

Predictors of Chronic Under Nutrition (Stunting) Among Children Aged 6-23 Months in Kemba Woreda, Southern Ethiopia: A Community Based Cross-Sectional Study

Eskezyiaw Agedew¹ and Tefera Chane^{2*}

¹Department of Public Health, Arba Minch University, Southern Ethiopia

²Department of Public Health, Wolaïta Sodo University, Southern Ethiopia

Abstract

Background: Stunting is a public health problem in developing countries. Stunting (deficit in height/length for age of at least -2 Z score) affects close to 195 million children under five years of age in the developing world. Chronic under nutrition is a major cause of disability preventing children who survive from reaching their full developmental potential.

Objective: To assess chronic under nutrition (Stunting) and associated factors among Children aged 6-23 months in Southern Ethiopia.

Methods: Community based cross-sectional study was carried out among 562 mothers who have young child from 6-23 months in 2014/15 in Kemba Woreda by using pre tested and structured questioners. Bivariate and multivariate analyses were conducted by SPSS version 20 and finally result was interpreted, compared and discussed with different recently published scientific journal.

Results: The study revealed that out of 562 children, 18.7%; 95% C.I (15.6-22.1) of children were stunted, or chronically undernourished (i.e. HAZ \leq 2Z-score). In multiple logistic regressions, boys [AOR: 2.50; 95% CI(1.60-4.01)], older mothers [AOR: 2.60; 95% CI (1.07-6.35)], mothers who have no formal education [AOR: 2.76; 95% CI (1.63-4.69)], mothers who work as daily workers [AOR: 3.06; 95% CI (1.03-9.12)] and have Private work activity(merchant, farmers) [AOR: 2.39; 95% CI (1.61-3.53)], mothers who have no post natal follow up [AOR: 1.64; 95% CI (1.05-2.55)] and maternal illness encountered after delivery [AOR: 1.56; 95% CI (1.05-2.32)] were identified as significant independent predictors of childhood stunting.

Conclusion and Recommendation: A significant number of young child develop chronic malnutrition in this critical periods. Stunting was significantly associated with the illiterate mothers, mothers who work as daily workers and Private work, those has no post natal follow up and maternal illness encountered after delivery. An organized effort should be made at all levels to solve the problems of chronic under nutrition (stunting) in children.

Keywords: Stunting; South Ethiopia; Kemba Woreda

Abbreviations: AOR: Adjusted Odd Ratio; SAM: Sever Acute Malnutrition; MUAC: Mid-Upper-Arm Circumference; CI: Confidence Interval; SD: Standard Deviation; TFU: Therapeutic Feeding Unit

Introduction

Poor linear growth, or stunting (low length- or height-for-age), in young children is the result of multiple circumstances and determinants, including antenatal, intra-uterine and postnatal malnutrition, more commonly due to inadequate or inappropriate nutrition and the impact of infectious disease. Childhood stunting continues to be a public health issue in many African countries [1,2].

Stunting in early life is associated with adverse functional consequences and growth failure during infancy and early childhood is often irreversible, leading to short stature during adolescence and adulthood. Stunting is associated with an elevated risk of child mortality, increased susceptibility to infection and poor cognitive and psychomotor development. The long-term consequences of stunting include deficits in school achievement, reduced work capacity and adverse pregnancy outcomes. Worldwide, stunting affects nearly one-third of children under 5 years of age, with the prevalence being higher in low-resource countries in sub-Saharan Africa and South Asia [3-5]. Stunting is a multi-factorial phenomenon with a high prevalence in developing countries [6]. Globally, it is estimated that under nutrition

is responsible, directly or indirectly, for at least 35% of deaths in children less than five years of age. Stunting (deficit in height/length for age of at least -2 z score) affects close to 195 million children under five years of age in the developing world [7].

Appropriate weaning and complementary feeding behaviors, nutritional interventions, and disease control and treatment programs are strategies to prevent stunting. However, their effectiveness also depends on counteracting the environmental and socio-economic circumstances that allow infection and sub-optimal nutrition to persist [1,6].

