International Journal of Medical and Health Sciences Research
2015 Vol.2, No.2, pp.36-49
ISSN(e): 2313-2752
ISSN(p): 2313-7746
DOI: 10.18488/journal.9/2015.2.2/9.2.36.49

PREVALENCE OF STUNTING AND ASSOCIATED FACTORS AMONG UNDER FIVE CHILDREN IN WONDO GENET WOREDA, SIDAMA ZONE, SOUTHERN ETHIOPIA

Yadessa Tegene Woldie[1] --- Tefera Belachew[2] --- Dejene Hailu[3] --- Tesfalem Teshome[4] --- Hordofa Gutema[5†]

[1]*Department of Health Information Technique, Hawassa College of health science, Hawassa, Ethiopia*

[2]*Population and family health Department, College of public health and medical science, Jimma University, Jimma, Ethiopia*

[3]*College of medicine and health sciences, Hawassa University, Hawassa, Ethiopia*

[4]*Department of Public Health, Hawassa College of health science, Hawassa, Ethiopia*

[5]*Department of Health Education and promotion , College of medicine and health science, Bahir Dar University Bahir Dar Ethiopia*

ABSTRACT

Background: Stunting is a serious health problem and deep rooted in southern Ethiopia of poor diet, in adequate food intake, disease burden, population growth, poor health service delivery and repeated drought. Objective: to assess the prevalence of stunting and associated factors among under five year's old children in the study area. Methods: This cross sectional study was conducted in Wondo Genet Woreda from February, 25 to March 15, 2011. The sample size was determined using formula for estimating single population proportion. The sample size was determined using formula for estimating single population proportion. Three Kebele's were selected by stratified two stage cluster sampling method and study households were identified by simple random sampling technique from each 'Kebele. The data was analyzed using SPSS v.16.0 statistical software version16.0. For all statistical significance tests, the cut- off value set will be p<0.05 with CI of 95%. Results: Out of 576 study participants 50.3% were stunted. Stunting was 3.1times more common in households where decision was made by husband only (P=0.001), paternal education level of 7-8 grade was 2.29 times the contributing factor of stunting [AOR= 2.29, 95% CI: 1.15-4.54]. Children who did not eat vegetable source foods were 2.54 times more likely to be stunted [AOR= 2.54, 95% CI: 1.20-5.37]. Conclusion and Recommendation: Prevalence of stunting in Wondo Genet Woreda is similar when compared to the national figure and among female and male participants. Home delivery was found to be the protective factors of stunting and similar impact was seen by displacement from usual residence. Thus the community based nutrition program for prevention and early detection of stunting should be strengthened.

Keywords: Stunting, Prevalence, Associated factors, Wondo genet, Ethiopia.

† Corresponding author

Received: 8 June 2014/ Revised: 18 November 2014/ Accepted: 22 November 2014/ Published: 26 November 2014

Contribution/ Originality

This study is the first of its kind in this study area. So it contributes for strengthening in the existing literature at national and regional level.

1. INTRODUCTION

The World Health Organization (WHO) reports that stunting is one of the most important indices of child well-being throughout the world. In developing countries approximately 32%, or 186 million children <5 years of age are stunted. [1]

Stunting reflects long-term nutritional status of a child and is assessed by height-for-age. The WHO considers two standard deviations less than the mean short-for-age or stunted. Three standard deviations less than the mean are considered severely stunted and between two and three standard deviation less than the mean is moderately stunted. The WHO has recommended that the US National Center for Health Statistics growth charts be used as the reference population when looking at growth patterns in children. During infancy and very early childhood, low height-for-age is the most sensitive indicator for moderate malnutrition. If intervention occurs early, then stunting that occurs during infancy may be reversible. Stunting generally begins in infancy and develops within the first two years of life. In developing countries 30-60% of children have some degree of stunting. [2, 3]

The highest levels of stunting are from Eastern Africa, where on average 50 % of preschool children are affected in the year 2010. In Eastern Africa stunting is increasing at 0.08 % per year. Over the period 2000 to 2005, numbers are expected to increase from about 22 to 24.4 million preschool children. The recent Demographic and Health Survey (DHS) of Ethiopia gives a similar picture of the state of stunting to that of the 1998 survey. In this survey, the prevalence of stunting in Ethiopia was 51.2 percent. According to the 1992 survey, national prevalence of stunting in Ethiopia is (64 %) which was the highest in the world. [4-7]

