ADDIS ABABA UNIVERSITY

FACULTY OF MEDICINE, COMMUNITY HEALTH DEPARTMENT

Prevalence and Determinants of Child Malnutrition In Gimbi district, Oromia region, Ethiopia

Comparative Cross - Sectional study

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Declaration

I the undersigned, declare that this thesis is my original work, has never been presented in this or any other University, and that all the resources and materials used for the thesis, have been duly acknowledged.

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Acronyms

ANC; Anti Natal Care

ARI; Acute Respiratory Illness

BMI; Body Mass Index

CDC; Centre for Disease Control and prevention

CI; Confidence Interval

DHS; Demographic and Health Survey

FGD; Focus Group Discussion

H/A; Height-for-age

HAZ; Height for age Z score

HH; House Hold

MOH; Ministry of Health

MUAC; Mid-upper Arm Circumference

NCHS; National Centre for Health Statistics

OR; Odds Ratio

AOR; Adjusted Odds Ratio

PEM; Protein-Energy Malnutrition

SD; Standard Deviation

UNICEF; United Nations Children's Fund

W/A; Weight-for-Age

WAZ; Weight for Age Z score

WFP; World Food Program

W/H; Weight-for-Height

WHZ; Weight for Height Z score

WHO; World Health Organization

Abstract

Child malnutrition is one of the most serious public health problem in the developing world including Ethiopia. Recent survey in the country show that 38% of children are underweight, 10.5% wasted and 46.5% are stunted. However, underlying variations of these nutritional indicators and determinant factors among regions and localities is poorly understood.

The main objective of the study was to assess the prevalence of child malnutrition and identify the various causes and their relative contributions in urban and rural settings.

A comparative cross sectional study was conducted in Gimbi district, Oromia region on a total of 490 children (310 from rural and 180 from urban areas) of age 6-59 months in March 2007. A multistage systematic sampling method was employed to collect quantitative data using structured questionnaire and anthropometric measurements. The study variables include; socio-economic and demographic characteristics, child and maternal related variables and environmental health conditions.

Data were processed using EPi-info soft ware and exported to SPSS for analysis. NCHS reference population standard of WHO utilized to convert height and weight measurements into Z-scores of the H/A, W/H and W/A indices considering age and sex of the children. Bivariate and multivariate logistic regression analysis methods were used to identify determinants of nutritional status and to account for potential confounding factors.

The result of the study indicated that 15.9 percent of the children were wasted, 32.4 percent were stunted, and 23.5 percent underweight. Prevalence of severe wasting, stunting and underweight respectively were 5.7%, 15.7%, and 8.0%. No significant variation of child malnutrition by residence was observed.

Main determinant factors of wasting were childhood illness indicated by fever, low household income and maternal lack of education. Low birth size of children, paternal lack of education, maternal lack of decision making on use of money and lack of animals were associated with

chronic malnutrition (stunting). ARI in children, lack of windows of houses and low maternal BMI (<18.5) are most important determinants of under weight.

Rural resident children were more exposed to nutritional risk factors than their urban counterparts.

This study indicated that acute nutritional problem is highly prevalent in the area and chronic nutritional problem is also of particular concern. It is recommended that prevention and treatment of childhood illness should be enhanced and therapeutic feeding centers be established in short term. More over, women empowerment and efforts to alleviate poverty are crucial if the problem of malnutrition is to be solved in the long run.

1. BACKGROUND

Malnutrition continues to be a major public health problem in developing countries. It is the most important risk factor for the burden of disease causing about 300, 000 deaths per year directly and indirectly responsible for more than half of all deaths in children (1, 2).

Much of the burden of deaths resulting from malnutrition, estimated to be over half of childhood deaths in developing countries, can be attributed to just mild and moderate malnutrition, varying from 45% for deaths due to measles to 61% for deaths due to diarrhea(3). It's estimated that 53 percent of deaths among pre-school children in the developing world are due to the underlying effects of malnutrition on diseases such as measles, pneumonia, and diarrhea.

In Ethiopia, child malnutrition rate is one of the most serious public health problem and the highest in the world (4). High malnutrition rates in the country pose a significant obstacle to achieving better child health outcomes. Underweight and stunting rates among young children are the highest in sub-Saharan Africa (17, 18). About two in five children (38%) are underweight, 10.5% of the children are wasted (2.2% are severely wasted) and 46.5% of the children are stunted that half of them are severely stunted (5). Other earlier studies in specific localities also indicated that prevalence of wasting; 12-13, stunting; 45-46.7 and underweight; 42-44 percents (16, 29).

In Oromia region prevalence of child malnutrition indicated that 34.4% are underweight with 11% severe underweight, 9.6% of the children are wasted (2.4 % severe wasting) and 41 % of the children are stunted with 21.8 sever stunting (5).

Rationale and Significance

As nutritional status can vary by background characteristics, there is a need to investigate underlying variations of these nutritional indicators and determinant factors among regions and localities or residence for proper priority setting and interventions.

While the problem of malnutrition in Ethiopia is relatively well documented, their specific determinants particularly with regard to the relative contribution of different factors for the nutritional status of children is not well addressed (4,11). National surveys and most small scale studies on child nutrition were descriptive in nature and limited to analysis of association between nutritional status and related variables (15).

In the study area a number of cases of severely malnutritioned cases come to Gimbi Adventist hospital for treatment. These cases were admitted directly to hospital wards along with all other cases. There is no therapeutic feeding center in the hospital or the district to properly treat cases.

To improve the nutritional status and improve living conditions in communities, it is necessary to determine the nature, magnitude and cause of malnutrition. Broad analysis of causes of malnutrition is required before action.

The result of this study, which specifies the prevalence of child malnutrition with these various causes and their relative contributions by residence, can serve as reference in priority setting, designing effective nutritional programs to address the problem and its consequences, in monitoring and evaluation of the impacts of programs and for policy responses specifically tailored to the needs of different population groups.

2. LITERATURE REVIEW

Nutritional status is the best global indicator of well-being in children. Child malnutrition is also an important indicator of monitoring progress towards the millennium development goals (MDGs); to reduce by 2015, child malnutrition of age under five years by at least one third, with special attention to children under two years of age.

Seven of the Millennium Development Goals (MDG's); to eradicate extreme poverty and hungry, achieve universal primary education, promote gender equality and empower women , reduce child mortality, improve maternal health, ensure environmental sustainability, and combat HIV/AIDS, malaria and other diseases are directly related to nutrition.

Healthy child growth and development is the basis of human development. The impact of malnutrition is multifarious. It has an all-pervasive impact on the physical well-being and socioeconomic condition of a nation. It perpetuates poverty through direct losses in productivity, indirectly losses from poor cognitive function, poor child development and deficits in schooling and losses due to increased health costs (20, 23).

The mainstreaming of nutrition in health and development entails that the strategy will be comprehensive and holistic, incorporating biological and social determinants through a multi-sectorial response that needs to be at the centre of the nexus of government, the private sector, civil society and international cooperation efforts (20).

Child malnutrition as poverty indicator is a comprehensive indicator which is reflective and indicative of other desirable outcomes of development i.e improvement in gender empowerment, intra-household distribution and equality, and health environment quality (26).

Good nutrition is the cornerstone for survival, health and development for current and succeeding generations. Well-nourished children perform better in school, grow into healthy adults and in turn give their children a better start in life.

Undernourished children have lowered resistance to infection; they are more likely to die from common childhood ailments like diarrhoeal diseases and respiratory infections, and for those who survive, frequent illness saps their nutritional status, locking them into a vicious cycle of recurring sickness and faltering growth. Their plight is largely invisible: three quarters of the children who die from causes related to malnutrition were only mildly or moderately undernourished, showing no outward sign of their vulnerability.

The pattern of malnutrition in Africa is quite distinct. The prevalence of stunting declined from 40.5% in 1980 to 35.2% in 2000, a decrease of only 0.26 percentage points per year. The highest level of stunting is found in Eastern Africa, where, on average, 48% of preschool children are currently affected. In this region, stunting has been increasing at 0.08 percentage points per year.

In sub-Saharan Africa the absolute numbers of malnourished children are expected to be increasing to 128 million under an optimistic scenario, in which improvements in the determinants is accelerated, by 2020.

A sharp regional shift in the location of child malnutrition is projected; South Asia's share of total numbers of children will fall from 51% to 47%, but sub-Saharan Africa's share will rise from 19% to near 35 %(10)

Causes of mal-nutrition

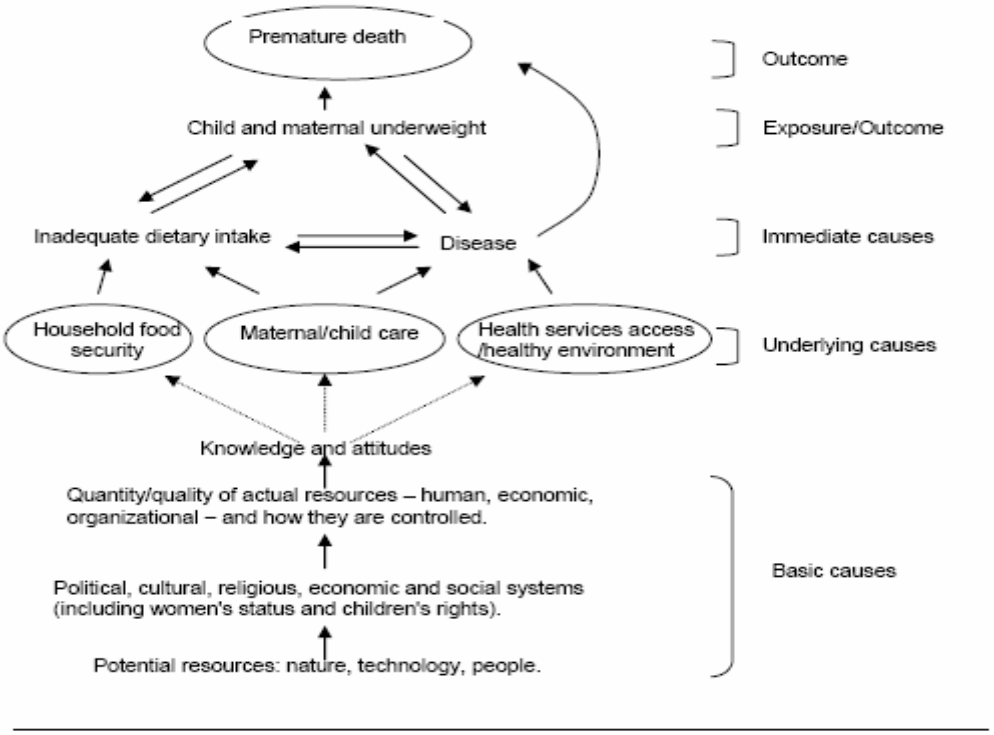
The causes of malnutrition are numerous and multifaceted. These causes are intertwined with each other and are hierarchically related. The most immediate (proximate) determinants are poor diet and disease which are themselves caused by a set of underlying factors; household food security, maternal/ child caring practices and access to health services and healthy environment.

These underlying factors themselves are influenced by the basic socio-economic and political conditions (1, 9) (Fig.1).

Malnutrition due to deficiencies and to excesses is strongly correlated with social and economic inequalities (20). In Sub-Saharan Africa, extreme poverty, inadequate caring practices for children, low levels of education and poor access to health services are among the major factors causing under-nutrition. Conflicts and natural disasters in many countries have further exacerbated the situation.

The increase in the number of undernourished children in Africa also reflects a rapid rate of population growth while the devastating effects of HIV/AIDS, particularly in the second half of the decade, have reversed some of the gains made in the decade's early years (1).

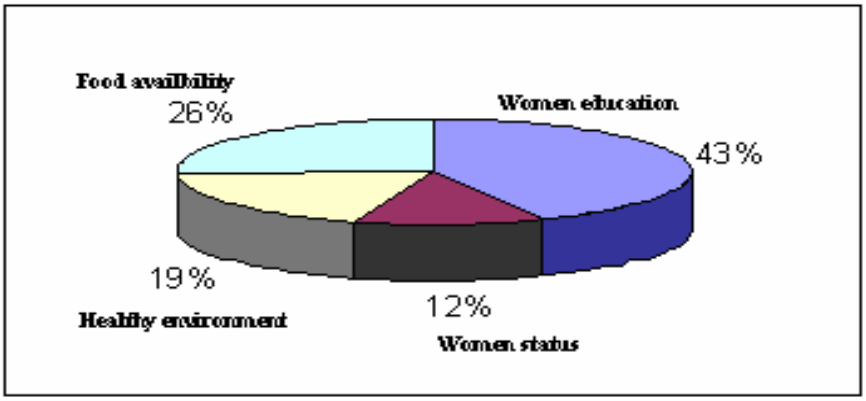
Figure 1 | Causal framework for child malnutrition[a]



[a] Adapted from UNICEF (1990).

Study from the experience of 63 developing countries over 25 years period on determinants of child malnutrition across different regions found four strong determinants; women's education, national food availability, women status and health environment quality. The greater contribution of women's education and status was mentioned to contribute; over 50 % percent of reduction in child underweight (Fig.2) (10).

Fig. 2 Estimated contributions of underlying determinants to reducing under-weight rate in the Developing country 1970-95



The underlying causes of under nutrition vary across regions. Large disparities exist for underweight prevalence among urban and rural children in the developing world, Significant disparities exist between rich and poor children, on average poor children are twice as likely to be underweight as rich children, and little difference in underweight prevalence exists between boys and girls. (6)

In many developing countries, especially in Africa, where climatic seasonality governs agricultural production, food availability is not constant throughout the year. These subsistence farming communities experience various food-insecure periods during each production year. Such seasonal variations in food production and fluctuations in prices of foods could be considered as contributing to transitory food insecurity of poor households, which over time, escalate into chronic food insecurity and nutritional deterioration(22)

Measuring malnutrition

A Variety of methods are commonly used for assessing the nutritional status of populations based on anthropometric, clinical, dietary and biochemical measurements. Anthropometric measurements (body dimensions and composition) are often used as proxies for assessing the eventual extent and severity of malnutrition.

