



Prevalence of Stunting and its Associated Factors among Under-Five Children from Rural Communities with Productive Safetynet Program in South Gondar Zone, Northwest Ethiopia

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Abstract

Background: undernutrition is a major public health problem worldwide and can impair the intellectual development of a child. Stunting is the commonest nutritional public health significant disorder among children, especially in developing countries including Ethiopia. Even if the cause is multifactorial, inadequate intake of nutrients and infection is the immediate causes of under nutrition. All these problems were more severe among children's in the productive safety net program beneficiaries of the rural community due to low agricultural productivity and/or low socioeconomic status. So, this study aims to determine the level of stunting and its associated factors among under-five children from rural communities with productive SafetyNet program in South Gondar Zone, Northwest Ethiopia.

Methods: A community-based cross-sectional study was employed. By using simple random sampling, 769 children paired with their mother or caregivers were included into this study. The data were collected using a structured and pre-tested questionnaire. Anthropometric indices were built to determine height for age Z score. AnthroPlus and Epi info version 7.0 software's were used for data entry and finally, the entered data were exported to SPSS version 20.0 software to carry out the further statistical analysis. Both bivariate and multivariable logistic regression models were used to explore significant variables. Finally, a P-Value ≤ 0.05 was used to declare the statistical significance of the variables.

Results: In this study, the magnitude stunting was 44.2% (95% CI (40.9%, 47.7%)). Stunted children from productive Safety Net households were 50.3%. Factors associated with the development of stunting were a birth interval (AOR: 1.61, 95% CI (1.15, 2.26)), ANC follow-up (AOR: 0.47, 95% CI (0.26, 0.87)), hand washing practice (AOR: 1.96, 95% CI (1.16, 3.31)), and family size (AOR: 4.40, 95% CI (3.20, 6.07)).

Conclusion: Stunting is a severe public health problem. And, appropriate counselling regarding birth spacing, to have antenatal care follow up, and limiting the number of children is very important for women in the reproductive age group by integrating with all other services to reduce the magnitude and burden of stunting.

Keywords: Stunting, Under-Five Children; Safety Net Program; South Gondar Zone; Ethiopia

Abbreviations: AOR: Adjusted Odds Ratio; COR: Crude Odds Ratio; DDS: Dietary Diversity Score; HAZ: Height For Age Z Score; PSN: Productive Safetynet; SD: Standard Deviation; SPSS: Statistical Packages For Social Sciences; WHO: World Health Organization.

Introduction

According to the Millennium Development Goals, economic growth, household living standards, and child survival are indicated by the nutritional status of children [1]. Currently, Ethiopia found with the highest population

growth and remarkable economic growth and expansion of the services [2]. With this effort, poverty and food insecurity is still a major problem due to poor agricultural marketing system with poor access to transport, communications, and production technologies [3,4].

Productive safety net program (PSNP) implemented in Ethiopia since 2005 to address chronic food security through transfers (food and or money) to chronically food-insecure households in order to prevent asset depletion. In 2009 PSNP+ was launched for small income-generating activities among households to financial services and markets in order to have self-sustainable finance [5-7]. PSNP is provided to meet consumption needs and to avoid selling productive assets because of food insecurity [5].

This day in Ethiopia, food insecurity with hunger, and under nutrition persist as a major problem in each region of the country [8]. Amhara regional state has all this problem which is reflected by the poor nutritional status of women and children [9,10]. Stunting might be persisting due to inadequate intake, low dietary diversity, and poor food quality, inappropriate feeding practices. In addition to this, hygienic practices, and illness that lead to failure to take, and absorb sufficient essential nutrients for growth & development [11].

There is a high prevalence of stunting among children with PSNP dependent households as compared to those households without PSNP in Ethiopia [10]. Existences of stunting have a negative consequence in early and later life which follows the intergeneration life cycle. Because of this, productivity will be decreased and affects both the economic growth and development of the country at large. Food insecurity has a negative effect on school attendance and educational attainment of children and in Ethiopia too [12].

