Hangafa yokn quxisuu yoo qabaatte gidduun keessanitti ji'a meeqa?	1. Kan jalqabaati _____ 2. Ji'a 24 gadi _____ 3. 24-47 gidduu _____ 4. 48+ _____	
8	10. Haala fuudhaa fi heerumaa yeroo ammaa kee?	1. Kan hin heerumne/fuune _____ 2. Kan heerumte/fuudhe _____ 3. Kan addaan bahan/kan jalaa duute _____ 4. Kan biro yoo jiraate ibisi _____	
9	Sadarkaan Barumsa keetii hammami?	1. Hin baranne _____ 2. Sadarkaa tokkoffaa (1-6) _____ 3. Sadarkaa giddu galeessaa (7-8) _____ 4. Sadarkaa lammaffaa (9-12) _____ 5. Kolleejjii/Universitii _____	

C) Gaaffiiwwan amalaa fi sochii nama raga keenu irraa funaanamu

Lak.	Gaaffii	Deebii	Irra darbuu
10	Hamma ammaatti araada waan fiduu danda'an itti fayyadamtee beekta? Deebiin yoo lakki ta'e gaffi	1. Eeyyen _____ 2. Itti hin fayyadamne _____	13tii
11	Kanneen armaan gadii keessaa kamitti fayyadamtee beekta (tokkoo ol deebisuun ni danda'ama)	1. Jimaa _____ 2. Dhugaatii nama macheessan _____ 3. Hashiisha/shiishaa _____ 4. Tamboo _____ 5. Kan biroo yoo jiraate ibis _____	
12	Kan gara oliitti ibsame yeroo hammamiif fayyadamte?	_____	
13	Mallaqa argachuuf barumsaan dura ykn barumsaan booda ni hojjattaa?	1. Eeyyen _____ 2. Lakki _____	
14	Sochii qaamaa itti fufiinsaan ni gootaa? (deebiin yoo hin hojjadhu ta'e gara gaaffii	1. Eeyyen _____ 2. Hin hojjadhu _____	16tii
15	Yeroo meeqaan sochii qaamaa gootaa?	1. Guyyaa guyyaadhan _____ 2. Torbaanitti al tokko _____ 3. Kan biroo yoo jiraate ibsi _____	
16	18. Ji'a jahan dabre duraatti si dhukkubee beekaa? Deebiin yoo lakki ta'e gaffi 20tti dabri	1. Eeyyen _____ 2. Lakki _____	
17	Yeroo meeqa si dhukkubee beeka	1. Yeroo 3 gadi 2. 3-5 gidduu _____ 3. 5ni ol _____	

D) Raga haala jireenya maatii

Lak.	Gaaffii	Deebii	Irra darbuu
18	Umriin/ganni kee yeroo ammaa meeqa? Ogaa xuumurten	_____	
19	Haala fuudhaa fi heerumaa yeroo ammaa?	1. Kan hin heerumne/fuune _____ 2. Kan heerumte/fuudhe _____ 3. Kan addaan bahan/kan jalaa duute _____ 4. Kan biro yoo jiraate ibisi _____	
20	Maatiin keessan walii galaan meeqa?	_____	
21	Abbaa warraa manaa eenyu?	1. Dhiira _____ 2. Dubartii _____	
22	Bakki jireenya keessani eessa?	1. Magaalaa _____ 2. Baadiyaa _____	
23	Sadarkaan Barumsaa kee hammami?	1. Hin baranne _____ 2. Sadarkaa tokkoffaa (1-6) _____ 3. Sadarkaa giddu galeessaa (7-8) _____ 4. Sadarkaa lammaffaa (9-12) _____ 5. Kolleejjii/Universitii _____	
24	Hojiin kee maali?	1. Hadha manaa _____ 2. Hojjattu mootummaa _____ 3. Daldaltuu _____ 4. Kan biroo yoo jiraate ibis _____	
25	Galiin maati keeti kan ji'aa meeqa mallaqaan)?(warra irraa)	_____	

Lak.	Gaaffii	Deebii	Irra darbuu
26	Amantiin kee maali?	1. Ortodoksii _____ 2. Muslima _____ 3. Proteestaantii _____ 4. Kan biro yoo jiraate ibisi _____	
27	Sabni/sablammiini kee maali?	1. Oromoo _____ 2. Amaaraa _____ 3. Tigree _____ 4. Guraagee _____ 5. Kan biroo yoo jiraate ibis _____	
28	Mana fincaani ni qabduu? Deebiin isaa yoo lakkii yoo ta'e gara gaffii 36tti dabri	1. Eeyyen _____ 2. Lakki _____	32
29	Gosti mana ficaani maali?	1. Mana fincaani fooli qabu/kan aadaa _____ 2. Mana fincaani fooli hin qabne _____ 3. Mana fincaani bishaaniin hojjatu _____	
30	Bishaan dhugaati eessa fayyadamtu?	1. Lagaa _____ 2. Tubboodhan kan dhufu _____ 3. Boolla keessaa _____ 4. Kan biroo yoo jiraate ibsi _____	
31	Balfa eessatti gattu?	1. Badhee irratti _____ 2. Boolla balfaa walii galaa _____ 3. Boolla balfaa dhuunfaa _____ 4. Ni gubna _____ 5. Ni awwaalla _____ 6. Kan biroo yoo jiraate ibis _____	

DECLARATION

ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the college of public health and medical sciences in effect at the time of grant is forwarded as the result of this application.

Name of the student: - Abebe Alemu

Date. 30/10/2003 Signature [Signature]

Name of first advisor: - Fasil Tassama

Date. 8/12/11 Signature [Signature]

Name of second advisor: - Kifle Woldemichael

Date. _____ Signature [Signature]

Name of internal examiner: - Mohammed Taha

Date. _____ Signature [Signature]