They are strong and feasible predictors at individual and community level of subsequent ill health, functional impairment and/or mortality. Anthropometry-based nutritional assessment has the advantage of being a universally applicable, inexpensive and non-invasive method. This procedure is also applicable to large sample sizes and helps to identify target groups of population for intervention, as a tool for nutritional surveillance, and in evaluation of success or failure of interventions directed towards economic and environmental factors underlying nutritional deprivation (4, 5, 12, 14, 26)

The most commonly used anthropometric measurements are four; body weight, height, age and sex of each individual, which allow to calculate the following indices:

Weight-for-age; reflects body mass relative to chronological age;

Often used if the child is normal, under or over weight. It is a simple index but does not take height into account. It is influenced by both the height (height-for-age) and weight (weight-for-height) of a child and its composite nature makes interpretation complex. For example, weight-for-age fails to distinguish between short children of adequate body weight and tall, thin children. However, in the absence of significant wasting in a community, similar information is provided by weight-for-age and height-for-age as both reflect the long-term health and nutritional experience of the individual or population.

Under weight is the most common assessment of child nutrition status. It is a good indicator for child under two years because of the need to do precise measurement of weight for these age groups.

Weight-for-height; reflects body mass relative to height;

It is a measure of acute or short term exposure to a negative environment. It is sensitive to calorie intake or the effects of disease. Wasting (thinness) reflects a deficit in tissue and fat mass and indicates that the child don't weigh as much as they should for their height. In most cases a recent and severe process of weight loss, which is often associated with acute starvation and/or severe disease. It is the first response to nutritional and/or infectious insult. However, wasting may also be the result of a chronic unfavorable condition.

Provided there is no severe food shortage, the prevalence of wasting is usually below 5 percent, even in poor countries. A prevalence exceeding 5 percent is distressing given a parallel increase in mortality that soon becomes apparent. On the severity index, prevalence rates between 10-14 percent are regarded as serious, and above or equal 15 percent as critical. Typically, the prevalence of low weight-for-height shows a peak in the second year of life.

Height-for-age; reflects height relative to chronological age;

It is used to tell if a child is the normal height for age. Stunted growth (shortness) reflects failure to reach linear growth potential (pre and post natal) as a result of sub-optimal health and/or nutritional conditions. On a population-wide basis, high levels of stunting are associated with poor socio-economic conditions and increased risk of frequent and early exposure to adverse conditions such as illness and/or inappropriate feeding practices. It is assumed to indicate long term, cumulative effects of inadequate nutrition and poor health status. It is a measure of past nutrition condition.

The world-wide variation of the prevalence of low H/A is considerable, ranging from 5 percent to 65 percent among the less developed countries. In many such settings, prevalence starts to rise at the age of about three months; the process of stunting slows down at around three years of age, after which mean heights run parallel to the reference curve.

Therefore, the age of the child modifies the interpretation of the findings: for children below 2-3 years, low H/A probably reflects a continuing process of "failing to grow" or

"stunting"; for older children, it reflects a state of "having failed to grow" or "being stunted".

For children under age five, the Z-score classification system is used for population-wide assessments including surveys and nutrition surveillance. For consistency with clinical screening, prevalence-based data are commonly reported using cut-off values, usually at minus two and plus two Z-scores from the median in the reference population. This implies that slightly more than 2 percent of the reference population will be classified as "malnourished" even if they are truly "healthy" individuals with no growth impairment.

Choice of the indexes

For rapid assessment of food crisis assessment the measurement of wasting alone would provide sufficient information. It is also the best index when difficult to determine the exact age of the children being measured.

For designing what type of program is needed in specific area all three indexes of anthropometric measurements may need be collected.

In programs or projects where intervention impacts are expected with in a short period of time (like food supplementation, fortification, stamp, school lunch program etc), by order of sensitivity, the indexes are wasting, underweight and stunting. For interventions not expected to be immediate (more than 3-6 years) the reverse order could help to capture impact (26).

Addressing Child malnutrition

Causes of childhood malnutrition are a complex issue that requires tackling on a wide number of fronts. To mention some of them: (9)

- Ensuring food security for poor households; enough food and the right kinds of food
- Educating families to understand the special nutritional needs of young children, notably the value of breastfeeding and the importance of introducing suitable complementary foods at the right age
- Protecting children from infections, by such measures as immunization against common childhood diseases and provision of safe water and sanitation;
- Ensuring that children receive quality care when they fall ill
- Shielding them from the micronutrient deficiencies that can bring death and disability, especially iodine, iron and vitamin A deficiencies
- Paying special attention to the nutritional needs of girls and women, since chronically undernourished women tend to bear low-birth weight babies and so perpetuate the vicious cycle of under-nutrition into the next generation

Any comprehensive strategy for resolving the problem of child malnutrition must include actions to address both its underlying and basic causes. Efforts to improve women's education, bolster women's status, raise food supplies (or reduce population growth or both), and create healthful environments should be an integral part of strategies for reducing child malnutrition (13).

Also, interventions including income generation and nutritional education to maternal support, food supplementation and food price subsidies and high immunization coverage and early and correct management of cases of infectious disease play major roles in the prevention and treatment of PEM. In poor communities, the treatment of helminthes infections three times per year improved child growth and development (1).

3. OBJECTIVE OF THE STUDY

General objective

The overall objective of the study was to assess prevalence and determinants of malnutrition among children of age 6-59 months in urban and rural settings of Gimbi district, Oromia region, Ethiopia.

Specific Objectives

- To determine prevalence of PEM in under five year children.
- To identify determinants of child malnutrition in the study area.
- To compare prevalence and determinants of child malnutrition by residence.

4. METHODOLOGY

4.1 Study design; Comparative cross-sectional quantitative study design.

4.2 Study area and period

The study is conducted in Gimbi district including Gimbi town, West Wollega zone of Oromia regional state, in March 2007.

Gimbi district has 87,056 population residing in 32 rural kebeles and Gimbi town, centre for the zone. Gimbi district, has 51,384 population living in four kebeles. It is located in western part of the country at a distance of 440 Kilometer from Addis Ababa.

Gimbi district is a mountainous area with full of ups and downs topography and it covers 113,818 hectare of land area. There are three agro-ecological zones in the district in a range of 1100-2100 meter altitude. The majority classified (72%) as midland, 18.75% as high land and the rest as low land. It is a coffee growing area that most of the farmers are based solely on this farming and buy food items from market. There is a seasonal vulnerability of the peoples to malnutrition influenced by coffee harvest condition.

4.3 Source and Study population

Source population was children under five years age living in the district (rural and urban) and the study population was children of age 6-59 months randomly included in the study.

Inclusion criteria

Children who were living in the area since their birth and not seriously ill /hospitalized/ for sickness were selected for the study.

4.4 Sampling and Sample Size

The study employed multi-stage sampling scheme using stratified, simple random and systematic sampling. First, the study area was stratified in to urban and rural kebeles and then a total of six kebeles were randomly selected; two from urban and four from the rural kebeles considering agro ecological areas. Systematic sampling method was applied to select study participants.

Sample size

Applying two proportion sample size determination and taking the national prevalence of underweight of the rural area 40 % and 23% for the urban area (DHS 2005) and a 95% confidence interval, the sample size would be;

$$\frac{(z_{1-\alpha/2}\sqrt{2p(1-p)} + z_{1-B}\sqrt{p_1(1-p_1) + p_2(1-p_2)})^2}{(p_2 - p_1)^2}$$

Where P= (P1+P2)/2, P1=0.40, P2=0.23 Power of at least 80% , i.e (1-B) =0.80, $Z_{1-B} = 0.84$

$$\rightarrow \frac{(1.96\ \ 2\ (0.32)\ (0.68)} + 0.84\sqrt{(0.40)\ (0.60) + (0.23)\ (0.77)})^2$$

$$(0.23\text{-}0.40)2$$

n = n1+n2= 235 total samples

Considering design effect of 2=235*2 = 470 and allowance for possible non-response rate of 5% makes the final sample size;470+23= 493 HHs.

Using proportional allocation to the rural and urban based on population; 311(63%) samples from the rural kebeles and 182(37%) samples from the urban kebeles was selected.

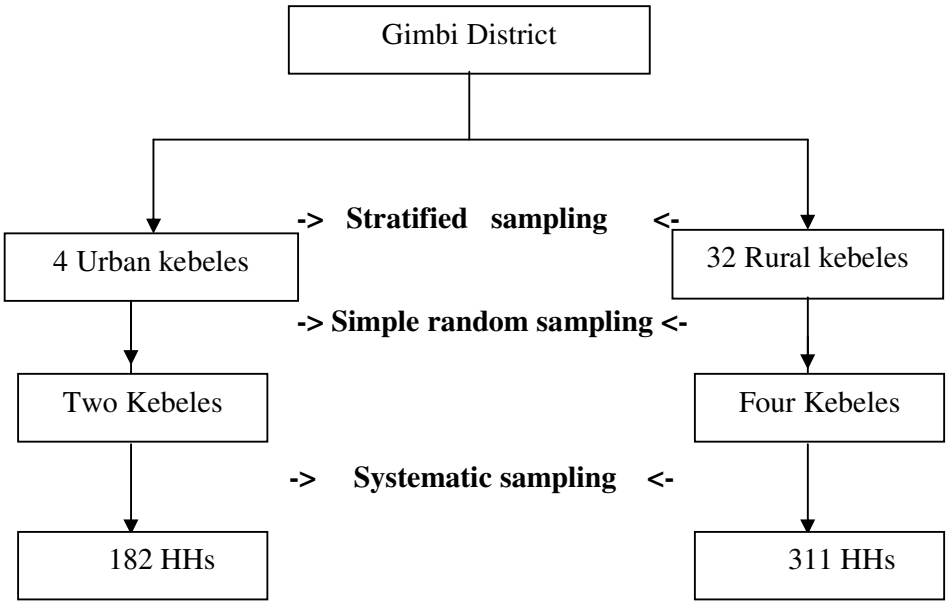


Fig.2 Schematic presentation of sampling frame

4.5 Study variables

Indicators (Dependent variable)

Prevalence of stunting, wasting and underweight as determined by anthropometric measurements of weight and height taking age and sex into consideration.

Independent variables

Five categories of factors were assessed as independent variables;

- *Socio-economic and demographic variables*; type of family, family size, income, maternal/paternal education and occupation and presence of cattle
- *Child characteristics*; Age, Sex, birth order, birth size/wt and morbidly status.
- *Child caring practices*; feeding, hygiene, health care seeking and immunization
- *Maternal Caring and characteristics*; age, height, nutrition awareness, number of children ever born, ANC visits, pre-pregnancy weight, health status during pregnancy, use of extra food during pregnancy or lactation and autonomy in decision-making
- *Environmental Health condition*; Water supply, sanitation and housing conditions

4.6 Data Collection

Data were collected using structured questionnaire and anthropometric measurements.

Ten data collection team members including the principal investigator were involved in the data collection. They were recruited from Gimbi Adventist Hospital located in the district. The data collectors have completed secondary education and have experience on administrative work and the supervisors are health professionals working in the hospital.

Both the interviewers and supervisors were trained for three days from March 06 to 08/2007 on objective and methodology of the research, data collection and interviewing approach, anthropometric measurement and data recording.

Interview was conducted with mothers of the children to fill the questionnaire and where impossible to get them or there was refusal next HH was considered for the study. In households with more than one children of age between 6-59 months, one child was selected randomly.

Weight was measured with minimum clothing and no shoes using a Salter spring scale and beam balance in kilogram to the nearest of 0.1 kg.

Measurement of height (length) was done in a lying position with wooden board for children of age under two years (below 85 cm) and for children above two years stature is measured in a standing position in centimeters to the nearest of 1cm. Only children under 110 cm (proxy for 5 year) and over 65 cm (proxy for 6 month were questioned to ascertain age using detail season calendar.

MUAC was measured on left mid upper arm to the nearest 1mm and the result was recorded for both children and their mothers. Only bilateral edema was considered to be an indicator of sever acute malnutrition (kwashiorkor). Edema was assessed by applying medium thumb pressure on upper side of both feet for three seconds. It was diagnosed if a bilateral depression (pitting) remained after the pressure was released.

To identify retrospective morbidity of children, mothers were asked about any occurrence of illness during the past two weeks. Enumerators probe to confirm nature of illness based on operational case definition and also ask to identify occurrence of measles in the past one year.

Vaccination status of children checked by observing immunization card and if not available mothers were asked to recall it. BCG vaccination was checked by observing scar on right (also left) arm.

4.7 Data Quality Management

Questionnaire prepared in English was translated into Oromic language for field work purpose and back to English for checking language consistency.

Pre-test was done before the actual data collection to see for the accuracy of responses and to estimate time needed. Weighing scales were calibrated with known weight object regularly. The scales indicators was checked against zero reading after weighing every child.

On daily basis collected information was reviewed and possible errors were returned to the collectors for correction. Epi-info, Epi-Nut soft ware was used to flag out of range values or errors while data processing.

4.8 Data processing and Analysis

First the data checked for completeness and consistency. Then it was coded and entered in the computer using EPI6 software. The soft ware has a program (Epi-Nut) to convert nutritional data into Z-scores of the indices; H/A, W/H and W/A taking age and sex into consideration using NCHS reference population standard of WHO.

Then, the data exported to SPSS program for analysis; descriptive summary using frequencies, proportions, graphs and cross tabs used to present study results. P-value less than 0.05 was considered as statistically significant.

Bivariate and multivariate logistic regression analyses, based on UNICEF's analytical framework, were conducted to identify determinants of nutritional status i.e independent variables that had a significant role in influencing nutritional status and to account for possible confounding factors using SPSS standard ENTER method.

4.9 Ethical consideration

Ethical clearance was obtained from AAU, faculty of Medicine and the local authorities were informed about the study objectives through letter written from Gimbi Adventist hospital to study kebele administration offices to enhance cooperation.

Verbal consent was taken from each selected participant to confirm willingness. Honest explanation of the survey purpose, description of the benefits and an offer to answer all inquires was made to the respondents. Also affirmation that they are free to withdraw consent and to discontinue participation with out any form of prejudice was made.