The 2005 Ethiopian national survey has reported that, of all the under five children in the country, 47% are stunted. This shows that the rate of stunting in Ethiopia is still higher than the reported percent for developing countries. The situation of child malnutrition is different among regions. For instance, in southern Ethiopia; the prevalence of stunting is 52 %, one of the highest rates in Ethiopia and unacceptably high by any standards [8]. Reducing the prevalence of stunting from 46% to 40% is one of the activities designed to be implemented in the first phase of the national nutrition program. So far there is no study which documented the prevalence of stunting and associated factors in the study area. The objective of this study is to assess the prevalence of stunting and associated factors among under five years old children in Wondo Genet Woreda, Sidama Zone, Southern Ethiopia by hypothesizing There is high prevalence of stunting in Wondo Genet Woreda compared to the recent national figures.

2. METHODS AND MATERIALS

2.1. Study Design and Population

A cross sectional study was conducted among <5 year children of Wondo Genet Woreda Sidama Zone southern Ethiopia. Wondo Genet Woreda has a total population of 128,476where 64,138 are males, 64,338were females and 20,043 of them were under five children. The major crops produced in the area includes: root crops, false banana (*Enset ventricosum*) and maize, in their order of production. Chat and coffee are the major cash crops in the area.

2.2. Participant and Sampling

The source population is all mothers who had children of <5 years residing at WondoGenet Woreda during the study period, whereas the study population included mothers who were in the study area and had apparently healthy < 5 year children, at the time of survey and were selected for the study. Mothers having children age < 5 years old and who lived for more than six months in the study area at the time of the study were included. While those children with gross physical defect excluded from the study.

The sample size was calculated assuming proportion of 52% prevalence of stunting, confidence interval of 95% and 5% margin of error (d). The sample size was determined to be 384. But, in account for the design effect the number was after multiplied by 1.5 and the final sample size was determined to be 576 participants. Stratified two stage cluster sampling was used to select representative samples. Lists of Clusters (*kebeles*) existing in the Woreda was identified in the first stage and three clusters were selected from the existing 13clusters based on Probability Proportional to Size (PPS) sampling technique. Sampling interval was calculated by dividing total cumulative under five populations (20,043) by the number of kebeles to be selected. By adding the sampling interval to the random number, the number of <5 years age children selected from each Kebele was obtained by PPS (probability proportional to the size).In stage two the numbers of households in the selected clusters with children aged < 5 years of age were identified by immunization cards from health posts and through house-to-house requests during the data collection.

A stratified sampling frame was prepared, based on age and sex categories (≤24, 25-59 months), which had a list of all households in the selected clusters with eligible children aged < 5 years. Simple random sample was taken from each age stratum; yielding a required sample size of apparently healthy children aged <5 years.

2.3. Operational Definition

Stunting: Reflects long-term cumulative effects of inadequate nutrition and health. Stunting is defined as low height-for-age at < -2 SD of median value of the NCHS/WHO international growth reference. Severe stunting is defined as <-3 SD.. Variables

Stunting was dependent variable. The child's age and sex, age interval between two last children, number of children <5 years, time of initiation of breast feeding, Duration of exclusive

breast feeding, Weaning practice, Immunization status, Child illness, Vitamin A supplementation, Maternal age, ANC follow up, Place of delivery, Monthly income, Source of water, Number of rooms, Presence of Latrine and Household food insecurity were independent Variables.

2.5. Data Collection Procedure

The study was conducted from February, 25 to March, 15, 2011. The questionnaire was initially prepared in English and then translated into Amharic. The Amharic version was again retranslated back to English by other individual to check for consistency of meaning. The translated Amharic version questionnaire was pre-tested prior to the actual data collection on 5% of the sample size on mothers of children aged less than 5 years who were not included in the study. Training on how to conduct the interviews was given to the interviewers by the principal investigator for two days. Questionnaires were administered to mothers (care takers) of the children. The questionnaire was used to assess socio-demographic characteristics, maternal characteristics, child characteristics, and the feeding and caring patterns of the children.