Methodology and Materials

Study Design and Setting

A community-based cross-sectional study was employed in South Gondar Zone, Amhara regional state. In this zone there are five Woredas (Layi gayint, Tachgayint, Simada, Ebinat and Libokemkem) with known food insecurity. In these Woreda, based on the household assets the households were selected for productive Safety Net program. Two Woredas were randomly (Tach Gayint and Libokemkem) selected for this study. The districts have relative high temperature and relatively low amount of annual rainfall. The Woredas have a single rainy season and agricultural activities (commonly from June to September). Cereals and grains are the main cash crops. The total population of Libokemkem in 2010 was 198,951 of which 100,951 were males and 97,423 females and the number of households in the Woreda with

productive safety net program was 4887. The total numbers of children less than 5 years were expected to be 34,986. Based on the 2007 national census conducted by the Central Statistical Agency of Ethiopia (CSA), Tach Gayint woreda has a total population of 101,956, of whom 51,041 are men and 50,915 women and the number of households in the Woreda with productive safety net program was more than 5000. The total numbers of children less than 5 years were expected to be over 25,000. The data were collected from May to June, 2016.

Study Population

All children (06 to 59 months of age) with their caregiver/parents in the rural community of Lerbo – Kemkem Woreda during data collection periods were included. But, children with a physical disability, guests, and newcomers were excluded.

Sample Size Determination and Sampling Procedure

For this study, 769 children's data were included after excluding incomplete dates with the absence of physical measurements, age of the child and flagged cases. We were selected 4 kebeles from Tach Gayint and 5 from Libokemkem Woredas.

After selecting 09 rural Kebeles randomly (lottery method), a multistage sampling method was employed to get all study participants. The sample size was allocated for each selected Kebeles. After obtaining the list of children from the Health Extension workers' family folder record, children were selected by using simple random sampling until we got the required amount of sample size. During data collection, in the case of two or more children within a single household lottery method was used to select one.

Measurements and Tools for Data Collection

Well-structured and pretested Amharic version questionnaires were used after translated into Amharic from the English language in order to check its consistency. The questionnaire had socioeconomic, anthropometry and dietary habit. The dietary habit data was collected by asking the children's mother to recall all the foods consumed by the child within the past 24 hours.

The weights were measured after take-off the shoe, and wearing a possible light close and for children less than 2 years the panty bag was used. The wooden board used to take the height as well as the length for children's less than 2 years interchangeably. The height/length was measured by placing the participants into the Frankfurt position.

Data Quality Assurance

The questionnaire contained demographic, socioeconomic and behavioral factors and prepared in a simple and easily understandable way in the Amharic language. Six data collectors (a team of two individuals), three supervisors and principal investigators were involved in data collection process after intensive training of 02 days on how the data collectors and supervisors interview the mothers, fill the questionnaire and taking physical measurements by using standard instruments of weighing scale and height/length board. Pretested was done on 20 participants of adjacent Woredas before actual data collection.

To obtain the appropriate age and to reduce recall bias; prominent local events, Baptism cards, and immunization cards were employed.

Weighing scales were calibrated by using 1kg of standard weight before every measurement of each day and three consecutive measurements were taken to ensure accuracy. Weight and lengths/height were recorded into the nearest 0.1kg and 0.1cm respectively. All forms were reviewed every night by the supervisors and investigator to communicate with problems.

Definitions of Terms

Stunting: when a child height for age Z-score was $<-2SD$ of the median value of the NCHS/WHO curve [13]. Households with PNSPs: households identified as chronically food insecure and currently they are a part of cash transfer or asset-building program [14,15].

Dietary diversity score (DDS):- is the consumed food by the child within 24 hours and was categorized as low (consumed <4 food groups) and good (consumed ≥ 4 food groups) dietary diversity scores [16].

Data Processing and Analysis

The age, sex, height/length and weight of children

entered into Anthro Plus software to build height for age based on growth reference of NCHS. All the data entered by using EPI info version 7.0 and then exported into SPSS version 20.0 for windows for cleaning of data, descriptive and analytical analysis of variables. Binary and multivariable analysis was done to saw independent and multivariable effects height for age. Finally, p -value ≤ 0.05 was used to declare statistical significance. An odds ratio (OR) values with 95 % of the confidence interval were computed to saw the levels of association.

Ethical Consideration

Ethical clearance was obtained from the Institutional Review Committee of Debre Tabor University. An official letter was obtained from Zonal Health Department and respective Woreda health offices. Oral consent was obtained from each study participant's mother or caregiver after they were included in this study. First, the purpose of the study was explained to them and we assured the privacy and confidentiality of the information throughout the data collection and after. Lastly, they got information about the rights to interrupt and to refuse the interview process at any time. After analyzing the final data, we assured that the final result of the study will be published in an international scientific journal. Weight and height of children were measured as much as possible without posing discomfort. All caregivers who had stunted children were counseled about the importance of appropriate feeding and health education and advice on the spot.