Privacy and confidentiality of collected information was ensured through out the process; Data collected in a way that makes it impossible or at least very hard to identify the respondent and question that contain information that could be used to identify the surveyed HH or persons were removed.

Sick and severely malnourished children were referred to health facilities and health/nutritional advice was also given to parents.

To ensure efficiency of the survey; information was collected with the least burden to the respondents and justifiable budget. Relevant information which is wanted by the communities and organizations dedicated to improving the nutritional and general basic needs situation were collected.

The investigator has commitment that finding's will be used later to improve the nutritional situation and living conditions of the target population

4.10 Operational Definitions

Acute Respiratory Illness; A child with cough and fast breathing or difficulty in breathing

***Complementary foods*;** are foods which are required by the child, after six months of age, in addition to sustained breastfeeding.

Diarrhea; A child with loose stools for three or more times in a day and a sign of dehydration

Family size; refers total number of people living in a house during the study period.

Fever; A child with elevated body temperature than usual

Income; It is periodical monthly earning from one's business, lands, work, investment etc

Malnutrition; refers to under nutrition or deficiency in protein-energy nutrition.

Measles; A child with fever, generalized rash and conjunctivitis (red eyes)

Stunting: H/A that is less than the international median NCHS/WHO reference value by more than two standard deviations below -3SD is severe stunting.

Sever wasting; W/H below -3SD or less than 70% of the median NCHS/WHO reference values.

Underweight: W/A that is less than two SD below the international median NCHS/WHO reference value.

Wasting: W/H less than the international median NCHS/WHO reference value by more than two SD.

5. RESULTS

5.1 Demographic and socio-economic conditions

From the total 493 planned study subjects, complete response was obtained for 99.4%. As indicated in Table 1, female headed HHs were 8.6 percent (urban 10.6%, rural 7.4%) and 90.6% of respondent were married.

Average family size was 5.2 persons (1.74 SD) while 37.1% of the HHs have more than five family size. About 34.3% of the HHs had two under five year children and 2 percent of the HHs had three under five year children. There was no significant variation of these demographic conditions by residence.

Occupations of the heads of the households were farming (40%), daily laborer (25 %), government employee (17%) and merchants (10.5). About 16.4 % of the mothers had a job; merchant (6.6%), government employee (4.5%) and daily laborer (5.3%).

Majority of the respondents were Oromo ethnic group (95.7%) and their religion was; 39.2% Orthodox Christian, 54.7% Protestants, 4.7% Muslim and 1.4% catholic.

About 81% of the HHs earn monthly income of less than 500 birr (91.6% in rural and 62.8% in urban). Average income in urban and rural area was 586 birr (717 SD) and 262 birr (244 SD) respectively.

There is a significant variation by residence that urban resident HHs were 6.5 times more likely to get above 500 birr in a month than rural residents (OR:= 6.5, 95%CI: 3.9 - 10.7). Decision on use of money made only by fathers in 24 (5%) HHs and in rural area fathers decision was three times higher than in urban area.

Farm land ownership in the rural area was 56.5% and 68% of these land owners had 0.5 or less hectare area. Animal ownership was 48.4% (34.4% in urban and 56.5% in rural) and urban residents are 2.5 times more likely to lack animal than rural residents (OR=2.5, 95% CI: 1.7-3.6).

Regarding educational status 44.0 % of the mothers (27.8 % in urban and 54% in rural) and 27.8 % of the fathers (17.1% in urban and 34.0% in rural) did not attend formal education. Secondary and above level education was attended by 65.4% and 40.6% of mothers and

77.5% and 71.1% of fathers in urban and rural area respectively.

Lack of formal education of mothers in rural area is three times higher than those from urban area (OR=3.0, 95%CI: 2.0 - 4.5) and mothers who attended secondary and above educational level are 2.8 times higher in urban than rural area (OR=2.8, 95%CI:1.7 - 4.5).

Similarly, fathers in urban areas were 2.5 times higher in formal education attendance than fathers in rural areas (OR=2.5, 95%CI: 1.6-4.0). However, there is no variation in paternal education level by residence.

Table 1; Demographic and Socio-Economic characteristics of study subjects by Residence, Gimbi district, June 2007

Variable		*Residence*			
		Urban (%)	**Rural (%)**	**Total No (%)**	**P-value**
Head of HH	Male	89.4	92.6	448 (91.4)	
	Female	10.6	7.4	42 (8.6)	0.20
Marital status	Married	90	91.0	444(90.6)	
	Divorced	2.8	2.9	14(2.9)	0.90
	Widowed	4.4	3.9	20(4.1)	0.80
	Separated	1.7	0.6	5(1.0)	0.30
	Single	1.1	1.6	7(1.4)	0.70
Family size	2-5	64.6	61.9	307(62.9)	

	>5	35.4	38.1	181(37.1)	0.60
<5 years Children in HH	1	65.6	62.6	312(63.7)	
	2-3	32.8	35.2	178(36.3)	0.50
Monthly HH Income	<500	62.8	91.6	397 (81.0)	<0.001
	>501	37.2	8.4	93 (19.0)	
Farm land ownership	<0.5 Hectare	66.7	68.0	119 (68.0)	
	>06 Hectare	33.3	32.0	55 (32.0)	1.00
Ownership of animals	Yes	34.4	56.5	237 (48.4)	
	No	65.6	43.5	253 (51.6)	<0.001
Decision making on use of money	Both jointly	77.8	73.2	367 (74.9)	
	Mainly husband	10.6	9.7	50 (10.2)	0.90
	Mainly spouse	9.4	10.6	49 (10.0)	0.60
	Only husband	2.2	6.5	24 (4.9)	0.04
Maternal formal education	Yes	72.2	46.1	273 (55.7)	
	No	27.8	53.9	217 (44.3)	<0.001
Maternal edu. level	Primary	34.6	59.4	130 (47.6)	
	Secondary and above	65.4	40.6	143 (52.4)	<0.001
Paternal formal education	Yes	82.9	66.0	335 (72.2)	
	No	17.1	34.0	129 (27.8)	<0.001
Paternal edu. level	<6 grade	22.5	28.9	88 (26.2)	
	>7 grade	77.5	71.1	248 (73.8)	0.20

5.2 Child characteristics and Caring practices

From the total children, 53.7% were males. Their birth order was; first birth for 3.5%, second to fourth birth 63.5% and above forth birth order for 13% of the children with no significant variation by residence (Table 2).

Place of delivery was at home for 61.6% of the children (rural 79.4%, urban 31.1%). Home delivery in rural resident mothers was 8.6 times higher than in urban mothers (OR=8.6, 95%CI: 5.6-13.0).

Birth weight was very small for 14.8% of the children (rural 17.5%, urban 10.1%) and rural children were two times more likely to become very small birth size (OR=2.0, 95%CI: 1.1-3.5) than urban children.

Child Caring practice

Breast Feeding; 40.4 % of children were exclusively breast fed for only 3 and less months. Average duration of EBF =5 months (SD; 1.3) with no significant variation by residence and average duration of BF=23.6(SD; 9) months. In rural area mean duration of BF was 25(SD; 10) month and in urban 22(SD; 6) month which was a significant difference (P-value; 0.02) (Table 2).

Concerning immunization, 4.1% of the children did not receive any form of vaccine and 13.8 percent did not receive vitamin A with significant difference by residence that rural children were 3.4 and 1.8 times more likely not to receive any vaccines and vitamin A respectively.

About 75% of the children (79% from urban and 72.5% from the rural) visited health facility for illness care and 17.6 % (14% in urban and 20% in the rural) of the children took bath every other day to week period with no significant variation by residence.

About 28.9% (31% in urban and 26.7% in the rural) of the HHs use bottle to feed their children with no significant variation by residence.

Prevalence of common childhood illnesses

Diarrhea; 106 children (21.6%) had diarrhea in the two weeks preceding the study; urban 18.9% and rural 23.2%. About 29.5% of them were having three and above episodes of diarrhea in a year.

Children with age two and less year were two times more affected (prevalence; 27.9%) by diarrhea than those above two years (prevalence 15.6%) (OR=2.1, 95%CI: 1.34 - 3.26). The difference was seen particularly in rural area where 32.8% of children of age two and less year were affected.

ARI and fever were prevalent in 4.7% (urban; 4.4% and rural; 4.9%) and 23.0% (urban; 20.8% and rural; 24.2%) of children in the past two weeks of the study respectively.

Measles; was prevalent in 8.2% of the children in the preceding one year before the study (5.6% in urban and 9.7% in rural). Prevalence of measles in children more than 2 years was significantly higher (11.6%) than children aged 2 and less years (4.6%) (OR=2.7, 95%CI: 1.3 - 5.6).

The difference was seen particularly in urban area where the disease seen in 13.5% of the children aged more than 2 years and none among children aged 2 and less years. Children of age two and less year in rural were affected 1.86 times higher than children of the same year in urban area.

There was no statistical significant variation of these childhood illnesses by residence.

Table 2; Child characteristics and Caring practices by Residence, Gimbi district, June 2007

Variable		*Residence*			
		Urban (%)	**Rural (%)**	**Total No (%)**	**P-value**
Child characteristics					
Child sex	Male	50.0	55.8	263 (53.7)	
	Female	50.0	44.2	227 (46.3)	0.30
Birth order	1	26.7	21.6	115 (23.5)	
	2-4	60.0	65.5	311 (63.5)	0.20
	Above 4	13.3	12.9	64 (13.0)	0.60
Place of delivery	Home	31.1	79.4	302 (61.6)	<0.001
	Health facility	68.9	20.6	188 (39.0)	
Birth size	Average and above	84.8	74.8	382(78.4)	
	Smaller than averag	5.1	7.8	33 (6.8)	0.20
	Very small	10.1	17.5	72 (14.8)	0.02
Diarrhea	Yes	18.9	23.2	106 (21.6)	0.30
	No	81.1	76.8	384 (78.4)	
ARI	Yes	4.4	4.9	23 (4.7)	0.80
	No	95.6	95.1	466 (95.3)	

Frequency of diarrhea/year	1 episodes	29.3	8.4	35 (28.7)	
	2 episodes	31.7	46.9	51 (41.8)	0.40
	>=3 episodes	39.0	24.7	36 (29.5)	0.40
Measles	Yes	5.6	9.7	40 (8.2)	0.50
	No	94.4	90.3	450 (91.8)	
Fever	Yes	20.8	24.2	112 (23.0)	0.10
	No	79.2	75.8	376 (77.0)	
Child caring practice					
EBF	<=3 months	43.2	38.7	178 (40.4)	0.90
	4-6 months	51.9	56.6	242 (54.9)	0.80
	>6 months	4.9	4.7	21 (4.8)	
Duration of BF	<12 months	3.2	3.0	9 (3.1)	0.80
	12-23.5 months	37.6	28.4	91 (31.4)	0.10
	>24 months	59.1	68.5	190 (65.5)	
Immunization	Yes	98.3	94.5	470 (95.9)	
	No	1.7	5.5	20 (4.1)	0.05
Vit. A suppl.	Yes	90.4	83.7	417(86.2)	
	No	9.6	16..3	67(13.8)	0.05
Ever taking to HF for sick.	Yes	79.0	72.5	366 (75.0)	
	No	21.0	27.5	123 (25.0)	0.14
Child took bath	Daily/twice daily	86.2	80.0	370 (82.4)	
	Every other day to week	14.0	20.0	79 (17.6)	0.13

5.3 Maternal conditions

As indicated in table 3, mean age of mothers was 28(SD; 5.4) years and mean age of mother at first child birth was 20 (SD; 5.4) year which was comparable in both urban and rural areas. Mothers who gave first birth at their age 18 or less years were 21.4% with no significant difference by residence.

Average total children born to a mother was 2.9 children (1.6 SD); urban 2.7 and rural 3, and 17.8% of the mothers (urban; 15.0% and rural; 19.4%) gave birth of five and above children with no significant variation by residence.

Regarding ANC, 22% of the mothers did not attend ANC (6.7% in urban and 31.3 in rural) and mothers from rural area who did not attend ANC were six times higher than urban mothers (OR= 6.3, 95%CI: 3.4 - 12.0).

Majority of the mothers (86.3%) had received family planning and mothers in urban area who used family planning were 3.7 times higher than rural mothers [OR=3.7, 95%CI: 1.8-8.0]. About 20% (16% in urban and 22% in rural, P-value >0.05) of the mothers did not have plan to give birth of the child.

No extra food was taken from the usual time during pregnancy and lactation for 53% of the mothers (rural; 62% and urban; 37%) and rural mothers who did not received it were 2.7 times higher than urban mothers who did not received extra food (OR=2.7, 95%CI: 1.9- 4.0).

Chronic energy deficiency (<18.5 Kg/m^2 BMI) was prevalent in 24.8% of the mothers; 1.8 % of them had BMI < 16.0, 4.1% were with BMI between 16.0-17.0 and 18.9% of them had 17-18.49 BMI with no significant variation by residence. Mean BMI of mothers was 20.5 with no significant variation by residence.

5.4 Environmental Health condition

Majority of the respondents in the rural area were using river water (45.0%) while 81.7% in the urban were using public pipe water (Table 3).

Average per capita water use in a day was 13 liters (SD 6.8) (urban; 14.6 liter and rural; 11.8 liters) and 43.4% (urban; 36.4%and rural; 47.4%) of the people use less than 10 liters in a day which shows significant difference by residence (P-value<0.001). Use of more than 20 liter water per capita in a day is 3.6 times more likely (OR=3.6, 95%CI: 1.9-6.8) in urban than rural area.

Majority of the HHs (80%) in the rural area lacks latrine. Rural resident were seven times more likely not to have latrine than urban counterparts. Traditional private pit latrine with wooden slab was the commonest type (88%) being utilized.

Housing type with corrugated iron sheet roof was 83% (97.8 % in urban and 73.4 % in rural)

and 31.6% of the rural houses did not have windows which is also 3.7 times higher (OR=3.7, 95%CI: 2.2-6.2) than urban houses lacking windows.