The height of the children is measured to the nearest 0.1 cm using the Shorr sliding board for children ≤2 years and a stadiometer was used by positioning them at the Frankfert plane for children >2years. Study participants were barefoot while measuring their height. For the children Z-scores, HAZ and LAZ was calculated based on the standard guidelines of WHO 2006 multicenter growth reference data using Anthro plus 2007 software. [9]

2.6. Statistical Analyses

The data was analyzed using SPSS Statistics software version 16. Data cleaning and assumption checking were performed prior to proceeding to analysis. Descriptive statistical analysis was done, Two sample Z test and independent sample t test were used to compare the association between Wondo Genet Woreda and national figure and for comparison of gender difference in stunting. Multiple logistic regression analysis was used for prediction of independent variables to stunuing. To claim statistically significant effect, crude and adjusted odds ratio with 95% confidence interval (CI) was employed. The finding from all analysis was summarized and presented by graphs, tables and other summery measures. For all statistical significance tests, the cut- off value set will be $p<0.05$ with CI of 95%. Those children with height for age less than -2 standard deviations below median values were categorized as stunted.

2.7. Ethical Considerations

The study protocol was approved by the Ethical Clearance Committee of Hawassa University and verbal consent was sought from mothers/caretakers before the interview. The data obtained in due course were confidentially stored.

3. RESULTS

3.1. Socio Demographic Characteristics of the Study Population

Socio Demographic Characteristics of the Study Population presented in table 1. In this study a total of five hundred seventy six participants were involved giving a response rate of 100%. From the 576 participants, 288 (50%) were male children giving a male to female ratio of 1:1. The mean age of the study participants were 34.8 ((±1.5) months. From the study participants 511 (88.7%) were protestant, and 43 (7.5%) were Orthodox. Majority of the study subjects 466 (80.9%) were Sidama, other account for 110 (20.1%). The majority 553 (96%) of the study participants were married and lives in union. Most of the study subjects 433 (75.2%) had no formal schooling and only 1 (0.2%) had completed college or universities level education while the remaining 142 (24.65%) had attended formal schooling. Housewives and farmers account for 403 (70%) and 124 (21.5%) respectively and civil servants account the smallest figure 8 (1.4%).

The mean family size of the study participants was 6.35 (2.04) persons, while 30.7% of the households had more than 7 family members. Of the households more than half of the study participants 319 (55.4%) had two under five year old children and 5(0.5%) of the households had four under five years of age. The majority 556 (96.5%) of children lived in male-headed households. Farming was the major sources of income 483 (83.9%). In 321 (55.7%) of the households decision on how the money would be spent was made only by husbands. Among the respondents, 59.2% of the households had latrines covered with a shade while 10.4% did not have a latrine. Access to safe water was reported by 91% of the respondents. In more than half of the study participants 279 (48.4%) maize were their staple diet followed by kocho 247 (42.9%).

3.2. Child and Maternal Characteristics

Child and Maternal Characteristics presented in table 2 and 3. From the total number of children who participated in the study, their birth order was: first birth for 46 (8%), second to fourth birth for 284 (49.3%) and above third birth for 246 (42.7%) of the children. Concerning the prevalence of common childhood illnesses prior to the past two weeks of the study; 77 (13.4%) of children had diarrhea, 25 (4.3%) acute respiratory infection (ARI) and fever was seen in 10.9 (11.7%) of the children. In more than half of the study participants 322 (55.9%) interval between the lastchildren were from 24-48 months and most of them557 (96.7%) were breast fed for more than 6 months.

Majority of mothers 563 (97.7%) has attended ANC during their last pregnancy and slightly above half of them 299 (51.9%) were married b/n the age of 18-35. Most of them 561 (97.4%) gave birth to the index child at their home. Average total children born to a mother was 4.3 (±1.9).

3.3. Housing Condition and Reported Assets

Housing condition and reported assets of household presented in table 4. In the study area, 288 (50%) of the households had house type made of Grass roof hut (thatched roof) and the mean

(SD) number of rooms in the houses were 2.3 (0.9%). Majority of the households 410 (71.2%) had a farm land size of ≤0.25 hectares and 91(15.8%) had >0.25 hectare and the remaining 75(13%) households had no farm land. The commonest cash crops in the area 210 (36.5) was chat. Most of the households 446 (77.4%) had animals (such as ox, cow, horse, donkey, goat, sheep, or chicken) while 22.6% of them had no animals. Concerning monthly income of the study subjects 505 (87.7%) were ≤500 Birr and the remaining 71 (12.3%) had monthly income of >500 Birr.