Results

Socio-Demographic Characteristics

The response rate for this study was 94.5%. The average age \pm SD the respondent (mothers/caregivers) was 30.11 + 5.16yrs. All of them were Orthodox religion followers. From the total, one-fourth of the households are under the safety net program. The average age in month \pm SD the child was 31.30 \pm 20.512 months and near to 55% found between 23 – 59 months of age as shown in the table below (Table 1).

Variable	Categories	Frequency	Percent
Current maternal Age (Yrs)	15 – 19	12	1.6
	20 – 24	76	9.9
	25 – 29	267	34.7
	30 – 34	252	32.8
	35 – 39	107	13.9
	40 – 44	55	7.2
	45 – 49	09	1.2

Household head	Husband	734	95.4
	Wife	35	4.6
Enrolled in Safety net program	Yes	195	25.4
	No	574	74.6
Marital status	Single	59	7.7
	Married	630	81.9
	Separated	80	10.4
Respondent's educational status	unable to read and write	591	76.9
	able to read and write	178	23.1
Husband's educational status	unable to read and write	427	55.5
	able to read and write	314	40.8
	primary education and above	28	3.7
Respondent's occupation	Housewife	385	50.0
	Daily laborer	35	4.6
	Farmer	349	45.4
Husband's occupation	Daily laborer	36	4.7
	Farmer	733	95.3
Age of the child	6 – 11 months	142	18.5
	12 – 23 months	300	39
	24 – 59 months	327	42.5
Sex of the child	Male	374	48.6
	Female	395	51.4

Table 1: Socio-demographic and economic characteristics of the children 6 – 59 months of age in South Gondar Zone, Northwest Ethiopia, 2016 (n=769).

Child Related Characteristics

The average age difference between the index and the next child \pm SD was 3.20 ± 1.54 years. The majority of the children were starting complementary feeding at the age of

06 months or above. Near to 5% of the mother gives additional food or beverages after delivery instead of colostrum. Eighty-five percent of the delivery was at a health institution for the index child (Table 2).

Variable	Categories	Frequency	Percent
Age difference between the last 2 children	< 2 years	283	36.8
	\geq 2 years	486	63.2
Breast feeding status	Yes	744	96.7
	No	25	3.3
Age at starting of complementary feeding	After birth	59	7.7
	1 – 6 months	118	15.3
	At 6 month or later	592	77.0
Giving additional/other foods or beverages after delivery	Yes	37	4.8
	No	732	95.2

Bottle feeding	Yes	68	8.8
	No	701	91.2
Attending ANC for current child	Yes	697	90.6
	No	72	9.4
Place of delivery	Health Institution	654	85.0
	Home	115	15.0
Vaccination history	Yes	720	93.6
	No	49	6.4
Illness in the last 2 weeks	Yes	193	25.1
	No	576	74.9
Hand washing practice	Yes	656	85.3
	No	153	14.7

Table 2: Obstetrics related characteristics of the children 6 – 59 months of age in South Gondar Zone, Northwest Ethiopia, 2016 (n=769).

The average dietary diversity score \pm SD was 5.23 ± 1.14 . By using 24-hour dietary recall of 7 food groups, most of the child 678(88.2%) had good dietary diversity and the remaining 91(11.8%) were had poor (<4 DDS).

Magnitude and Factors Associated with Stunting

The mean age \pm SD was 23.38 ± 13.20 months. The mean \pm SD of weight and height of the child was 10.05 ± 2.54 Kg and 81.12 ± 14.49 m respectively. The mean \pm SD of HFA was -1.28 ± 2.73 . The magnitude of stunting (HFA) was

44.2% (95% CI (40.4%, 47.7%)) and from this 28.0% (95% CI, (24.7%, 31.2%)) was very severe. In bivariate logistic regression; maternal education, enroll in PSN, birth interval, ANC follow-up, vaccination history, having diarrhea, hand washing practice, family size, and sex of the child were significant variables. Then, all these significant variables were fitted into multivariable logistic regression analysis and birth interval, ANC follow-up, hand washing practice, and family size were the associated factors for the development of stunting among under-five children as shown in the table below (Table 3).