Table 3; Maternal and Environmental conditions by Residence, Gimbi district, June 2007

Variable		*Residence*			
		Urban (%)	**Rural (%)**	**Total No (%)**	**P-value**
Maternal conditions					
Mothers age at first birth	15-18	21.7	21.3	105 (21.4)	1.00
	>18.1	78.3	78.7	385 (78.6)	
Total children born to a mother	<=4	85.0	80.6	402 (82.2)	
	>4.1	15.0	19.4	87 (17.8)	0.20
ANC visit	Yes	93.3	68.9	381 (78)	
	No	6.7	31.1	108 (22)	<0.001
Ever using family planning methods	Yes	93.9	80.5	296 (86.3)	
	No	6.1	19.5	47 (13.7)	<0.001
Plan to give birth of the child	Yes	84.0	78.0	393 (80.0)	
	No	16.0	22.0	97(20.0)	0.10
Extra food intake during pregnancy/lactation	Yes	63.0	38.0	231 (47.0)	
	No	37.0	62.0	258 (53.0)	<0.001
BMI (Kg/m^2)	<16	2.8	1.3	9 (1.8)	0.20
	16 - 17	3.4	4.5	20 (4.1)	0.50
	17 - 18.49	20.7	17.9	92 (18.9)	0.40
	>=18.5	73.2	76.3	366 (75.2)	
Environmental conditions					
Water source	River	11.7	45.0	160 (32.7)	0.40
	Unprotected spring	2.2	5.2	20 (4.1)	

	Protected spring	4.4	36.8	122 (24.9)	0.05
	Private well	0	1.0	3 (0.6)	1.00
	Pipe water	81.7	3.6	158 (32.3)	<0.001
	Common well	0	8.7	27 (5.5)	1.00
Per capita water use	<=10 liters	36.4	47.4	209 (43.4)	
	10-20 liters	46.6	46.4	224 (46.5)	0.20
	>20 liters	17.0	6.2	49 (10.2)	<0.001
Availability of latrine	Yes	91.7	20.2	225 (46.0)	
	No	8.3	79.8	265 (54.0)	<0.001
Type of residential house	Tukul with Thatched roof	2.2	27.6	83 (17.0)	
	Corrug. iron sheet	97.8	73.4	407 (83.0)	<0.001
Presence of window	Yes	88.9	68.4	372 (76.0)	
	No	11.1	31.6	118 (24.0)	<0.001

5.5 Nutritional status of the children

Table 4 presents prevalence of malnutrition for urban and rural settings. Overall prevalence of stunting, wasting and underweight were 32.4% (urban; 35.6%, rural; 30.6%), 15.9% (urban; 13.9%, rural; 17.1%) and 23.5% (urban; 20.0%, rural; 25.5%) respectively. Prevalence of severe stunting; wasting and underweight were 15.7%, 5.7% and 8.0% respectively.

There was no significant difference of the prevalence of malnutrition by residence. However, there was some variation of occurrence of malnutrition by child sex and age group.

Table 4; Prevalence of Child Malnutrition by Residence, Sex and Child Age category, Gimbi district, June 2007

Variable	*Urban No (%)*	*Rural No (%)*	*OR (95%CI)*
Stunting	64 (35.6)	95 (30.6)	1.3 (0.8-1.8)
Severe Stunting	25 (13.9)	52 (16.8)	1.3 (0.7-2.1)
Wasting	25 (13.9)	53 (17.1)	1.3 (0.8-2.1)
Severe wasting	6 (3.3)	22 (7.1)	2.2 (0.9-5.6)
Underweight	36 (20.0)	79 (25.5)	1.4 (0.9-2.1)
Severe underweight	11 (6.1)	28 (9.0)	1.5 (0.7-2.6)
Low MUAC (<12.5 cm)	30 (16.7)	44 (14.2)	1.2 (0.7-2.0)
Low MUAC (<11 cm)	10 (5.6)	15 (4.8)	1.2 (0.5-2.6)

Male children were 1.7 times more severely stunted than females (OR=1.7, 95%CI: 1.1- 2.9) and in urban area males were twice more stunted than females (OR=2.1, 95%CI: 1.1- 3.7). Prevalence of severe stunting significantly increases in children aged above two years than those below it. Children with age 6 - 11 months were relatively protected from stunting in both rural and urban areas (Table 4.1). But, severe wasting increases in under two year aged children than those above it, however the differences was not statistically significant (Fig.4).

Table 4.1; Prevalence of Severe Stunting and Wasting in Child age category, Gimbi, June 2007

Age category	*Severe Stunting*		*Severe Wasting*	
	No (%)	**OR (95%CI)**	**No (%)**	**OR (95%CI)**
6 - 11months	1 (1.8)	0.1(0.01-0.9) *	4 (7.0)	2.3 (0.5-11.0)
12 - 23 months	21 (15.8)	1.2 (0.6-2.3)	11 (8.3)	2.8 (0.8-10.5)
24 - 35 months	15 (14.0)	1.0	5 (4.7)	2.8 (0.8-10.5)
36 - 47 months	18 (18.9)	1.4 (0.6-3.0)	5 (5.3)	1.6 (0.4-6.7)
48 - 59 months	22 (22.4)	1.8 (0.9-3.7)	3 (3.1)	1.8 (0.4-7.6)
<= 2 years	29 (12.1)	1.0	17 (7.1)	1.6 (0.8-3.6)
> 2 years	48 (19.2)	1.7 (1.0-2.9) *	11 (4.4)	1
Total	77 (15.7)		28 (5.7)	

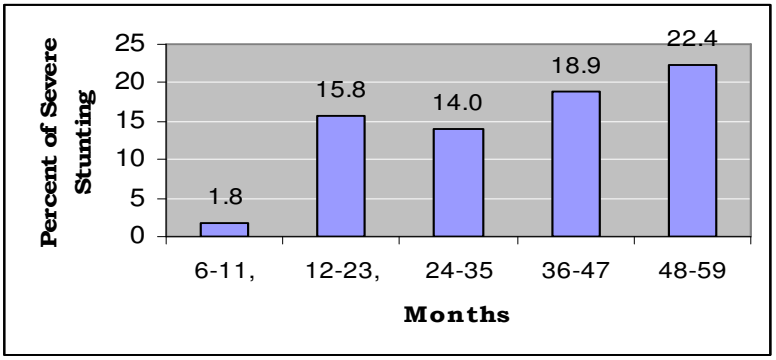
* Significant at p<0.05

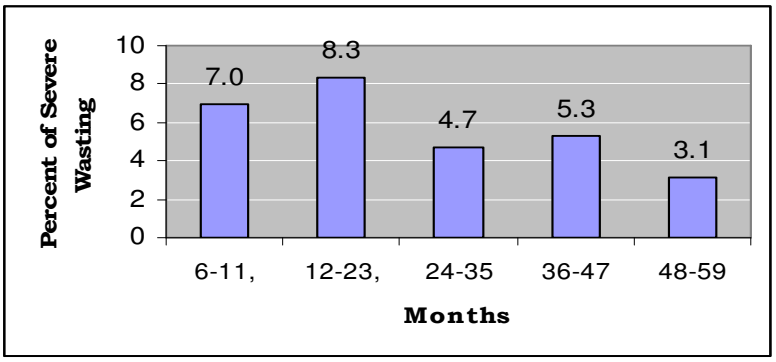
Being severe underweight has significant association with being stunted and wasted; severely underweight children were five times more likely stunted (OR=4.8, 95%CI 2.4-9.6) and fifty times more likely wasted (OR=50, 95%CI: 19-124)

MUAC measurement also indicated that 15.1% of the children were malnourished (<12.5 cm) and 5.1% of the children were severely malnourished, which is comparable with wasting conditions. Seven children (1.4%) had edema with no significant difference by residence.

Presence of edema was associated with; stunting (OR=5.3, 95%CI: 1.0-27) and underweight (OR=4.5, 95%CI: 1.0-20), Sever wasting (OR=7.0, 95%CI: 1.3-37), Sever underweight (OR=17.0, 95%CI: 3.7-79).

Fig 4; Distribution of Sever Stunting and Sever Wasting by Child Age category, Gimbi district, June 2007





5.6 Analysis of Determinants of Child Malnutrition

Differentials of malnutrition among under five children were investigated by some selected variables related to demographic, socio-economic, child, maternal and environmental aspects.

The prevalence of wasting among children who did not receive any vaccine was 3.0 times higher than in those who received vaccines irrespective of the doses. Wasting in children of illiterate mothers was 1.8 times higher than in those children of mother attended formal education (Table 5).

Wasting was 2.2 times higher in children born at home (OR=2.2, 95%CI: 1.2-3.8) than in those born at health facility, 1.9 times higher in children of father's educational level was primary than children of father's educational level being secondary and above, 2.7 times higher in HHs having monthly income less than 500 birr than those HHs earn more than 500 birr and 1.8 times higher in children of mothers did not receive ANC than children of mothers received ANC.

Children who had ARI and fever in the preceding two weeks of the survey were wasted 1.8 and 2.3 times higher than those children who did not have these illnesses respectively.

Prevalence of wasting in these variables ranges from 17.9 percent (in children from HHs earning monthly income 500 or less birr) to 35 percent prevalence (in children did not received any vaccine).

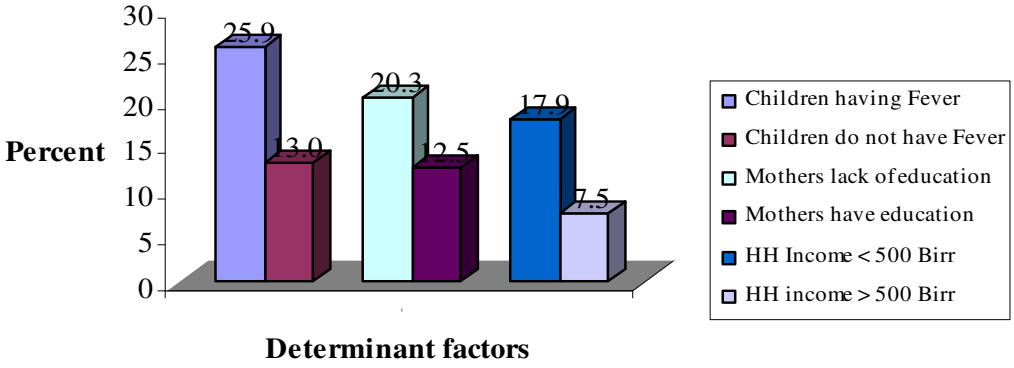
Table 5; Results from Bivariate and Multiple Logistic Regression analysis of selected correlates of Wasting, Gimbi district, June 2007

Variable	*Wasting No (%)*	*Crude OR (95% CI)*	*AOR (95% CI)*
Residence			
- Urban	25 (13.9)	1.0	1.0
- Rural	53 (17.1)	1.3 (0.8-2.1)	0.7 (0.3-1.4)
Child sex			
- Male	36 (13.7)	1.0	1.0
- Female	42 (18.5)	1.7 (0.9 -2.5)	1.4 (0.7 -2.6)
Child age			
- Less than (=)2 years	38 (15.8)	1.0	1.0
- Above 2 years	40 (16.0)	1.1 (0.6-1.7)	0.9 (0.4-1.7)
Maternal formal education			
- Yes	34 (12.5)	1.0	1.0
- No	44 (20.3)	1.8 (1.1-2.9) *	1.8 (1.1-3.6) *
Paternal educational level			
- Primary	19 (21.6)	1.9 (1.0-3.6)	1.4 (0.7-2.9)
- Secondary and above	31 (12.5)	1.0	1.0
Monthly HH income			
- <= 500 birr	71 (17.9)	2.7 (1.2-6.0) *	1.3 (0.5-3.6)
- > 500 birr	7 (7.5)	1.0	1.0
Place of delivery			
- Home	59 (19.5)	2.2 (1.2-3.8) **	1.8 (0.8-3.1)
- Health facility	19 (10.1)	1.0	1.0
Maternal ANC visit			
- Yes	53 (14.0)	1.0	1.0
- No	24 (22.2)	1.8 (1.0-3.0) *	1.9 (0.8-4.2)
Immunization			
- Yes	71 (15.1)	1.0	1.0
- No	7 (35.5)	3.0 (1.2-7.8) *	0.6 (0.1-3.5)
Presence of ARI			
- Yes	7 (30.4)	1.8 (1.0-3.0) *	2.4 (0.7-8.0)
- No	71(15.2)	1.0	1.0
Presence of fever			
- Yes	29 (25.9)	2.3 (1.4-3.9) *	2.7 (1.4-5.4) *
- No	49 (13.0)	1.0	1.0

***** Significant at p<0.05 ****** Significant at p<0.01

However, in multiple logistic analysis only presence of fever in children was significantly associated with wasting. Children having fever were 2.7 times more wasted (AOR=2.7, 95%CI: 1.4-5.4) than those who did not have it. Maternal lack of education marginally associated with wasting (AOR=1.8, 95%CI: 1.1-3.6) (Fig.5).

Fig. 5; Prevalence of Wasting in some Determinant factors



Stunting in children with very small birth size were 1.8 times higher (43% prevalence) (Adjusted OR=1.8, 9%CI: 1.1-3.0) than those children with average and above birth size (29.8% prevalence), 1.9 times higher (OR=1.9, 9%CI: 1.3-3.0) in children of paternal lack of education than in those children of fathers attended formal education and 1.8 times higher (OR=1.8, 9%CI: 1.2-2.8) in HHs lacking animal than those HHs having animal (Table 6).

Paternal decision making on use of money influenced stunting that children from HHs making decision on use of money only by fathers were stunted by 2.4 times higher (47% prevalence) (OR=2.4, 9%CI: 1.1-5.4) than those from HHs making decision jointly by partners.