The period from birth to two years of age is particularly important because of the rapid growth and brain development that occurs during

***Corresponding author:** Tefera Chane, Lecturer in Department of Public Health, Wolaïta Sodo University, Southern Ethiopia, Tel: +251 28794089; E-mail: teferachane@gmail.com

Received March 27, 2015; **Accepted** May 26, 2015; **Published** May 29, 2015

Citation: Agedew E, Chane T (2015) Predictors of Chronic Under Nutrition (Stunting) Among Children Aged 6-23 Months in Kemba Woreda, Southern Ethiopia: A Community Based Cross-Sectional Study. J Nutr Food Sci 5: 381. doi:10.4172/2155-9600.1000381

Copyright: © 2015 Agedew E, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

this time. The period is often marked by growth faltering, micronutrient deficiencies and common childhood illnesses [8].

Infant-feeding practices constitute a major component of child caring practices apart from socio-cultural, economic and demographic factors. Somehow, these practices constitute one of the most neglected determinants of young child malnutrition in spite of their important role in growth pattern of children [9].

Data exists in Ethiopia that show the problem of malnutrition beginning early in life, primarily during the first 12 months when growth faltering takes hold due to sub-optimal infant feeding practices. Stunted infants grow to be stunted children and stunted adults [10]. At national level, 44% of children under age five are stunted and 21% of children are severely stunted [11]. In order to effectively accomplish the goals of accelerated Stunting reduction, identifying the potential determinants of chronic under nutrition is a vital step to reduce the burden of stunting. Therefore, the aim of this study was to have detailed and concrete data that fill these gaps and would add a value that directs policy makers to draw appropriate intervention measures to improve and flourish the health of future generation.

Methods and Materials

Study setting and source population

This community based cross-sectional study was carried out from December 7-27/2014 on 562 mothers who has young child from 6 months to 2 years age in Kemba Woreda located in Southern parts of Ethiopia. The Southern Nations Nationalities and People's Regional State (SNNPRS) consists of 13 zones and 104 woreda. The region has an estimated 15,042,531 (20.4% of the national estimate) people. Close to 90% of the population are estimated to be rural inhabitants, while 1,545,710 or 10.3% are urban. Kemba woreda is one of the administrative woreda in Gamo Gofa Zone, South Ethiopia 100 km away from Zonal town Arba Minch. From the total population around 44,000 are women in reproductive age group. The Health institution distribution in the woreda is 39 health posts and 9 health centers providing health services including maternal and child health care.

Inclusion and exclusion criteria

Mothers/care givers who have young children from 6 months to 23 months old who live in the selected Keble for at least 6 months were included in the study and those who had mental illnesses interfering the interview were not considered in study.

Sample size determination and sampling methods

The sample size was determined by using single population proportion formula by the following assumption for prevalence of stunting (chronic malnutrition) as 44% in SNNPR, Southern Ethiopia [12], desired precision (d) as 5% and 95% as confidence interval.

$$N = \frac{\left(\frac{Z}{d}\right)^2 p(1-p)}{d^2}$$

The final sample size was calculated by taking 1.5 as design effect which is 567.

Sampling methods

Interviewed mothers were selected from eight kebeles which selected by using lottery method from all kebeles. Then the number of study participant was allocated for each Keble based on proportional

to population size allocation methods by using community based demographic and health related information registration prepared by health extension workers as the sampling frame. Rapid censuses were conducted first to identify the target household. Finally infant-mother pairs were selected from each Kebele by using simple random sampling methods after giving code for each household which has young child from six months to 24 months.