3.4. House Hold Food Security

House hold food security is presented in table 5. Slightly more than half of the study participant households 298 (51.7%) were food secured, 194 (33.7%) were severely insecure and the remaining 22 (3.8%) and 62(10.8%) were mildly and moderately food insecure respectively.

3.5. Anthropometric Measurement

Anthropometric measurement presented in table 6.Analysis of children nutritional status based on the standard deviation unit from the median value for anthropometric indices (height-for-age) revealed that 50.3% of the total children included in the survey were found to be stunted. Even though there was a slight increase in prevalence of stunting, 149 (51.7%) in male than female 141 (48.96%), it was not statistically significant (P=0.965).The mean HAS/LAS was negative for both sex. The mean (SD) Height/Length of the study participant children was 87.48 (13.07) and 83.18 (14.14) for male female participants respectively.

3.6. Factors Associated with Stunting

Analysis was performed using binary logistic regression and the tests are presented in table 7. Based on the available information this study examined the influence of socio demographic, economic, dietary, environmental, health care and immunization factors.

The result of this study showed that, except paternal education, decision making role in utilization of money and total number of children in the house hold, there was no significant association between under five children nutritional status (stunting) and all other socio demographic factors. The result of the analysis showed that the highest proportion of stunted children was observed in the households where decision making of money utilization was made by husband only (AOR= 3.1 [95%CI: 1.61-5.99]). Concerning paternal education, those children in house hold of paternal education level 7-8 grade were more likely to be stunted than paternal education level above and below these grades. AOR= 2.29 [95% CI: 1.15-4.54]).

Concerning maternal and child characteristics; birth order and place of delivery were the factors significantly associated with stunting. Those children with birth order 5-12 were 3.2 times more likely to be stunted than those with birth order ≤ 5 (AOR= 3.19 [95%CI: 1.64-6.21]). Children of mother who gave birth to their index child in health facility were 6.26 times more likely to be stunted than those who gave birth at home(AOR=6.26[95% CI: 1.11-35.34]). Those children who didn't eat from vegetable source were 2.54 times more likely to be stunted than

those children who ate (AOR= 2.54 [95% CI: 1.20-5.37]). Those children who ate fruit occasionally were 68% less likely to be stunted than who did not eat fruit and who ate once a week. Those who ate from animal source occasionally 47% less likely to be stunted (AOR= 0.53 [95% CI: 0.29-0.97]). Children of households not displaced from their usual residence 2.9 times more likely to be stunted than displaced children (AOR=2.92[95%CI: 1.36-6.28]).

4. DISCUSION

We found out that the prevalence of Stunting was 50.3%, the rate being 51.7 for boys and 48.96% for female. Other than a slight decrement, the result was parallel with the 2005 national and regional (SNNPRS) figure of Ethiopia which is 47% and 52%, respectively [8]. There is no significant difference in prevalence of stunting between the national figure of 2005 and under five children of Wondo Genet Woreda (P>0.05).

Age and sex are important demographic variables and are the primary basis of demographic classification in most cross-sectional studies in developing countries and here in Ethiopia have shown that female children are at higher risk of stunting than male children. Few studies showed boys are more malnourished than girls. Study conducted in West Gojam Zone revealed, male children's face nutritional disadvantages compared to female children. Even though male preference is prominent in this study area and studies in Ethiopia tending to show that it is female infants who usually receive less food than their male counterparts surprisingly, there is no significant association between gender difference and stunting (p>0.05). Similarly, study conducted in Gaza striprevealed as there is no difference in stunting between boys and girls [10-14]. The finding of this study revealed that sex preference doesn't face nutritional disadvantage in Wondo Genet Woreda.