Table 6; Results from Bivariate and Multiple Logistic Regression analysis of selected correlates of Stunting, Gimbi district, June 2007

Variable	*Stunting No (%)*	*Crude OR (95% CI)*	*AOR (95% CI)*

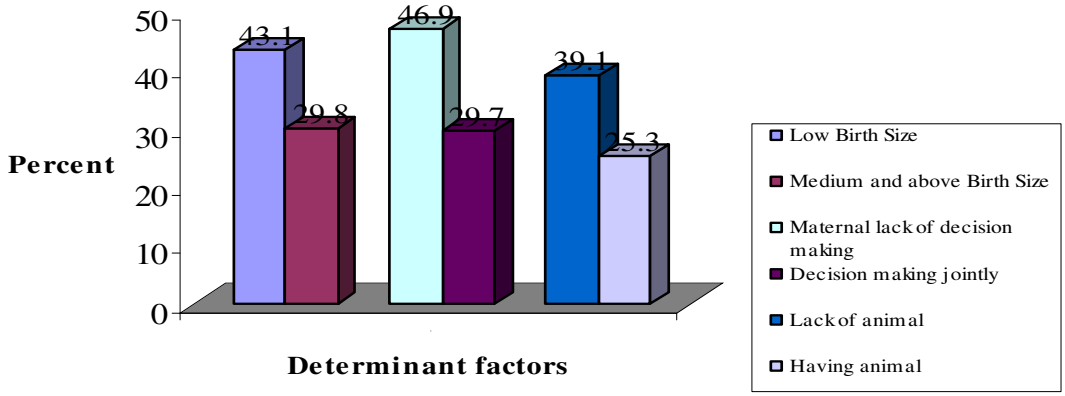
Residence			
- Urban	64 (35.6)	1.3 (0.8-1.8)	1.3 (0.8-2.0)
- Rural	95 (30.6)	1.0	1.0
Child sex			
- Male	93 (35.4)	1.3 (0.9-2.0)	1.4 (0.9-2.1)
- Female	66 (29.1)	1.0	1.0
Child age category			
- Less than (=)2 years	73 (30.4)	1.0	1.0
- Above 2 years	86 (34.4)	1.2 (0.8-1.7)	1.2 (0.8-1.8)
Marital Status			
- Divorced	8 (57.1)	3.0 (1.0-8.7)	-
- Married	138 (31.1)	1.0	1.0
Paternal formal education			
- Yes	93 (27.8)	1.0	1.0
- No	55 (42.6)	1.9 (1.3-3.0) **	1.6 (1.0-2.5) *
Decision making on use of money			
- Mainly husband	15 (30.0)	2.1 (1.0-3.8)	0.9 (0.4-1.8)
- Only husband	12 (50.0)	2.4 (1.1-5.4) *	2.4 (1.2-5.8) *
- Jointly with mother	109 (29.7)	1.0	1.0
Ownership of animals			
- Yes	60 (25.3)	1.0	1.0
- No	99 (39.1)	1.8 (1.2-2.8) **	1.8 (1.2-2.7) *
Birth size			
- Very small	31 (43.1)	1.8 (1.1-3.0) *	1.8 (1.3-3.1) *
- Average and above	114 (29.8)	1.0	1.0

* Significant at p<0.05 ** Significant at p<0.01

In adjusted analysis; low birth size (AOR=1.8, 9%CI: 1.3-3.1), lack of animal (AOR=1.8, 9%CI: 1.2-2.7) and decision making on use of money being only husband (AOR=2.4, 9%CI: 1.2-5.8) were retained their association with stunting (Fig.6).

Underweight showed significantly high association (P-value<0.01) with children of mothers who did not take extra food during pregnancy and lactation, HHs monthly income less than 500 birr and lack of window for the houses.

Fig. 6; Prevalence of Stunting in some Determinant factors, Gimbi district, June 2007



Also, maternal BMI is being less than 18.5, paternal education being primary level, maternal lack of ANC and family planning use, presence of fever and ARI in children, marital status being widowed, unavailability of latrine and per-capita water use being less than 1 liters associated with underweight. Prevalence of underweight in these variables ranges from 25.9 - 47.8%.

However, in multiple logistic analysis only presence of ARI in children (AOR=4.5, 9%CI: 1.1-20.0) and lack of windows (AOR =3.2, 9%CI: 1.4-7.4) for house remained significantly associated with underweight (Table 7).

Children having ARI were 5.4 times underweighted than those children with out ARI and children from house lacking windows were 3 times underweighted than those children from house had windows.

Some variables including birth order, maternal age at childbirth, length of exclusive breastfeeding, duration of breast feeding and family size were not found significantly associated with any of these nutritional outcomes.

Table 7; Results from Bivariate and Multiple Logistic Regression analysis of selected correlates of Underweight, Gimbi district, June 2007

Variable	*Underweight No (%)*	*Crude OR (95% CI)*	*AOR (95% CI)*
Residence			

- Urban	36 (20.0)	1.0	1.0
- Rural	79 (25.5)	1.4 (0.9-2.1)	0.6 (0.31-.3)
Child sex			
- Male	64 (24.3)	1.1 (0.7-1.7)	1.2 (0.6-2.4)
- Female	51 (22.5)	1.0	1.0
Child age category			
- Less than (=)2 years	57 (23.8)	1.1 (0.7-1.7)	0.9 (0.4-1.7)
- Above 2 years	58 (23.2)	1.0	1.0
Marital Status			-
- Widowed	9 (45.0)	2.9 (1.2-7.0) *	
- Married	99 (22.3)	1.0	
Paternal educational level			
- Primary	27 (30.7)	1.9(1.1-3.0) *	0.9 (0.4-2.0)
- Secondary and above	48 (19.4)	1.0	1.0
Monthly HH income			
- <= 500 birr	103 (25.9)	2.4 (1.4-4.5) **	1.9 (0.7-4.8)
- > 500 birr	12 (12.9)	1.0	1.0
Maternal ANC visit			
- Yes	80 (21.0)	1.0	1.0
- No	34 (31.5)	1.7 (1.1-2.8) *	1.7 (0.6-5.0)
Maternal use of FP methods			
- Yes	57 (19.3)	1.0	1.0
- No	15 (31.9)	2.0 (1.0-3.9) *	1.4 (0.5-3.5)
Maternal intake of extra food			
- Yes	41 (17.7)	1.0	0.5 (0.3-1.1)
- No	73 (28.3)	1.8 (1.2-2.8) **	1.0
Maternal BMI			
- <18.5	38 (31.5)	1.8 (1.1-2.9) *	1.7 (0.8-3.7)
- >18.5	76 (20.8)	1.0	1.0
Per capita water use/day			
- <= 10 liter	59 (28.2)	2.8 (1.1-7.0) *	1.1 (0.2-3.5)
- > 20 liters	6 (12.2)	1.0	1.0
Availability of latrine			
- Yes	72 (20.5)	1.0	1.0
- No	43 (31.2)	1.7 (1.1-2.7) *	1.6 (0.6-4.3)
Availability of window			
- Yes	74 (20.0)	1.0	1.0
- No	41 (35.0)	2.1 (1.4-3.4) **	3.2 (1.4-7.4) **
Presence of ARI			
- Yes	11 (47.8)	3.2 (1.2-7.5) *	4.5 (1.1-20.0) *
- No	103 (22.1)	1.0	1.0
Presence fever			
- Yes	36 (32.1)	1.8 (1.1-2.8) *	1.1 (0.5-2.4)
- No	79 (21.0	1.0	1.0
Presence of diarrhea			
- Yes	35 (33.0)	1.9 (1.2-3.0) *	1.6 (0.7-3.7)
- No	80 (20.8)	1.0	1.0

* Significant at p<0.05 ** Significant at p<0.01

5.7 Determinants of Child Malnutrition by Urban-Rural residence

Analysis of those variables found significant factors in overall analysis of the determinants of malnutrition showed variation for urban and rural settings; some variables become

insignificant factor and other variables strength of association with the nutritional outcomes varies by residence.

In rural area, bivariate analysis showed that low HH income, maternal lack of education, paternal educational level being primary, maternal lack of ANC and fever in children were set up association with wasting.

Place of delivery, lack of immunization and ARI in children, which are found to be risk factors for child wasting in overall analysis, were not kept significant factor in rural area (Table 8).

In multiple logistic analysis fever in children (AOR = 3.0, 95%CI: 1.2-7.5) and maternal lack of education (AOR = 2.1, 95%CI: 1.1-5.0) were main risk factors of wasting in rural area.

In urban area, wasting also associated only with presence of fever in children in both bivariate and multiple logistic analysis. Children having fever wasted 3.5 times higher (AOR = 3.5, 95%CI: 1.3-11.6) than those who did not have it. Also place of deliver being at home is significantly associated with wasting in urban area (OR= 2.8, 95%CI: 1.2-6.7).

Fever is an important significant factor of wasting in both urban and rural areas while ARI in children were not kept significant factor for wasting in both rural and urban area probably due to reduced sample size.

Important risk factor for children stunting in rural area was birth sizes being very small (AOR =2.1, 95%CI: 1.1-4.0) while child sex is significantly associated with stunting in urban area (AOR =2.0, 95%CI: 1.0-4.1) (Table 8.1).

Table 8; Analysis of Selected Determinant factors of Wasting by Residence, Gimbi district, June 2007

Variable	Urban		Rural	
	No (%)	Adjusted OR (95% CI)	No (%)	AOR (95% CI)
Child sex				
- Male	11 (12.2)	1.0	25 (14.5)	1.0

- Female	14 (15.6)	2.6 (0.8-8.0)	28 (20.4)	1.0 (0.4-2.5)
Child age category				
- Less than (=)2 years	16 (15.1)	1.0	22 (16.4)	1.7 (0.7-4.2)
- Above 2 years	9 (12.2)	1.2 (0.4-3.8)	31 (17.6)	1.0
Maternal formal education				
- Yes	16 (12.3)	1.0	18 (12.6)	1.0
- No	9 (18.0)	1.0 (0.2-4.2)	35 (21.0) #	2.1 (1.1-5.0) *
Paternal educational level				
- Primary	5 (15.6)	0.6 (0.1-2.1)	14 (25.0) #	2.1 (0.8-5.3)
- Secondary and above	15 (13.6)	1.0	16 (11.6)	1.0
Monthly HH income				
- <= 500 birr	19 (16.8)	1.8 (0.5-6.8)	52 (18.3) #	2.0 (0.2-17.0)
- > 500 birr	6 (9.0)	1.0	1 (3.8)	1.0
Place of delivery				
- Home	13 (23.2) #	2.9 (1.0-8.7)	46 (18.7)	1.3 (0.4-4.5)
- Health facility	12 (9.7)	1.0	7 (11.0)	1.0
Maternal ANC visit				
- Yes	23 (13.7)	1.0	30 (14.1)	1.0
- No	2 (16.7)	2.9 (0.4-24.0)	22 (22.9) #	2.0 (0.8-5.2)
Immunization				
- Yes	24 (13.6)	1.0	47 (16.0)	1.0
- No	1 (33.3)	13.5 (0.4-48.9)	6 (35.3)	0.4 (0.1-3.6)
Presence of ARI				
- Yes	2 (25.0)	0.6 (0.1-5.1)	5 (33.3)	4.0 (0.7-22.0)
- No	23 (13.4)	1.0	48 (16.3)	1.0
Presence fever				
- Yes	11 (30.0) #	3.5 (1.3-11.6) *	18 (24.0) #	3.0 (1.2-7.5) *
- No	14 (10.0)	1.0	35 (15.0)	1.0

Significant in bivariate analysis (P-value<0.05) * Significant at p<0.05 ** Significant at p<0.01

Although prevalence of stunting in very small birth size children was 38.9%, it could not become significant for stunting in urban areas.

In bivariate analysis paternal lack of education, lack of maternal decision making on use of money and lack of animals were associated with stunting in rural setting.

Table 8.1; Analysis of Selected Determinant factors of Stunting by Residence, Gimbi district, June 2007

Variable	*Urban*		*Rural*	
	No (%)	**Adjusted OR (95% CI)**	**No (%)**	**Adjusted OR (95% CI)**
Child sex				
- Male	39 (43.3) #	2.0 (1.0-4.1)*	54 (31.2)	1.0

- Female	25 (27.8)	1.0	41 (29.9)	0.9 (0.5-1.6)
Child age category				
- Less than (=)2 years	38 (35.8)	1.2 (0.6-2.6)	35 (26.1)	0.7 (0.4-1.2)
- Above 2 years	26 (35.1)	1.0	60 (34.1)	1.0
Marital Status				
- Divorced	4 (80.0)	1.0 (0.1-14.2)	4 (44.4)	-
- Married	55 (34.0)	1.0	83 (29.4)	1.0
Paternal formal education				
- Yes	44 (31.2)	1.0	49 (25.3)	1.0
- No	15 (51.7) #	2.1 (0.8-5.4)	40 (40.0) #	1.4 (0.8-2.6)
Decision making on use of money				
- Mainly husband	8 (47.1)	1.0 (0.1-6.8)	7 (21.2)	1.4 (0.4-5.4)
- Only husband	2 (50.0)	2.0 (0.6-5.8)	10 (50.0) #	0.5 (0.2-1.2)
- Jointly with mother	44 (31.4)	1.0	65 (28.6)	1.0
Ownership of animals				
- Yes	16 (25.8)	1.0	44 (25.1)	1.0
- No	48 (40.7)	2.0 (0.9-4.2)	51 (37.8) #	1.7 (0.9-2.9)
Birth size				
- Very small	51 (33.8)	0.9 (0.3-2.9)	24 (44.4) #	2.1 (1.1-4.0) *
- Average and above	7 (38.9)	1.0	63 (27.3)	1.0

Significant in bivariate analysis (P-value<0.05) * Significant at p<0.05 ** Significant at p<0.01

Main determinant factors of underweight in rural area are presence of ARI in children (AOR=7.0, 95% CI: 1.1-45.0) and lack of window (AOR=3.6, 95%CI: 1.2-11.0) for house. Low maternal BMI (<18.5) is risk factor for children underweight in urban area (AOR =3.6, 95%CI: 1.2-11.0) (Table 8.2).