Data collection methods, measurement and quality control

Data was collected from Mothers/care givers who have one child in age 6 months-2 years from each household by direct interviewing. Pre-tested structured questionnaire adapted from different literature was used to collect socio-demographic and others variables. The questioners were arranged and grouped according to the issue addressed. First the questioners was prepared in English and translated to Amharic and pre tested on 5% of mothers before actual data collection outside the selected kebeles; correction and modification was done based on the gap identified during interview. Six Grade 12 completed students were recruited as data collectors and supervised by 3 Nurse. Three day training was given on the aim of the research, content of the questionnaire, and how to conduct interview for data collectors and supervisor to increase their performance in field activities. The Collected data were checked every day by supervisors and principal investigator for its completeness and consistency.

Anthropometric measurements such as weight and height were measured using standard technique and calibrated equipment. The weight of each child was taken by using digital scale wearing light cloth, checking the calibration using 2 kg rod during each instant of weight measuring and the measurement was approximated to the nearest 10 g. Children were not in fasting condition and each subject was weighted twice and the average weight was taken. Length was measured in recumbent position using sliding board by two data collectors and taken to the nearest 1 mm [2,13,14]. The data collectors were trained efficiently on how to take the anthropometric measurements.

Data analysis and management

Data was coded and entered in to Epi-Info version 3.5.1 and exported to SPSS Version 20 for analysis. Exploratory data analysis was done to check missing values, potential outliers and the normality distribution for those continuous variables. The presence of multi-collinearity also was checked and effort was made to incorporate different models to cross check. Anthropometric index (HAZ) was analyzed by using WHO Anthro software version 3.2.2 and categorized as stunted if $HAZ \leq 2$ Z score and as normal if $HAZ \geq 2$ Z score; stunting is defined as $HAZ \leq 2$ SD [13]. Extreme outlier of ≤ 6 Z score of HFA was omitted from the analysis. Descriptive frequencies were calculated to describe the study population in relation to relevant variables. Bivariate logistic regression analysis was calculated to assess the crude association between dependent and independent variables. Finally variables which shows association in bivariate logistic regression analysis and have P-value less than 0.25 (not to miss some of important variables that are not significant in the bivariate analysis) were entered in to Multivariate logistic regression model, to identify significant independent predictors of stunting and to control the possible effect of confounding. Variables with P-value less than 0.05 were identified as significant predictors of stunting.

Ethical consideration

Ethical clearance was obtained from Research ethics committee

(REC) of Addis continental institute of Public Health. Permission letter was obtained from Kemba Woreda Health office. Verbal informed consent from each study participant was obtained after clear explanation about the purpose of the study. All the study participants were reassured that only anonymous data were taken. They were given the chance to ask anything about the study and made free to refuse or stop the interview at any moment they want if that was their choice.

Results

Socio-demographic characteristics of the mothers and young child

A total of 562 women having young child aged 6 months to 23 months were interviewed in the study from 567 sampled mothers with 99.11% response rate. The overall mean age of young child 13.82 months \pm 5.85 (SD), 53% were in age range from 6 months to 1 years and 273 (48.6%) were male and 289 (51.4%) were female with sex ratio of 0.94. Almost half of the mothers, 271 (48.2%) were in age range 25-29 years. About one third of respondents (30.8%) were have no formal educational and 46% of them were farmers and daily workers in there occupational statuses. About two third of the respondent mothers 348 (61.9%) were protestant followers and rest were orthodox and Muslims (Table 1).

Prevalence of chronic under nutrition (Stunting)

From 562 interviewed mothers-child pair 18.7%; 95% C.I (15.6-22.1) of children had chronic under-nutrition (i.e. HAZ \leq 2Z-score) of which 25.8%; 95% C.I (20.8-31.4) were boys and 12.5%; C.I (8.5-16.0) were girls. The level of moderate stunting was 10.4%; C.I (7.9-12.9); among all boys, 14.4%; 95% C.I (10.2-18.6) boys and among all girls, 6.8%; 95%; C.I (3.9-9.7) girls had moderate chronic under-nutrition. The prevalence of severe stunting (HAZ \leq 3 Z-score) was 8.4%; 95% C.I (6.1-10.7). In the overall scenario, boys were more affected than girls. There were higher numbers of stunted boys than stunted girls (Figure 1).