Although the pathways through which paternal education may influence stunting have been less frequently investigated, work from Indonesia and Bangladesh suggests that these may include health-promoting behaviors such as childhood vaccination, family planning, attendance at the local health clinic and vitamin A supplementation [15]. Study conducted by EHNRI also revealed that likelihood of being stunted was 1.4 times higher among children of father who has no education compared with children whose father has some secondary or higher education. Children whose father had some primary education were also 1.3 times more likely to be stunted compared to children whose father had some secondary or higher education [16]. Contrary to the above reports, in this study we have observed significant positive association between paternal education (grade 7-8) and child stunting (P<0.05). The probable reason for this finding might be those father in this range of educational level may not be employed in different organization because of their academic rank or they might be attending their education, so may not get enough time and money to care for their children.

Study conducted in Nepal showed that power over economic decisions regarding food is not favorable for children's nutritional status when held solely by the mother or father. They found that when parents share power over what food to buy or what to cook, children enjoy slightly

better growth than their counterparts whose parents do not share power [17]. Similar to the above findings in this study we found a significant positive association between decision making role made by only the husband and stunting (AOR= 3.11[95%CI: 1.61-5.99]). Those children of parents' decision making role on utilization of money handled only by the husband were 3.1 times more likely to be stunted than others. Study conducted in Ecuador showed as malnutrition rates were much higher for children who were born at home; the stunting rate for home-born children was 37.8 percent, compared with 18.6 percent for those born in institutional settings. The ratio was almost 2 to 1 in most cases [18].In this study a significant association between place of delivery and stunting was found, which is contrary to the above findings. Those children born in health facility were 6.26 times more likely to be stunted (AOR= 6.26[95%CI: 1.11-35.34]). This may not be surprising because in our study area mothers seek medical help only when they face difficulty during labor and delivery. Mal nutrition is one cause of abnormal labour for mothers, and it has an intergenerational cycle.

Infant-feeding practices constitute a major component of child caring practices apart from socio- economic, demographic, health care and environmental factors [19]. In this study it was observed that those children who ate from animal source occasionally are less likely to be stunted by 47% than who didn't eat and those who consume every day. Those who ate fruit occasionally were less likely to be stunted by 68%. Children who didn't eat vegetables were more likely to be stunted than who ate (AOR=2.54[95%CI: 1.20-5.37]).

Birth order of the child is one of the demographic variables explaining the risk of stunting in children. Study conducted in other parts of Ethiopia revealed that Children of first birth order were found to be at a significantly higher risk of stunting than children of higher birth order [16]. Contrary to this study, there is a significant positive association between higher birth order and stunting. Similar finding was observed in study conducted by EDHS [8]. This higher risk of stunting in higher birth order children could be due to shortage of resource because of large family size.

Study conducted in Peru revealed a significant association of displacement from usual residence and child stunting [20]. Similarly study from Mexico also revealed the positive association between stunting and displacement [21]. However we found out negative impact of non displacement from usual residence on child stunting (2.92[95%CI: 1.36-6.28]) .Non displaced children were nearly 2.92 times more likely to be stunted than displaced. The possible reason for this unexpected finding might be shortage of money which urged them to stay at home during the disaster time.

4.1. Limitation of the Study

This study is based on the reported answers and anthropometric measurement. There may be recall bias in reporting feeding practice and food security issues in spite of asking short duration history.

4.2. Conclusion and Recommendation

Prevalence of stunting is similar when compared to the national figure and among female and male participants. Decision made by husband only on money utilization and increase in birth order were contributing factors for an increase in stunting rate. Home delivery was found to be the protective factors of stunting and similar impact was seen by displacement from usual residence. There is no significant gender difference in prevalence of stunting and the result also showed that as there is no significant difference between National and Wondo Genet Woreda figure in prevalence of stunting in fewer than five children. It is recommended thatstrengthening the community based nutrition program for prevention and early detection of stunting, Encourage mothers (care takers) to feed their child from vegetable source food and empowerment of women by creating awareness in the general population so that they made decision on money utilization for better child caring practices should be in place.

4.3. Authors' Contributions

YT conceived and designed the study is principal investigator. DH, YT and TB analysis and interpretation of the data, TT and HG drafted the manuscript. YT and TB participated in the critical review of the manuscript. All authors gave their final approval of the version of the manuscript submitted for publication

Funding: This study received no specific financial support.

Competing Interests: The authors declare that they have no competing interests.

Contributors/Acknowledgement: The authors gratefully acknowledge Hawassa University and NORAD Project for funding this study. We are also thankful to the study participants for their voluntary participation and Wondo Genet Woreda Heath Office for their support in providing pertinent information.