Variable	Yes	Stunting		COR (95% CI)	AOR (95% CI)
		No			
Maternal education	Unable to read & write	343	248	0.67(0.48, 0.94)	0.76(0.53, 1.11)
	able to read & write	86	92	1	1
Enrol in SNP	Yes	97	98	1.38(1.00, 1.92)	1.29(0.89, 1.88)
	No	332	242	1	1
Birth interval	<2 years	154	129	1.92(1.43, 2.59)	1.61(1.15, 2.26) *
	≥ 2 years	186	300	1	1
ANC follow-up	Yes	316	381	1	1
	No	24	48	0.60(0.36, 1.01)	0.47(0.26, 0.87) *
Vaccination history	Yes	309	411	1	1
	No	31	18	2.29(1.26, 4.17)	1.80(0.92, 3.52)
Having diarrhoea within 2wks	Yes	107	86	1.83(1.31, 2.54)	1.30(0.85, 1.98)
	No	233	343	1	1
Hand washing practice	Yes	247	382	1	1
	No	66	47	1.96(1.30, 2.93)	1.96(1.16, 3.31) *

Family size (mean)	≤4	99	288	1	1
	>4	241	141	4.97(3.65, 6.77)	4.40(3.20, 6.07) *
Sex of the child	Female	143	231	0.62(0.47, 0.83)	0.74(0.54, 1.02)
	Male	197	198	1	

Table 3: Logistic regression analysis results of factors associated with stunting among children of 6 -59 months of age in South Gondar Zone, Northwest Ethiopia, 2016 (n =769).

* = Significant during multivariable analysis ($p \leq 0.05$), 1 = reference variable, SNP = Safety Net Program.

Children who had low birth intervals were 1.6 times (AOR: 1.61, 95% CI (1.15, 2.26)) stunted as compared to the highest birth interval. Children from a mother with ANC follow up were 53% less likely to be stunted (AOR: 0.47, 95% CI (0.26, 0.87)). Mothers who had no practice of handwashing were 2 times (AOR: 1.96, 95% CI high to had stunted child (1.16, 3.31)). Children from the highest family size were 4 times more likely to develop stunting (AOR: 4.40, 95% CI (3.20, 6.07)).

Discussion

In Ethiopia, still undernutrition is a significant public health problem and individual and community-level factors were significant determinants of childhood under-nutrition [17,18].

In this study, the overall prevalence of stunting was 44.2% (95% CI (40.4%, 47.7%)). This result shows that the prevalence of stunting in Lebo – Kemkem Woreda is higher when compared with the national prevalence reported by EDHS 2016 (38%) [18]. This variation partly could be due to the difference in sample size as compared to the national data. The prevalence of stunting in this study is in line with a result reported from Wondogenet District, Sidama Zone, Southern Ethiopia which was 45.5% [19]. In this study, the magnitude of stunting and wasting were also compared with a study conducted at Jigjiga Town in Somalia Regional State, Ethiopia, and the prevalence of stunting was found to be 34.9% which is low as compared to our finding [20]. The possible reason for this difference may be due to socioeconomic variations, educational status of parents regarding nutrition, and food culture or dietary habit differences.

Children from who had low birth interval were 1.6 times (AOR: 1.61, 95% CI (1.15, 2.26)) stunted as compared to the highest birth interval which is in line with a study in Tehsil Zarghoon Town, Pakistan that showed short birth interval between children predisposes them to stunting [21]. The possible reason may be due to when there are many children who are closely spaced in the family; there could be limited overall health care, food, and nutrition that end the child to be undernourished. Children from a mother with ANC follow up and hand washing practices were significant variables

strongly associated with stunting which are similar to a study done in Sebeta, Hawas District, Oromia, Ethiopia [22]. This result revealed that also children from the highest family size were 4 times more likely to develop stunting (AOR: 4.40, 95% CI (3.20, 6.07)) which is similar to findings from a study in Bule Hora District, Southern Ethiopia [23].

The study was limited in linking stunting to some specific variables like diseases without signs and symptoms, unable to establish any possible causal link and long-time exposures before, during and after delivery like chronic food insecurity.

Conclusions and Recommendations

In this study, the prevalence of stunting was a severe public health problem. Factors associated with the development of stunting were a birth interval, ANC follow-up, hand washing practice, and family size. Maternal education during ANC follow up and immunization by health care provider about the hygienic practice, maternal and childcare is very important to reduce the problem.

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Authors' contributions

MTE: made the draft of the proposal, and acquisition, analysis of data and on the interpretation or discussion of results and the whole parts of the manuscript.