Factors associated with chronic under nutrition (Stunting)

After conducting Multivariate logistic regression analysis boys [AOR: 2.50; 95% CI (1.60-4.01)], age of mothers those in age group \geq

Variables	Frequency (n=562)	Percent (%)
Age of child		
6-8 months	125	22.2
9-12 months	172	30.6
13-17 months	119	21.2
18-23 months	146	26
Sex of child		
Male	273	48.6
Female	289	51.4
Residence of mother		
Rural	205	36.5
Urban	357	63.5
Age of mother		
15-19	97	17.3
20-24	165	29.4
25-29	256	45.6
\geq 30	44	7.7
Religion statuses		
Orthodox	197	35.1
Protestant	348	61.9
Muslim	17	3
Education		
No education	173	30.8
Primary Education	202	35.9
Secondary & above	187	33.3
Occupational statuses		
Daily laborer	20	3.6
Private (merchant, farmers)	259	46.1
Government worker	27	4.8
Housewife	256	45.6
Ethnicity		
Gamo &Gofa	491	87.4
Wolaita	58	10.3
Amhara	11	2
Others	2	0.4

Table 1: Socio-demographic characteristics of mothers, who had infant aged from 6-23 months, who live in Kemba Woreda, 2014/15.

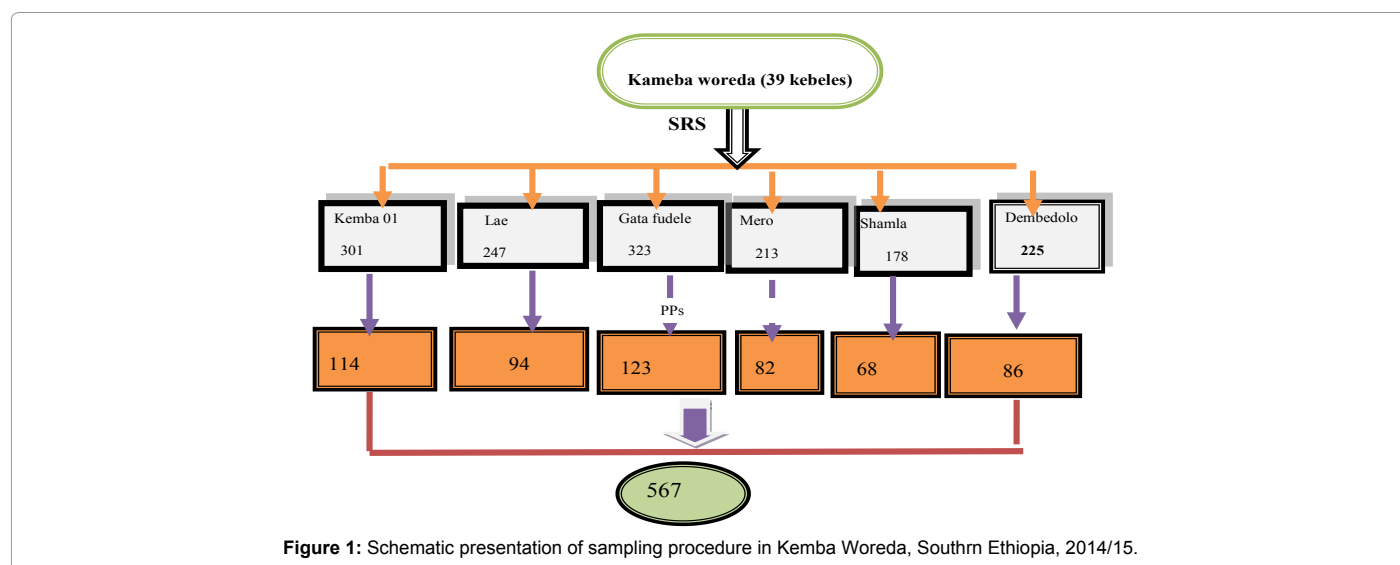


Figure 1: Schematic presentation of sampling procedure in Kemba Woreda, Southrn Ethiopia, 2014/15.