REFERENCES

[1] WHO, *Turning the tide of malnutrition: Responding to the challenge of the 21st century*. Geneva: WHO, (WHO/NHD/00.7), 2000.

[2] V. Vella, A. Tomkins, A. Borghesi, G. Migliori, B. Adriko, and E. Crevatin, "Determinants of child nutrition and mortality in Northwest Uganda," *Bull of the WHO*, vol. 70, pp. 637– 43, 1992.

[3] C. Bern, J. Zucker, B. Perkins, J. Otieno, and R. Yip, "Assessment of potential indicators for protein- energy malnutrition in the algorithm for integrated management of childhood illness," *Bull World Health Organ*, vol. 75, pp. 87–96 1997.

[4] R. E. Black, L. H. Allen, Z. A. Bhutta, and L. E. Caulfield, "Maternal and child under nutrition: Global and regional exposures and health consequences," *Lancet*, vol. 371, pp. 243-260, 2008.

[5] ACC/SCN, "Fourth report on the world nutrition situation: UN ACC/SCN in collaboration with IFPRI," Geneva, vol. 132, p. 132. Available www.unsystem.org/accscn, 2000.

[6] UNICEF, "Administrative committee on coordination/subcommittee on nutrition reproof the 15th session of the ACC/SCN," New York, 1989.

[7] Central Statistical Authority, "Demographic and health survey 2000." Preliminary Report, ORC Macro International Inc. Calverton, Maryland, USA, 2001.

[8] Central Statistical Agency (Ethiopia) and ORC Macro, "Ethiopia demographic and health survey 2005," Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ORC Macro International inc. Calverton, Maryland. USA, 2006.

[9] M. Blossner, S. A. Borghi, M. M. De Onis, A. Onyango, and H. Yang, *WHO anthro for personal computers: Software for assessing growth and development of the world's children., department of nutrition for health and development.* Geneva: World Health Organization, 2007.

[10] G. Rao, L. Ladusingh, and R. Pritamjit, "Nutritional status of children in North-East India," *Asia-Pacific Population Journal*, vol. 19, pp. 39-56, 2004.

[11] A. Gemechu, "Determinants of nutritional status of children in Amhara region," MSc Thesis in Demography, DTRC/IDR. Addis Ababa University, Addis Ababa, Ethiopia, 2000.

[12] S. Malla and S. Shrestha, "Complementary feeding practices and its impact on nutritional status of under two old children in urban areas of the Kathmandu, Nepal," *Journal of Nepal Health Research Council*, vol. 2, pp. 1-4, 2004.

[13] C. Hadley, D. Lindstrom, F. Tessema, and T. Belachew, "Gender bias in the food insecurity experience of Ethiopian adolescents," *Social Science & Medicine*, vol. 66, pp. 427-438, 2008.

[14] M. Schoenbaum, T. Tulchinsky, and Y. Abed, "Gender differences in nutritional status and feeding patterns among infants in the gaza strip," *Am J Public Health*, vol. 85, p. 968, 1995.

[15] W. Hugh, S. Fadia, S. Soedarti, and H. Peter, "Weight-for-age malnutrition in Indonesian children,1992–1999," *Int. J. Epidemiol.*, vol. 33, pp. 589–595, 2004.

[16] W. Girma and T. Genebo, "Determinants of nutritional status of women and children in Ethiopia. ORC Macro, Calverton, Maryland USA," vol. 1, pp. 1-36, 2002.

[17] B. Mullany, M. Hindin, and S. Becker, "Can women's autonomy impede male Involvement? In pregnancy health in Katmandu, Nepal?," *Social Science & Medicine*, vol. 61, pp. 1993-2006, 2005.

[18] World Bank, "Nutritional failure in ecuador; causes, consequences, and solutions, Washington DC USA," vol. 1, pp. 20-22, 2004.

[19] D. Kumar, N. Goel, P. Mittal, and P. Misra, "Influence of infant-feeding practices on nutritional status of under-five children," *Indian J Pediatr.*, vol. 73, pp. 417-421, 2006.

[20] A. Maganda, J. Risser, W. Chan, and M. Kline, "Growth in HIV infected children receiving antiretroviral therapy at a pediatric infectious diseases clinic in uganda," *Aids Patient Care and STDs*, vol. 22, pp. 245-251, 2008.