Table 8.2; Analysis of Selected Determinant factors of Underweight by Residence, Gimbi district, June 2007

Variable	*Urban*		*Rural*	
	No (%)	**Adjusted OR (95% CI)**	**No (%)**	**Adjusted OR (95% CI)**
Child sex				
- Male	19 (21.1)	0.7 (0.2-2.1)	45 (24.6)	1.0
- Female	17 (18.9)	1.0	34 (25.5)	0.7 (0.3-1.9)
Child age category				
- Less than (=)2 years	24 (15.1)	1.1 (0.4-3.0)	33 (24.6)	1.0
- Above 2 years	12 (12.2)	1.0	46 (26.1)	1.1 (0.4-3.2)
Marital Status				

- Widowed	3 (37.5)	-	6 (50.0)	-
- Married	31 (19.1)	1.0	68 (24.1)	1.0
Paternal educational level				
- Primary	7 (21.9)	1.4 (0.4-5.3)	20 (35.7) #	0.8 (0.3-2.4)
- Secondary and above	21 (19.1)	1.0	27 (19.6)	1.0
Monthly HH income				
- <= 500 birr	26 (23.0)	2.5 (0.7-8.5)	77 (27.1) #	2.1 (0.3-13.1)
- > 500 birr	10 (14.9)	1.0	2 (7.7)	1.0
Maternal ANC visit				
- Yes	33 (19.6)	1.0	47 (22.1)	1.0
- No	3 (25.0)	0.8 (0.1-11.0)	31 (32.3) #	1.8 (0.5-6.5)
Maternal use of FP methods				
- Yes	27 (19.4)	1.0	30 (19.1)	1.0
- No	1 (11.1)	0.6 (0.1-6.3)	14 (36.8) #	2.2 (0.7-6.7)
Maternal intake of extra food				
- Yes	19 (16.8)	1.0	22 (18.6)	1.0
- No	17 (25.4)	1.1 (0.4-3.6)	56 (29.3) #	2.2 (0.8-6.5)
Maternal BMI				
- <18.5	15 (31.3) #	3.6 (1.2-11.0) *	23 (31.5)	1.0 (0.3-3.6)
- >18.5	21 (16.0)	1.0	55 (23.4)	1.0
Per capita water use/day				
- <= 10 liter	15 (23.4)	1.3 (0.3-5.7)	44 (30.3)	0.9 (0.1-9.4)
- > 20 liters	4 (13.3)	1.0	2 (10.5)	1.0
Availability of latrine				
- Yes	32 (19.4)	1.0	40 (21.4)	1.0
- No	4 (26.7)	3.4 (0.2-68.0)	39 (31.7) #	1.6 (0.6-5.0)
Availability of window				
- Yes	31 (19.4)	1.0	43 (20.3)	1.0
- No	5 (25.0)	1.1 (0.2-5.7)	36 (36.7) #	3.6 (1.2-11.0) *
Presence of ARI				
- Yes	3 (37.5)	0.7 (0.03-16.2)	8 (53.3) #	7.0 (1.1-45.0) *
- No	33 (19.2)	1.0	70 (23.8)	1.0
Presence fever				
- Yes	12 (32.4) #	0.9 (0.2-3.7)	24 (32.0)	1.4 (0.5-4.2)
- No	24 (17.0)	1.0	55 (23.4)	1.0
Presence of diarrhea				
- Yes	11 (32.4) #	1.8 (0.4-7.7)	24 (33.3)	1.6 (0.5-4.9)
- No	25 (17.1)	1.0	55 (23.1)	1.0

Significant in bivariate analysis (P-value<0.05) * Significant at p<0.05 ** Significant at p<0.01

6. DISCUSSION

Generally prevalence of child malnutrition was high in the district and in comparison to the DHS 2005 report (5) of stunting, underweight and the respective sever forms; the finding's of this study is lower. However, wasting (15.9%) and sever wasting condition (5.7%) of the children in the study area were higher than that of the national (10.5% wasting and 2.2% severe wasting) as well as regional (9.6% wasting and 2.4% severe form) DHS report.

There was very high prevalence of wasting in the study area alarming to increased risk of death to children. It signifies acute nutritional problem due to illness and/or recent food shortage. High chronic malnutrition also signifies children's failure to grow; impact on both physical and mental capacity of the affected children.

According to discussion with some community members, recently there was a failure of coffee plant to provide adequate crop and affected income of the HHs to purchase food items. Common staple food of the area is also maize and sorghum that can not provide nutritious food particularly for children. Also, there is inadequate child caring practices mainly on child feeding.

In this study, wasting was associated with fever in both bivariate and multivariate analysis. This indicates that childhood illness is the main factor for acute nutritional problem. Illness affects dietary intake and utilization.

In an independent analysis of selected variables with wasting; low HH income, lack of child immunization, presence of ARI in children, place of delivery being at home and lack of maternal education were found significant risk factors.

As the proportion of these variables, except ARI, is significantly higher in the rural area, they are more important determinants of wasting in the rural area.

Both bivariate and adjusted analysis indicated that low birth size, lack of animals and decision making on use of money being only by father as determinant of stunting. Also paternal lack of education and HH marital status being divorced were found significant factors of stunting in bivariate analysis.

Variables including; low birth size, decision making on use of money being only by fathers and paternal lack of education will become important factors of stunting particularly in rural area because their proportion is higher in the rural area.

Underweight associated with presence of ARI in children and lack of windows for house after controlling for potential confounders. However, in the bivariate analysis many variables were significantly associated with it. Particularly low income of the HHs and mothers not receiving extra food during pregnancy and lactation were associated significantly with underweight (P-value<0.001).

Also maternal low BMI, maternal visit to health facility for ANC, presence of diarrhea in children and low per-capita daily water use were significant factors.

Many of these finding's were in agreement with other studies; Income growth at the HH and national levels imply similar rates of reduction in malnutrition (28).

Study in the country indicated that private income growth and enhanced female adult education would reduce the prevalence of child stunting by about 5 to 10% each with the effect of the latter intervention typically a little bit larger. Together, they would eliminate between 10 and 20% of Ethiopia’s child stunting using the diagnostic capability of mothers as a proxy for their nutritional knowledge (11).

It is also indicated that a high prevalence of stunting in children of illiterate mother than children of literate mothers (10, 29). Education enables women to provide appropriate care for children.

A study explored the relationship between women status, defined by the women's power relative to men, and children's nutrition in three developing region; Sub-Saharan Africa, South Asia and Latin America and Caribbean indicated that higher women status has positive effect on children's nutritional status. It was also noticed that women's status impacts child nutrition

because women with higher status have better nutrition themselves, are better cared for, and provide higher quality of care for their children (30).

In Ethiopia, three consecutive welfare monitoring surveys over the period of 1996-1998 identified household resources, parental education, food prices and maternal nutritional knowledge as key determinants of growth faltering. Community sanitation, health and communication infrastructure are also important determinants of child malnutrition (11).

Young lives research project in Ethiopia April 2004 -December 2005 indicated that there is need for greater attention on intra-household access to resources and power in consideration of livelihoods and food security interventions. The result found out that while access to independent income for women was generally positive, caring practices also suffered due to arduous hours worked by women and a compulsion to wean children prematurely (27).

This study finding is also consistent with the study in Bangladesh which showed birth size as an important risk factor for all the three categories of malnutrition (stunting, wasting and underweight). Children of well-nourished mothers had a lower risk of being under weight compared to children of acutely malnutritioned mothers. The reason may be that thin or malnourished mother cannot provide sufficient breast milk because of their nutritional deficiency.

Acute malnutrition of mother could be an impediment for her child's growth. Maternal nutrition influences fetal growth and birth weight as there is an intergenerational link between maternal and child nutrition. Studies showed that a high proportion of low birth weight and stunted children were observed among malnourished mothers (20, 23).

Another study in Bangladesh showed, children who were very small in size at birth had two times higher risk of being stunted than those who were larger in size at birth. Prevalence of wasting and underweight were also remarkably high among low birth weight children. Sanghvi et al. (2001) investigated the risk factors for underweight status in children under 3 years of age in Kerala, India. Their statistical analysis showed that infant birth weight ($p =$

0.01) and maternal body mass index (p = 0.03) were significant risk factors for current child underweight status. Wasting and underweight status of under five children showed significant relationship with mothers BMI (23).

Mothers living in developing countries are often exhausted by the combination of pregnancy and child birth which can end in the loss of their lives. Low birth weight and/or immature and malnourished infants born to such women are vulnerable to life-threatening diseases and nutritional problems (20).

A study in southern Ethiopia indicated that number of ANC visits the mother had during pregnancy linked to chronic malnutrition (16). But, in the current study maternal ANC use is associated with their children being underweight. Children of mothers who did not visit health facility for ANC were underweight 1.7 times higher than children of mother attended ANC irrespective of the number of visits.

According to this study finding, there was strong association of presence of ARI in children and lack of windows of house as risk factor for child under weight. Absence of windows means that air ventilation will be minimized and indoor air pollution increases. Almost all HHs in the study area are using biomass fuel which worsen the pollution level. Other study in the country also indicated high magnitude of overcrowding in rural housing; about 85% of the houses (tukuls) are crowded and far behind to satisfy the physiological needs of a resident (31).

There is consistent evidence that indoor air pollution increases the risk of chronic obstructive pulmonary disease and acute respiratory infections in childhood, the most important cause of death among children under 5 years of age in developing countries. Evidence also exists of associations with low birth weight as babies born to women using wood fuel were 63 gm lighter ($P < 0.049$) than those born to women using gas and electricity (32).

Analysis on Ethiopian DHS 2000 data that indicated significant externalities associated with access to water and sanitation at the community level. The external impacts of community level of access to these services are an important determinant of the probability a child is

underweight and the external impact of access to water is larger for children living in rural areas.

This report also indicated that biological factors; child' s age and mother' s height and social economic factors; household wealth and mother 's education, are important determinants of a child ' s nutritional status (24).

Prevalence of chronic energy deficiency (<18.5 Kg/m2 BMI) of mothers (24.8%) in the study area was lower than the national (DHS 2005) finding which was 27.0%. However, it was comparable with the Oromia regional finding of the DHS (24.3%).

Although evidences show that urban children generally have a better nutritional status than their rural counterparts particularly for liner growth (stunting) and underweight (25), this study could not find significant difference by urban-rural settings. It is suggested that accelerated rates of urbanization currently observed in the developing world raise new concerns regarding increasing rate of urban malnutrition (25).

However, significance and strength of the determinant factors varies by residence in this study.

Analysis of prevalence of severe malnutrition conditions by child age group point out that severe wasting is higher in children aged 3-5 years which indicates that the children are already in the state of being stunted as a result of cumulative effect of the risk factors.

On the contrary, prevalence of severe wasting is higher in children of age less than two years. Possible explanation for this could be the higher prevalence of diarrhea disease in these age groups as indicated by the finding of this study. These groups are also susceptible to infection as their immune system fail to protect them adequately. More over, they have high nutritional requirement due to their fast growth.

7. STRENGTH AND WEAKNESS OF THE STUDY

Strength

- Many variables considered to be differentials of child malnutrition were assessed. This enabled to conduct thorough analysis of their relative contribution for the nutritional outcomes.

- Valid questionnaires used in other studies were adapted for this study.

Weakness

- As the study is cross-sectional in design, it neither represents seasonal variation of nutritional outcomes particularly to the wasting status nor establishes causal relation ship.

- Dietary aspect which is the immediate determinant of nutritional status is not included in this study.

- Some measurements may not be accurate due to subjective responses and recall biases from answers based on the reminiscence of the mothers and possible dilution effect of selecting one child from a household.

8. CONCLUSION AND RECOMMENDATIONS

Conclusion

Based on the findings of this study it can be concluded that; acute nutritional problem is at critical stage alarming to hasten mortality of children. High prevalence of stunting in the area is also of particular concern in both rural and urban areas.

In both rural and urban setting's childhood illness which is indicated by fever and maternal lack of education in rural area are important determinants of wasting.

Also, in bivariate analysis low HH income, place of delivery being at home, maternal lack of ANC and lack of child immunization become significant factors of wasting in rural area.

Low birth size, lack of animal, paternal lack of education and decision making on use of money being only husband were key determinants of stunting. In rural area, children birth sizes being very small and in urban area child sex are important factors of stunting.

In rural area presence of ARI in children and lack of widow for house were main determinants of under weight while low maternal BMI is risk factor for children being underweight in urban area.

Rural resident children are more exposed to nutritional risk factors than their urban counterparts.

Recommendations

- ☞ Immediate establishment of therapeutic feeding centers and community nutrition program is critical to tackle the problem and its consequences.

- ☞ Intervention initiatives should focus on improving HH food security; support income generation, nutrition education, promotion of education and status of women and agricultural diversification.

- ☞ Prevention and control of childhood illness through improving access to safe and adequate water supply, immunization, housing, sanitation and hygiene practices.

- ☞ Promotion of better child and maternal caring practices.

- ☞ Improved multi-sectorial interventions to address multifaceted causes of malnutrition. A balanced strategy of income growth and investment in more direct interventions are essential to accelerate reductions in malnutrition and met MDG.

- ☞ Further research in child caring practices and dietary assessments are required.

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Annexes

Annex 1; Oromic version Questionnaires

UNIVARSITY FINFINNE FAKALITII FAYYATTI QAJEELCHA FAYYAA HAWAASUMA QORANAA SADARKAA SIRNA NYAATA IJOOLE

GODINA LIXA WALLAGAA AANAA GIMBII

Waraqaa Gafii

Waraqaan gafii kun kan qopha'e ragaa sadarkaa sirna nyaata ijoole fi dhimoota murtessa issa ta'aan sadarkaa mana manatti funaanuuf, aanaa Gimbi, Naannoo Oromiyaa

Waligaltee

Nagaa

Seensa;

Maqaan koo _____ jedhama. Ani kan hojjachaa jiru ragaa qoranaa Univarsitii Finfinne, fakalitii fayyatti qajeelcha fayyaa hawaasuma walin ta'uun matta dure "Sadarkaa sirna nyaata ijoole fi dhimoota murtessa isaa ta'an" irratti gageefamuuf oolu funanuu dha.

Maqaan keessan guca kana irratii hin-bareefamu, akkasummas ragaa naa keenitan walin qabsifamees itti hin-fayyadamamu. Gafiin isin deebisuu hin-barbanne yoo jiratee dhisuun mirga keessan ta'e yeroo barbaadanis gafii fi debii gageesinu dhabbu ni-dandeessu.