30 years AOR (2.60; 95% CI (1.07-6.35), education level those who have no formal education AOR 2.76 (1.63-4.69), occupational of mothers those who work as daily workers AOR 3.06 (1.03-9.12) and private work activity (merchant, farmers) AOR 2.39 (1.61-3.53), mothers who have no post natal follow up for their child in Health service AOR (1.64 (1.05-2.55), and maternal illness encountered after delivery AOR 1.56 (1.05-2.32) were significantly associated with chronic under nutrition. However, variables such as place of residence, place of delivery and ANC follow up did not show statistical association with chronic under nutrition (Table 2).

Discussion

The result of this study showed that the prevalence of stunting (HAZ \leq 2SD) was 18.7%) 95% C.I (15.6-22.1). Boys were more likely to be stunted than girls (25.8% vs. 12.5%). The prevalence of stunting in this setting was much lower than as compared findings from different parts of Ethiopia (Bule Hora (47.6%), Jimma arjo (41.4%) [14] and

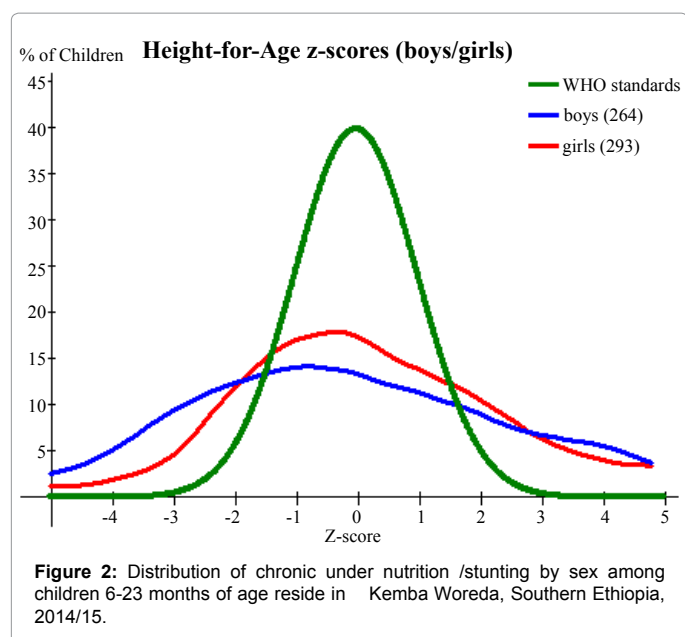
even lower than the regional stunting levels of Ethiopian demographic and health surveillance report [11], Eastern Kenya (33.3%) [15]. This finding was consistent with finding from Johannesburg (18%) [16]. In contrast to the above findings, the magnitude of stunting in the our study area was higher than report from Latin America and Caribbean countries (11%) [17]. The reason why the finding in our setting is lower than the others may be due the narrowing of age of children in the study make the magnitude of stunting is declined as compared to studies having wide target children(<5 years of age. The reason is goes in line with findings from Eastern Kenya that shows stunting is more prevalent in children >2 years [15].

In this study, child sex, maternal age, maternal educational level and occupational status, post natal follow up and were statistically significant with chronic under nutrition. Having no formal education of mothers and older mothers (>31 years) were negatively associated with the nutritional status of children. Similarly the findings are supported with findings from Johannesburg, Tanzania and Kenya