[21] J. Hector, A. Miguel, R. Adriana, A. Marcos, N. Albert, F. Douglas, A. M. Mark, and B. Paula, "Malnutrition among children younger than 5 years-old in conflict zones of chiapas, Mexico," *American Journal of Public Health*, vol. 97, pp. 410-17, 2007.

Table-1. Sociodemographic characteristics of study subjects in Wondo Genet Woreda, southern Ethiopia (n=576)

Socio-demographic variables	Frequency	Percent
Household head		
Male headed	556	96.5
Female headed	20	3.5
Maternal education		
Have no formal education	433	75.2
Have formal education	143	24.8
Paternal education		
Have no formal education	334	58
Have formal education	242	42
Maternal occupation		
House wife	403	70
Civil servant	8	1.4
Farmer	124	21.5
Petty trader	32	5.6
Others[1]	9	1.6
Marital status		
Married in union	553	96
Married not in union	10	1.7
Divorced	5	0.9
Widowed	8	1.4
Religion		
Muslim	21	3.6
Orthodox	43	7.5
Protestant	511	88.9
Others[2]	1	0.2
Source of income		
Farming	483	83.8
Daily laborer	17	3
Others[3]	76	13.2
Decision making on use of money(n=576)		
Mainly husband	156	27.1
Only husband	96	16.7
Both jointly	321	55.7
Only wife	3	0.5
Ethnicity(n=576)		
Sidama	466	80.9
Oromo	46	8
Amhara	11	1.9
Others[4]	53	9.2
1-Evajelist, traditional healer 2-Jova, Catholic, Adventist 3-donation, merchant, civil servant	4-Wolayita, Hadiya, silte, gurage	

Table-2. Maternal and Child characteristics of the study subjects in Wondo Genet Woreda, 2011 (n=576)

Maternal and Child characteristics	Frequency	Percent
Sex of the index child		
Male	228	50
Female	228	50
Birth order of the index child		
1-2	129	22.4
3-4	201	34.9
≥5	246	42.7
Interval between the last children(n=545)		
		Continue

<24 month	183	31.8
24-48month	322	55.9
≥48month	40	6.9
Duration of breast feeding		
<6 month	19	3.3
≥6 month	557	96.7
Bottle feeding		
Bottle fed	94	16.3
Not bottle fed	482	83.7
Vaccination status		
Vaccinated	567	98.4
Not vaccinated	9	1.6
Vitamin A supplementation		
Yes	496	86.1
No	80	13.9
Diarrhea in the past two weeks		
Yes	77	13.4
No	499	86.6
ARI in the past two weeks		
Yes	25	4.3
No	551	95.7
Fever in the past two weeks		
Yes	63	10.9
No	513	89.1
Complimentary feeding started		
Immediately after birth	4	0.7
1-6 month	107	18.6
6- 12 month	451	78.3
After 12 month	12	2.1
Not started	2	0.3
Pre lacteal feeding		
Yes	64	11.1
No	512	88.9
Feeding from animal source		
Yes every day	83	14.4
Yes occasionally	418	72.6
No	75	13
Feeding from fruit		
Yes, once a week	39	6.6
Yes, occasionally	203	35
No	335	58.2

Table-3. Maternal and Child characteristics of the study subjects in Wondo Genet Woreda, 2011 (n=576)

Maternal and Child characteristics	Frequency	Percent
Feeding from vegetable		
Yes, once a week	93	16.1
Yes, occasionally	215	37.3
No	268	46.5
ANC during the last pregnancy		
Yes	563	97.7
No	13	2.3
Place of delivery		
Home	561	97.4
Health facility	15	2.6
		Continue

Delivery attended by		
TBA	413	75.3
Health personnel	17	3
Others	125	21.7
Maternal age at marriage		
18-35	277	48.1
>35	299	59.9
Total under five children born to a mother (Mean ± SD)	1.7±0.6	
Total children born to a mother (Mean ± SD)	4.3±1.9	

Table-4. Housing condition and reported assets of the study participants in Wondo Genet Woreda, 2011(n=576)