ADG and DTA: worked on the analysis of data, on the interpretation or discussion of results and revising the whole manuscript.

All the authors read and approved the final manuscript.

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Availability of Data and Materials

The datasets are available from the corresponding author.

Consent for Publication

The content is included in the ethics approval statement.

Competing Interests

We declare that there is no competing interest with anyone else.

References

- Horton R, Lo S (2013) Nutrition: a quintessential sustainable development goal. *The Lancet* 382(9890): 371-372.
- The world bank (2015) World Bank: Ethiopia: Country Profile. In: World Bank.
- Rural poverty portal: Rural poverty in Ethiopia. In: IFAD.
- Alderman H (2010) Safety nets can help address the risks to nutrition from increasing climate variability. *J Nutr* 140(1): 148S-152S.
- Berhane G, Hoddinott JF, Kumar N (2012) The impact of Ethiopia's Productive Safety Nets and Household Asset Building Programme: 2006-2010. Institute of Development Studies (IDS).
- Devereux S, Sabates Wheeler R, Tefera M, Taye H (2006) Ethiopia's productive safety net programme: trends in PSNP transfers within targeted households. Institute of Development Studies, Brighton.
- Gilligan DO, Hoddinott J, Taffesse AS (2009) The impact of Ethiopia's Productive Safety Net Programme and its linkages. *The journal of development studies* 45(10): 1684-1706.
- Devereux S (2000) a discussion paper for Food Insecurity in Ethiopia. In: DFID.
- Central Statistical Agency, ICF International (2011) Ethiopia Min Demographic and Health Survey 2011. In: Addis Ababa, Ethiopia, and Calverton, Maryland, USA: Central Statistical Agency and ORC Macro.
- Central Statistical Agency, ICF International (2014) Ethiopia Min Demographic and Health Survey 2014. In: Addis Ababa Ethiopia, and Calverton, Maryland, USA: Central Statistical Agency and ORC Macro.
- ACF International (2011) Guidelines for the integrated management of severe acute malnutrition: in- and out-patient treatment. In: nutrition and health department, ACF - international.
- Belachew T, Hadley C, Lindstrom D, Gebremariam A, Lachat C, et al. (2011) Food insecurity, school absenteeism and educational attainment of adolescents in Jimma Zone Southwest Ethiopia: a longitudinal study. *Nutr J* 10: 29.
- WHO (2006) WHO child growth standards: Methods and development: length/height for age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age. In: World Health Organization.
- Devereux S, Sabates-Wheeler R, Tefera M, Taye H (2006) Trends in PSNP transfers within targeted households. Institute of Development Studies, Sussex and Indak International, Addis Ababa.
- Hoddinott J, Berhane G, Gilligan DO, Kumar N, Seyoum Taffesse A (2012) The impact of Ethiopia's Productive Safety Net Programme and related transfers on agricultural productivity. *Journal of African Economies* 21(5): 761-786.
- FAO, USAID (2016) Food and Nutrition Technical Assistance III Project (FANTA), Rome.
- Haile D, Azage M, Mola T, Rainey R (2016) Exploring spatial variations and factors associated with childhood stunting in Ethiopia: spatial and multilevel analysis. *BMC pediatrics* 16: 49.
- Central Statistical Agency, ICF International (2016) Ethiopia Demographic and Health Survey 2016. In: Addis Ababa Ethiopia, and Calverton, Maryland, USA: Central Statistical Agency and ORC, Macro.
- Rodamo KM, Fiche YA, Geleto FB, Abebe RF, Dangiso DDJJoG (2018) Magnitude and Associated Factors of Protein Energy Malnutrition among Children Aged 6-59 Months in Wondogenet District, Sidama Zone, Southern Ethiopia 6(3): 47-55.
- Yimer Mihrete (2018) Assessment of Stunting, Wasting Rate and Associated Factors among Children 0-59 Months at Jigjiga Town in Somali Regional State, Ethiopia. *J Food Nutr Popul Health* 2(3).
- Achakzai P, Khan R (2016) Nutritional status and associated factors among children less than five years of age in tehsil Zarghoon town, District Quetta, Baluchistan. *Journal of Ayub Medical College Abbottabad* 28(1): 146-151.

22. Haile A, Amboma TA (2018) Children's nutritional status and its determinants in small towns, Sebeta Hawas district, Oromia, Ethiopia 1(1): 33-47.
23. 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(1): 41.