Explanatory Variable	Chronic Nutritional statuses		Crude OR (95% CI)	Adjusted OR (95% CI)	P-value
	Normal (%)	Stunted (%)			
Residence					
Rural	159 (77.6)	46 (22.4)	1.50 (1.04-3.33)	1.34 (0.82-2.19)	0.24
Urban	298 (83.5)	59 (16.5)	1	1	
Sex of child					
Male	204 (74.2)	69 (25.8)	2.43 (1.56-3.80)	2.50 (1.60-4.01)	0.001
Female	253 (87.5)	36 (12.5)	1		
Age of mother					
<=19	74 (76.3)	23 (23.7)	1	1	
20-24	144 (87.3)	21 (12.7)	1.03 (0.60-1.74)	1.15 (0.647-2.08)	0.62
25-30	203 (79.3)	53 (20.7)	1.20 (0.74-1.95)	0.97 (0.54-1.75)	0.924
>=31	36 (81.8)	8 (18.2)	1.96 (0.94-4.09)	*2.60 (1.07-6.35)	0.035
Maternal Education level					
No formal Education	102 (75.6)	33 (24.4)	3.08 (1.98-4.79)	*2.76 (1.63-4.69)	0.001
Primary education	199 (80.9)	47 (19.1)	1.72 (1.15-2.57)	1.42 (0.89-2.25)	
Secondary & above	156 (86.2)	25 (13.8)	1	1	
Occupational statuses					
Daily laborer	16 (72.7)	6 (17.3)	3.55 (1.40-9.09) 0.41 (0.28-0.59)	*3.06 (1.03-9.12)	0.045
Private (merchant, farmers,)	216 (80.9)	51 (19.1)	0.34 (0.12-0.96)	*2.39 (1.61-3.53)	0.001
Government worker	30 (88.2)	4 (11.8)	1	0.44 (0.16-1.18)	0.103
Housewife	195 (81.6)	44 (18.4)		1	
Media Exposure					
Yes	251 (83.7)	49 (16.3)	1		
No	206 (78.6)	56 (21.4)	1.91 (1.35-2.69)	0.86 (0.53-1.39)	0.54
Place of delivery					
Home	153 (78.9)	41 (21.1)	1.25 (0.87-1.78)	1.41 (0.89-2.24) 1	0.14
Health facility	304 (82.6)	64 (17.4)	1	1	
ANC follow up					
Yes	404 (81.3)	93 (18.7)	1	1	
No	53 (81.5)	12 (18.5)	1.66 (0.95-2.89)	0.82 (0.44-1.57)	0.55
PNC follow up					
Yes	132 (84.1)	25 (15.9)	1	1	
No	325 (80.2)	80 (19.8)	1.80 (1.48-3.2)	**1.64 (1.05-2.55)	0.029
maternal illness					
Yes	19 (79.2)	5 (20.8)	1.40 (0.99-1.96)	**1.56 (1.05-2.32)	0.027
No	437 (81.4)	100 (18.6)	1	1	

**Significant factors

Table 2: Factors associated with stunting among mothers who have 6-23 months of young child in Kemba Woreda in 2014/15.



[15,16,18]. Having maternal illness and not attending post natal care were also independent predictors of stunting.

Strength and weakness of the study

This study is community based it show real nutritional condition of children 6-23 months of age. Thus it has strong generalization power because others study conducted with relatively small sample size and institutional based. Recall bias may be introduced even if it was minimized by probing mothers to report by association with different life events may not remember events occurred in the past, and possibility of interviewer bias and misreporting of events were the potential limitation. Another limitation of the study was failing to incorporate wealth index, dietary diversity and house hold food security (Figure 2).

Conclusion and Recommendation

A significant number of young children were affected by chronic malnutrition. Stunting was significantly associated with child sex, maternal illiteracy, mothers who work as daily workers and Private work, those has no post natal follow up and maternal illness encountered after delivery. An organized effort should be made at all levels to improve maternal education, post natal care practice and maternal health statues to solve the problems of chronic under nutrition (stunting) in children, especially in this critical periods to avoid its effect on future development of young children. Appropriate and early intervention should be design at health facility and community level for mothers to have post natal follow up since it is an opportunity for health professional to give nutrition education for mothers. Further research should be conducted to investigate specific nutrient deficiency status in body serum by using laboratory methods.