Haa ta'u malee, gafilee hundaaf deebiin sirii ta'e kayoo qoranaa kanaf bahee ni-barbachisadha. Hirmaachuudhaaf fedhii qabduu?

Gafii fi deebi kana xumuruuf sa'aa _____ ta'u nutti ni-fudhata.

Mallattoo gafataa, Namni gaafatamu kun waligatee issa jechaan ibsu isaa mirkaneessuuf _____

001. Lakkoofsa waraqaa gafii /_____/_____/

002. Maqaa nama gaafatuu _____

003. Guyyaa gafii fi deebbi _____

004. Teesso; 1. Magaala 2. Badiyaa

005. Frii: 1. Hundi guutame 2. Walakaa guutame 96. kan biraa (Ibsi)

To'ata hordofe; Maqaa _____, Mallattoo_____

KUTAA TOKOFAA: GAFILEE HAWASSUMAA FI DINAGDEE			
Lakk	**Gafii**	**Debii**	**Darbu/Ibsa**
101	Abban mana?	1. Dhira 2. Dubartii	
102	Haali fuudha ?	1. Walin jiru 2. Wal-hikan 3. Irra dudhe 4. Addan bahan 5. Qophaa	
103	Bayina matii mana keessa jiratuu ?	_____ lakkofsan	
104	Bayini ijoole wagga <5 mana kessa jirani	_____ lakkofsan	
105	Barumsa hadha mana Barumsa idlee baratanii beektu?	1. Eye 2. HIn-baraee	Yoo hin-barane, 107 tti darbi
106	Sadarkaan barumsa idlee xumurtani meeqa?	1. Kutaa _____ 2. Barumsa oogummaa sartifikeeti 3. Diplomaa 4. Digrii 96. kan biraa (Ibsi)	
107	Barumsa idlee aala baratanitu?	1. Eye 2. Lakki	
108	Dubisuu fi bareessu dandeessu?	1. Eye 2. Lakki	
109	Barumsa abba mana Abban mana keessan barumsa idlee barataniiru?	1. Eye 2. HIn-baraee	
110	Sadarkaan barumsa idlee xumurani meeqa?	1. Kutaa _____ 2. Barumsa oogummaa sartifikeeti 3. Diplomaa 4. Digrii 96. kan biraa (Ibsi)	
111	Barumsa idlee aala barataniiru ?	1. Eye 2. Lakki	
112	Dubisuu fi bareessu ni-danda'u ?	1. Eye 2. Lakki	
113	Jiruun hadha mana (Deebiin toko ol ni-danda'ama)	1. Hadha mana qofa 2. Qotee bulaa 3.Daldalaa 4. Hojjata jarmiyaa dhunfaa 5. Hojjataa mootummaa. 6. Hojjataa guyyaa 96.Kan biraa (Ibsi)	
114	Jiruun abba mana (Deebiin toko ol ni-danda'ama)	1. Qotee bulaa 2. Hojjata mootummaa 3. Daldalaa 4. Hojjataa jarmiyaa dhunfaa. 5. Hojjataa guyyaa 96. kan biraa (Ibsi)	
115	Ji'aati galiin mana meeqa ta'aa ?	Qarshii _____	
116	Itti fayyadama maalaqa argatni irratti eenyu murtessa ?	1. Caalaman hadha mana 2. Caalaman abba mana 3. Abba mana qofa 4. Lamanu malin ta'uun	
117	Dhimma jiruu mana adda adda irratti murtee fudhachuuf mirga yookin itti-gaafatamumaa qabdu ?	1 Eye 2. Lakki 99. Hin-beeku	
118	Horii qabdu?	1. Qabu 2. Hin-qabnu	Yoo hinqabne, 120 tti darbi
119	Meeqa ta'u ? - Loon - Re'een - Hooloni - Indaqoon - Fardaa fi hareen Waligalatii	 Lakkofsan_____ Lakkofsan_____ Lakkofsan_____ Lakkofsan_____ Lakkofsan_____ Lakkofsan_____	
120	Lafa (Qona/looni)hangam ta'u qabdu ?	1. Hin-qabnu 2. Qarxii(Heektaraa)____ 99. Hin-beeku	
121	Qoomon keessan mali?	1. Oromo 2.Sidama 3. Tigree 4. Guragee 96. kan biraa (Ibsi)	
122	Hamantii keessan mali?	1.Ortodoksii 2.Muzilmaa 3. kirstaana /Penxee/ 4. Katolikii 96. Kan biraa (Ibsi)	
KUTAA LAMAFFA: HAALA MUCAA (Caraan fili)			

201	Saali mucaa (Maqaa) maali?	1. Dhiira 2. Durba	
202	Umuriin isaa/ishe meeqa?	Ji'aa_____	
203	Mucaa (Maqaa) meeqafaattii deessan	_____ ffa	
204	Bakki itti deesssan eessa ?	1.Mana jireenya 2.Mana yaala 96. Kan biraa (Ibsi)	
205	Ji'a meeqeaffatti dhatale/tte	1. Ji'aa sagalii gaddi 2. Ji'aa salgaffatti 3. Ji'aa sagalii ol 99. Hin-beeku	
206	Yammu dhalatu ulfinii issa/ishe madaalameera ?	1. Eye 2. lakki	Yoo lakki, 208 tti darbii
207	Yoo madaalame/te, meeqa ture/te?	Gramii_____ (kardii/yaadan?)	
208	Yammu dhalatu/ttu, hangam ga'aa/si ?	1. Heddu gudda ture/te 2. Giddugalessa ol 3. Giddugaless 4. giddugalessa gaddi 5. xiqaa ture/te 99. Hin-beeku	
209	Gosni dhaloota	1. Baqee 2. Lakku	
210	Mucaa (maqaa) dauuf karoora (Qophii) qabdu turee) ?	1. Eye 2. Lakki	
211	Talaali fudhate/tte beeka/beektii?	1. Eye 2. Lakki	Yoo hin-fudhane, 213 darbii
212	Talaali kam fudhate? (kardii ilaali, yoo hin-jirane akka yaadatan gaafadhu) (Deebiin toko ol ni-danda'ama)	1. BCG qofa 2. DPT (lakk. Dozii___) 3. Gifira 4. Kardiin hin-jiru	
213	Rakkon fayya mucaa yeroo heddu mal isintti fakkata?	1. Dhukkuba/toota_____ 99. Hin-beekamu	
214	Vit. A ji'aa ja'aa darbe keessatti fudhate/tte	1 Eye 2. Lakki 99. Hin-beeku	
215	Torban lamaan darbe keessa mucaan dhukkuba gara kaassa qaba/qabdi?	1. Qaba 2. Hin-qabu 99. Hin-beekamu	Yoo hin-qabne, 217 tti darbi
216	Waggatti yeroo meeqa qaba?	1. toko 2. lama 3. yeroo 3-4 4. >5 ol	
217	Torban lamaan darbe keessa mucaan dhukkuba gubaa qaba/qabdi?	1. Qaba 2. Hin-qabu 99. Hin-beekamu	
218	Torban lamaan darbe keessa dhukkuba afuur ykn sombaa qaba/qabdi?	1. Qaba 2. Hin-qabu 99. Hin-beekamu	
219	Wagga darbe keessa dhukkuba gifiraatiin qabamee beeka/beektii?	1. Qaba 2. Hin-qabu 99. Hin-beekamu	
220	Dhitoo mila gaddi irra qaba ? (ilaali)	1. Qaba 2. Hin-qabu	
KUTAA SADAFFA: HAALA QABINSA MUCAA			
301	Mucaa keessan harma hoosistu?	1. Eye 2. Lakki	Yoo hin-hosisne, 303 tti darbi
302	Yoo hin-hoosisne, sababni issa maali?	Sababa_____	
303	Mucaan (Maqaa) dhalatee/tte hamam turtani harma hosisuu eegaltan?	1. Akkuma dhalateen 2. Sa'a _____ booda 3. Guyyaa ____ booda	
304	Akkuma deesanin nyaani /dhagala'aan/ mucaa (Maqaa) keenitan jira?	1. Eye 2. Lakki	Yoo hinjire-306 tti darbi
305	Maali keenitaniif ture?	1. Bishaan 2. Dhadha 3. Hanan 96. Kan biraa (Ibsi)	

306	Hanan harma kan calqabaa eelmitanii ni-gatu?	1. Eye 2. Lakki	
307	Hanga hammati hosisaa jirtu?	1. Eye 2. Lakki	Yoo lakki, 315 tti
308	Sa'aa 24 darbeetti yeroo meeqa hosistan?	Yeroo _____	
309	Halkan ni-hosiistu?	1. Eye 2. Lakki	
310	Mucaan (Maqaa) nyaata bira/dhangala'aa sa'aa 24 darbee keessatti fudhateera/tti?	1. Eye 2. Lakki	Yoo hinfudhane, 322 tti darbi
311	Yoo fudhate, nyaaata akkami? (Deebiin toko ol ni-danda'ama)	1. Hanan looni 2. Dhadha 3. sha'ii 4. Hanan bita (formulaa) 5. Haximitii (Bulaa) 96. kan biraa (Ibsi)	
312	Sa'aa 24 tti yeoo meeqa fudhate/tte?	Yeroo _____	
313	Uumurii meeqatti nyaata bira (dabalataa) laachuuf eegaltan?	Ji'aa _____	
314	Mucaa (Maqaa) nyaachisuuf meesha akkamtti gargaaramtu?	1. Sinii 2. Butulee 3. Mankaa 96.Kan biraa (Ibsi)	
315	Hanga umurii meeqatti harma hoosistan?	1. Ji'aa____ 99. Hin-yaadadhu	
316	Harma qofa hanga umurii meeqatti hoosistan?	1. Ji'aa_____ 99. Hin-yaadadhu	
317	Mucaa (Maqaa) nyaachisuu yeroo heddu eenyuttu hordofa?	1. Hadha 2. Hoboleeti 3. Hakawoo 4. Hojjatuu manaa 96.kan biraa (Ibsi)	
318	Yeroo dhukkuba haali mucaa (Maqaa) itti nyaachiftan ni-jijiramaa?	1. Eye 2. Lakki	Yoo Lakki, 320 tti darbi
319	Haali nyaachisu akkamitti jijirama?	1. Harma hoosisu dhabbun 2. Nyaata kennufi dhabbun 3. Nyaata dabaltaa kennun 96. Kan biraa (Ibsi)	
320	Yeroo meeqati meeshaa nyaata kan mucaa (Maqaa) dhiqtu?	1. Guyyatti yeroo lama 2. Guyyaa guyyatti 3. Guyya lamafatti 4. Hanguma nyaachiseen 96. Kan biraa (Ibsi)	
321	Yeroo meeeqati mucaa dhiqtu?	1. Guyya guyyatti 2. Torbanitti 96. Kan biraa (Ibsi)	
322	Yeroo mucaan dhukkubsatu/ttu hakamitti yaalchiftu?	1. Yeroo heddu manumatti 2. Yaaltoota aadaa birattti 3. Dhabba fayyaa geessun 96. kan biraa (Ibsi)	
323	Kanan durra yaalidhaaf dhabba fayyaa geesitanii beektuu?	1. Eye 2. Lakki	Yoo lakki, kutaa arfafaa tti darbi
324	Yeroo meeqa mucaan dhukkubsatee/tte dhabba fayya geesitanii beektu?	1. Yeroo _____ 99. Hin yaadadhu	
KUTAA ARFAFFAA: HAALA HADHA			
401	Umuri dhadha meeqa?	Wagga _____ xumure	
402	Umuri mucaa issa jalqabaa itti deessanni	Wagga _____ tti	
403	Umuri mucaa issa dhumaa itti deesan?	Wagga _____ tti	
404	Ijoolee meeqa kanan durra deesan?	Ijoolee _____	
405	Ulfni garatti bachuu keessani durra qabdan meeqa ture? (mucaa issa qoratamu)	Kilogramaa _____	
406	Yeroo garatti batan/hosistan (mucaa issa qoratamu) nyaata dabalata (adda) nyaatu?	1. Eye 2. Lakki	

407	Haali fayyaa keessani yeroo garati bata akkam ture?	1. Garii ture 2. Garii hin-ture (Ibsi)	
408	Dhabbata fayya qoraana dahumsa durra (QDD) tiif ni-deemtu ture?	1. Eye 2. Lakki	Yoo Lakk, 411 tti darbi
409	Garatti batanii ji'aa meeqaffatti QDD tiif dhabba fayyaa deemu eegaltan?	Ji'aa _____ tti	
410	Yeroo meeqa QDD tiif dhabba fayyaa deemtanittu?	1. Yeroo _____ 99. Hin-beeku	
411	Wa'ee karoora matii beektu?	1. Eye 2. Lakki	Yoo hin-beekne, 415 tti darbi
412	Toftalee karoora matiitti fayyadamtan beektu?	1. Eye 2. Lakki	Yoo hin-lakki, 415tti
413	Toftaa kamitti fayyadamtani beektu?	1. Kininii/pills 2. Dipo 3. 'Norplant' 4. Kondomiii 96. kan biraa (Ibsi)	
414	Yeroo hamma itti fayyadamaa jirtu?	1. Eye 2. Lakki	
415	Harka keessan yeroo kami dhiqatu? (Yeroo heddu) (Deebiin toko ol ni-danda'ama)	1. Mana fincaani booda 2. Nyaata otoo hin-qopheesine 3. Nyaata otoo hin-dhiyeesine 4.Bobaa ijoole eerga qulqulessine booda 96. kan biraa (Ibsi)	
416	Akkamin (maalin) dhiqatu?	1. Bishaan qofaan yeroo heddu 2. Samuuna wajjin darbee 3. Yeroo hunda samuunan 4. Daraa walin yeroo toko	
417	Mucaan keessan qaaman (guddin) issa maali isintti fakkata?	1. Qalaa 2. Furdaa 3. Xiqaa 4. Eeraa 5. Giddugalessa (Siruma)	
418	Hanga umuri meeqatti mucaan harma qofa hargachuu qaba jitanii yaadu/beektu?	1. Ji'aa _____ tti 99. Hin-beeku	
KUTAA SHANAFAA: HAALA NAANNOO			
501	Maddi bishaan dhugatti keessan?	1. Laga 2. Haroo 2. Burqaa hin-ijaaramane 3. Burqaa ijaarame 4. Birii dhunfaa 5. Boono 96. Kan biraa (Ibsi)	
502	Guyyatti bayina bishaan itti gargaaramani meeqa?	Litira _____	
503	Yammu bishaan warabdan deemani deebi'uuf yeroo hamami isinitti fudhata?	Daqitaa _____ ni-fudhata	
504	Bishaan itti fayyadamtan qulqulessuuf yaaliin gootan ni-jira?	1. Eye (ibsi) 2. Lakki	
505	Mana fincaani ni-qabdu	1. Eye 2. Lakki	Yoo lakki, 507 tti darbi
506	Gosni mana fincaani itti gargaramtani? (Ilaali)	1. Boola dhunfa kan qadado muka 2. " " " simintoo 3. Boola walini kan qadado muka 4. " " " simintoo 5. "VIP" kan dhunfa 96. Kan biraa (Ibsi)	
507	Haali kosii gogogaa itti gatan akkam?	1. Bakkeetti 2. Boola dhunfaatti 3. Boola walintti 4. 'Compost" gochuu	