Housing condition and reported assets		
Name	Frequency	Percent
House type		
Grass roof hut (thatched roof)	288	50
Corrugated iron roof	282	49
Walls covered with cement andCorrugated ironroof	6	1
Number of rooms in the house		
1-2	353	61.3
3-5	223	38.7
Land ownership		
Land size ≤ 0.25 hectare	410	71.2
Land size > 0.25 hectare	91	15.8
Do not have their own land	75	13
Farm animals		
Own farm animals	446	77.4
Do not own farm animals	130	22.6
Cash Crop production (n=343)		
Coffee	3	0.5
Fruit	28	4.9
Chat	210	36.5
Monthly income(Birr)		
<500	505	87.7
≥500	71	12.3
Staple food of house hold		
Kocho	247	42.9
Maize	279	48.4
Teff	50	8.7

Table-5. House holds food security of study participants in Wondo Genet Woreda, 2011 (n=576)

Food security status %		
Food secured	298	51.7
Mildly food insecure	22	3.8
Moderately food insecure	62	10.8
Severely food insecure	194	33.7

Table-6. Mean ±SD anthropometric measurements of children involved in the study,(n=576)

Anthropometric	Sex of child		
	Male	Female	P
Height (cm)	87.48 ± 13.07	83.18 ± 14.14	0.043
Height –for- age Z score	-1.95 ± 2.65	-2.37 ± 3.00	0.292

Table-7. Analysis of selected characteristics of stunted and non- stunted children in Wondo Genet Woreda, Southern Ethiopia (logistic regression analysis) (n=576)

Variables	Factor associated with stunting			
	Stunted No. (%)	Non stunted No. (%)	Crude OR	Adjusted OR
Decision in money utilization				
Mainly husband	68[11.80]	88[15.28]	1	1
Only husband	64[11.11]	32[5.56]	0.39[0.04-4.35]	3.11[1.61-5.99] **
Both jointly	156[27.08]	165[28.65]	1[0.09-11.45]	1.16[0.67-2.01]
Only wife	2[0.35]	1[0.17]	0.47[0.04-5.27]	0.35[0.02-8.23]
Displacement				
Displaced	15[2.60]	39[6.77]	1	1
Non displaced	275[47.74]	247[42.88]	0.35[0.19-0.64] **	2.92[1.36-6.28] **
Paternal education				
Not educated	166[28.82]	168[29.17]	1	1
Read and write	24[4.17]	27[4.69]	1.98[0.49-8.03]	0.56[0.28-1.12]
Grade1-6	46[7.99]	47[8.16]	1.78[0.40-7.89]	1.09[0.61-1.95]
Grade7-8	33[5.73]	21[3.65]	1.96[0.46-8.29]	2.29[1.15-4.56] *
Grade9-12	18[3.13]	17[2.95]	3.14[0.71-13.95]	1.08[0.46-2.54]
College/University	3[0.52]	6[1.04]	2.12[0.46-9.84]	0.51[0.09-2.93]
Place of delivery				
Home	278[48.26]	283[49.13]	1	1
Health facility	12[2.08]	3[0.52]	0.25[0.07-0.88] *	6.26[1.11-35.34] *
Birth order				
1-2	60[10.42]	69[11.98]	1	1
3-4	99[17.19]	102[17.71]	0.76[0.49-1.17]	1.39[0.79-2.46]
5-12	131[22.74]	115[19.97]	0.85[0.59-1.24]	3.19[1.64-6.21] **
Fed animal source				
Yes every day	46[7.99	37[6.42]	1	1
Yes occasionally	198[34.38	220[38.19]	0.78[0.42-1.48]	0.53[0.29-0.97] **
No	46[7.99	29[5.03]	0.57[0.34-0.94] *	1.07[0.49-2.36]
Fed fruit				
Yes once a week	22[3.82]	16[2.78]	1	1
Yes occasionally	93[16.15]	110[19.09]	1.26[0.64-2.48]	0.32[0.13-0.79] *
No	175[30.38]	160[27.78]	0.77[0.55-1.09]	0.52[0.11-1.73]
Fed vegetable				
Yes once a week	40[6.94]	53[9.20]	1	1
Yes occasionally	98[17.01]	117[20.31]	0.58[0.36-0.93]	1.64[0.89-3.05]
No	152[26.39]	116[20.14]	0.64[0.45-0.92] *	2.54[1.20-5.37] *

**: P<0.01 *: P<0.05