Acknowledgment

We would like to thank Arba Minch University for funding of our research work. Our deepest gratitude goes to data collectors, kebeles leaders and Kemba woreda Health center manager for his cooperation starting from the beginning till the end of data collection time.

Conflict of Interest

The authors declare that they have no computing interest

Authors' Contribution

EA: Initiated the research, wrote the research proposal, conducted the research, did data entry and analysis and wrote the manuscript.

TC: Contributed in the designing of methodology and write up of proposal.

References

1. Willey BA, Cameron N, Norris SA, Pettifor JM, Griffiths PL (2009) Socio-economic predictors of stunting in preschool children--a population-based study from Johannesburg and Soweto. *S Afr Med J* 99: 450-456.
2. de Onis M, Blössner M, Borghi E (2012) Prevalence and trends of stunting among pre-school children, 1990-2020. *Public Health Nutr* 15: 142-148.
3. Rah JH, Akhter N, Semba RD, de Pee S, Bloem MW, et al. (2010) Low dietary diversity is a predictor of child stunting in rural Bangladesh. *Eur J Clin Nutr* 64: 1393-1398.
4. Fund, UNCs, The State of the World's Children 2009 UNICEF. 2008.
5. Victora CG, Adair L, Fall C, Hallal PC, Martorell R, et al. (2008) Maternal and child undernutrition: consequences for adult health and human capital. *Lancet* 371: 340-357.
6. Ruel MT, Menon P (2002) Child feeding practices are associated with child nutritional status in Latin America: innovative uses of the demographic and health surveys. *J Nutr* 132: 1180-1187.
7. Organization WH (2010) Global Data Bank on Infant and Young Child Feeding, World Health Statistics. Geneva, World Health Organization.
8. Wolde TEA, Alemu Sufa, Adeba E (2014) Prevalence of Chronic Malnutrition (Stunting) and Determinant Factors among Children Aged 0-23 Months in Western Ethiopia. *J Nutr Disorders*.
9. Kumar D, Goel NK, Mittal PC, Misra P (2006) Influence of infant-feeding practices on nutritional status of under-five children. *Indian J Pediatr* 73: 417-421.
10. Kimani-Murage EW, Madise NJ, Fotso JC, Kyobutungi C, Mutua MK, et al. (2011) Patterns and determinants of breastfeeding and complementary feeding practices in urban informal settlements, Nairobi Kenya. *BMC Public Health* 11: 396.
11. Macro CSAEaO (2012) Ethiopia Demographic and Health Survey 2011. Addis Ababa, Ethiopia and Calverton, Maryland, USA.
12. Macro CSAEaO (2011) Ethiopia Demographic and Health Survey. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ORC Macro.
13. WHO (2006), WHO Multicenter Growth Reference Study Group WHO Child Growth Standards: Length/ height-for-age, weight-for-age, weight-forlength, weight-for-height and body mass index-for-age: Methods and development. Geneva, World Health WHO.
14. Asfaw M, Wondaferash M, Taha M, Dube L (2015) Prevalence of undernutrition and associated factors among children aged between six to fifty nine months in Bule Hora district, South Ethiopia. *BMC Public Health* 15: 41.
15. Bukania ZN, Mwangi M, Karanja RM, Mutisya R, Kombe Y, et al. (2014) Food Insecurity and Not Dietary Diversity Is a Predictor of Nutrition Status in Children within Semi-arid Agro-Ecological Zones in Eastern Kenya. *J Nutr Metab* 2014: 907153.
16. Willey BA, Cameron N, Norris SA, Pettifor JM, Griffiths PL (2009) Socio-economic predictors of stunting in preschool children--a population-based study from Johannesburg and Soweto. *S Afr Med J* 99: 450-456.
17. Unicef (2013) Improving Child Nutrition The achievable imperative for global progress.
18. McDonald CM, Kupka R, Manji KP, Okuma J, Bosch RJ, et al. (2012) Predictors of stunting, wasting and underweight among Tanzanian children born to HIV-infected women. *Eur J Clin Nutr* 66: 1265-1276.