		5. Gubuu 96.Kan biraa (Ibsi)	
508	Gosni mana jireenya? (Ilaali)	1. 'Tukkuli/citaa 2. Qorgoroo 96. Kan biraa (Ibsi)	
509	Kutaan mana meeqa? (Kushina fi mana kuusa meesha tiin alatti)	Kutaa_____	
510	Lafti mana jireenya maal irra hojjatame?	1. Biyoo 2. Simintoo(Brick) 3. Muka (Bambuu) 4. Seramikii 96.Kan biraa(Ibsi)	
511	Balini mana nama tokof hamam ta'a?	_____m2	
512	Manni jireenya fodaa qaba?	1. Eye 2. Lakki	
513	Kushinaa qobaatti qabdu?	1. Eye 2. Lakki	
514	Horii yoo qabatan mana isaani qobatti qabdu?	1. Eye 2. Lakki	
515	Nyaata bilcheesuuf qoraan malitti gargaaramtu?	1. Muka 2. kerosinii 3. Elektrikaa 4. kiboota 96. Kan biraa (Ibsi)	

Madaali qaama

Ulfni mucaa Kilogamaan_____

Eerinii mucaa sentimetraan_____

Madaaliin 'MUAC' kan mucaa santimeetraan_____

Ulfni hadha Kilogamaan_____

Eerinii hadha sentimetraan_____

Hirmaana qoranaa kana irratti gootaniif bahe isin galateefanna

Fayyaa ta'aa

Annex 2; English version Questionnaires

This questionnaire is prepared for collecting information on child nutritional status and determinants at household level in Gimbi district of Oromia region.

Consent

Greetings

Introduction;

My name is_____. I am working as data collector in a survey conducted by the collaboration of Addis Ababa University, Medical faculty/Department of community Health so as to assess child nutritional status and determinants.

Your name will not be written on this form and will never be used with any information you may tell me. You don't have to answer any questions that you don't want to answer and you may end this interview at any time you want. However, your honest answer to these questions is very important for the purpose of the study. We would very much appreciate your participation in this survey by genuinely responding to the interviews. Would you be willing to participate?

It would take _____ minutes to complete the questionnaire

Signature of the interviewer certifying that informed consent has been given verbally by respondent_____.

001. Questionnaire identification number /_____/_____/

002. Interviewer code_____ Name_____

003. Date of interview_____

004. Residence; 1. Urban 2. Rural

005. Result: 1. Completed 2. Partially completed 96.Others (Specify)

Checked by supervisor; Name_____, Signature_____

PART ONE: SOCIO-DEMOGRAPHIC VARIABLES			
No	**Question**	**Response**	**Skip to/Remark**
101	Head of the HH	1. Male 2. Female	
102	Marital status	1. Married 2. Divorced 3. Widowed 4. Separate 5. Single	
103	Total family size (How many person live in the HH?)	In number_____	
104	How many children <5 year live in the HH	In number_____	
105	Maternal education Have you ever attended basic education?	1. Yes 2. No	If no, skip to 107
106	What is the highest grade you completed?	Grade _____ 1. Technical/Vocational certificate 2. Diploma 3. Degree 96. Other (specify)	Skip to 109
107	Have you ever attended Informal education?	1. Yes 2. No	If no, skip to 109
108	Do you able to read and write?	1. Yes 2. No	
109	Paternal education Have your husband ever attended basic education?	1. Yes 2. No	If no, skip to 111
110	What is the highest grade he completed?	Grade _____ 1. Technical/Vocational certificate 2. College/University Diploma 3. College/University Degree	Skip to113

		96. Other (specify)	
111	Has he ever attended Informal education?	1. Yes 2. No	If no, skip to 113
112	Does he able to read and write?	1. Yes 2. No	
113	Occupation of mother (More than one answer is possible)	1. Housewife only 2. Farmer 3. Merchant/Trade 4 Private Organization employe 5. Government employee 6. Daily laborer 96. Other (specify)	
114	Occupation of husband (More than one answer is possible)	1. Farmer 2. Government employee 3. Merchant/Trade 4. Private Org. employee 5. Daily laborer 96. Other (specify)	
115	Monthly income of the HH	_____ Birr	
116	Who decides how the money you earn will be used?	1. Mainly spouse 2. Mainly husband 3. Only husband 4. Both jointly	
117	Do you have some control and power (autonomy) in decision-making?	1. Yes 2. No 99. Do not know/not sure/	
118	Do you have livestock, herd or farm animal?	1. Yes 2. No	If no, skip to 120
119	If yes, how many? - Milk cow, Oxen and bulls? - Goat? - Sheep? - Chicken? - Horse, donkey mule? In total	 _____ number _____ " _____ " _____ " _____ " _____ "	
120	How many agricultural lands do you have?	1. Do not have 2. _____(local unit) (Qarxe or Hacter) 99. Do not know/not sure	
121	Ethnicity	1. Oromo 2.Amara 3. Tigre 4. Gurage 96. Others (specify)	
122	What is your religion	1.Orthodox 2.Muslim 3. Protestant 4. Catholic 96. Others(specify)	
PART TWO: CHILD CHARACTERSTICS (Randomly select)			
201	Child's sex	1. Male 2. Female	
202	Child's age	_____ Months	
203	Birth order	_____ th	
204	Place of delivery	1.Home 2.Health institution 96. Other (specify)	
205	Gestational age at birth	1. Less than 9 Months 2. At 9 months 3. Greater than 9 Months 99. Do not know /Not sure/	
206	Was your child weighed at birth	1. Yes 2. No	If no, skip to 208
207	How much was the weight?	_____ Grams (card/recall?)	

208	When (NAME) was born, How big was he/she?	1. Very large 2. Larger than average 3. Average 4. Smaller than average 5. Very small 99. Don't know	
209	Type of birth	1. Single 2. Multiple/Twin/	
210	Did you have plan (want) to give birth of the child?	1. Yes 2. No	
211	Does the child ever been immunized?	1. Yes 2. No	If no, skip to 213
212	Vaccines received (See card, if no card available ask them to recall) (More than one answer is possible)	1. BCG only (See Scar) 2. DPT (No of dose____) 3. Measles 4. No card found	
213	Vit. A supplementtion in the past six months?	1. Yes 2. No 98. Don't know/not sure	
214	What do you think is the frequent health problem to the child	_____ Disease/s 99. Don't know	
215	Has the child had diarrhea in the last two weeks	1. Yes 2. No 99.Do not know/not sure	If no, skip to 217
216	How frequent in a year	1. Once 2. Twice 3. 3-4 times 4. >5 times	
217	Has the child been ill with fever at any time in the last two weeks?	1. Yes 2. No 99. Don't know/not sure	
218	Presence of respiratory disease in the last two weeks	1. Yes 2. No 99. Do not know/not sure	
219	Has the child get sick with measles in the last year	1. Yes 2. No 3. Do not know/not sure	
220	Presence of oedema on the child (Observe)	1. Yes 2. No	
PART THREE: CHILD CARING PRACTICE			
301	Did you ever breast fed the child (NAME)?	1. Yes 2. No	If yes,skip to 303
302	If no, reason for not breastfeeding?	Reason_____	
303	How long after birth did you first out the child to breast feed?	1. Immediately 2. ____ Hours (If less than 24 hours record hour) 3. ____ Days 99. Don't know/not sure/	
304	Did you give the child (NAME) pre-lactation food/fluid?	1. Yes 2. No	If no, skip to 306
305	If yes, what did you gave him (her)?	1. Water 2. Butter 3. Milk 96. other (Specify)	
306	Did you squeeze out and throw the first milk?	1. Yes 2. No	
307	Are you still breastfeed?	1. Yes 2. No	If no, skip to 315
308	How many times in the last 24 hours you breastfed?	_____ Times	
309	Do you breast feed in the night?	1. Yes 2. No	
310	Did you give the child additional food or fluid other than breast milk in the past 48 hours?	1. Yes 2. No	If no, skip to 322
311	If yes, what ingredients you gave? (More than one answer is possible)	1. Cow's milk 2. Butter 3. Sugar solution. 4. Formula milk. 5. Axmiet/Bula 96. Other (specify)	
312	How many times in 24 hours?	_____ times	

313	At what age did you start feeding other additional food?	_____ Months	
314	What do you use to feed the child	1. Bottle 2. Cup 3. Spoon 96. Other (specify)	
315	How many months did you breast-feed the child?	_____ Months 99. Don't know/not sure/	
316	For how many months did you exclusively breast-fed the child?	_____ Months 99. Don't know/not sure/	
317	Who is usually taking care of the baby feeding?	1. Mother 2. Sister 3. Grand mother 4. House maid 96. Other (specify)	
318	During the illness, has the child feeding practice changed?	1. Yes 2. No	If no, skip to 320
319	How could the practice changed?	1. preventing from breast 2. preventing from giving food 3. Providing additional food 96. Other (specify)	
320	If yes how frequent you wash it?	1. Twice daily 2. Once daily 3. Every other day. 4. Immediately after use 96. Other (Specify)	
321	Bath taking of the child	1. Daily 2. Weekly 96. Other (Specify)	
322	How did you usually treat your child when get sick	1. Usually home treatment 2. Taking to traditional healers 3. Taking to Health institution 96. Other (Specify)	
323	Have you ever take your child to health institution for sickness	1. Yes 2. No	If no, go to part 4
324	How many times have you ever taken the child to health institution getting sick?	_____ Times 99. Don't know/not sure	
PART FOUR : MATERNAL CHARACTERSTICS			
401	Mother's age in years	Year completed_____	
402	Age at first birth	_____ Years	
403	Age when the youngest child was born	_____ Years	
404	Total number of children ever born?	In number _____	
405	Pre-pregnancy weight (of the last pregnancy)	In kilogram_____ 99. Do not know/not sure/	
406	During pregnancy or lactation, did you consume extra food? (the child under the study)	1. Yes 2. No	
407	Health status during the pregnancy	1. Good 2. Not good/sick	
408	Did you visited health facility for ANC	1. Yes 2. No	If no, skip to 411
409	At what months of the pregnancy you started ANC	At _____ months 99. Don't know/not sure	
410	How many times you visited health facility for ANC during the pregnancy?	_____ times	
411	Do you know about family planning?	1. Yes 2. No	If no skip to 415
412	Have you ever used family planning methods	1. Yes 2. No	If no, skip to 415
413	Which method have you ever used? (More than one answer is possible)	1. Pills 2. Depo-Provera 3. Norplant 4. condom 96. other (Specify)	

414	Do you use it now?	1. Yes 2. No	
415	When do you usually wash your hands? (More than one answer is possible)	1. After latrine use 2. Before preparing food 3. Before serving food 4. After cleaning child feaces 96. Other (specify)	
416	How do you wash your hand?	1. Using water only 2. Using soap some times 3. Using soap always 4. Using ash some times	
417	What do you think your child physically looks?	1. Thin 3. Tall 2. Heavy 4. Normal 3. Small	
418	For how long do you think should a child exclusively be breast-fed?	In months_____	
PART FIVE: ENVIRONMENTAL CONDITIONS			
501	What is your main source of drinking water?	1. River 2. Pond 2. Un protected spring. 3. Protected spring. 4. Private well 5. Public tap 96. Other (specify)	
502	Amount of water used in the household daily?	In liters_____	
503	How long does it take you to go and come back to fetch water?	In minutes_____	
504	Do you treat water in any way to make it safer?	1. Yes (Specify) 2. No	
505	Do you have latrine?	1. Yes 2. No	If no skip to 507
506	Type of latrine you use? (Observation)	1.Private pit / wooden slab 2. Private slab / cement slab 3. Shared latrine/wooden slab 3. Shared VIP latrine 96. Other (Specify)	
507	How do you dispose garbage?	1. Open field disposal. 2. In a pit 3. Common pit 4. Composting 5. Burning 96. Other (specify)	
508	Type of House (Observation)	1.Tukul/thached 2. Corrugated Iron Sheet 96. Other(Specify)	
509	How many rooms for use by the member of your household? (Excluding kitchen and store)	____ in Number	
510	Type of house floor (Observation)	1. Earth /Soil/. 2. Cement/Brick 3. Wooden/Bamboo 4. Ceramic 96. Other(Specify)	
511	Floor area of the house per person	____Km2	
512	Presence of windows (Observation)	1. Yes 2. No	
513	Do you have separate room which is used as Kitchen?	1. Yes 2. No	

514	If you have livestock, do you have separate room for them?	1. Yes 2. No	
515	What type of fuel do you mainly use for cooking?	1. Wood 2. Kerosene 3. Electricity 4. Animal dung 96. Other(specify)	

Anthropometrical measurement

Child weight in kilogram_____

Child height in centimeters_____

MUAC measurement in centimeters _____

Maternal Weight in kilogram _____

Maternal Height in centimeters _____