

Magnitude of Stunting and Associated Factors Among 6-59 Months Old Children in Hossana Town, Southern Ethiopia

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Abstract

Introduction: Stunting remains a public health problem of greater magnitude and it more accurately reflects nutritional deficiencies of the most critical periods of growth and development in early life. Therefore, the study was aimed to assess the magnitude of stunting and associated factors among 6-59 months old children in Hosanna town, Southern Ethiopia.

Methods: A community based cross-sectional study was conducted using a simple random sampling technique with a sample size of 734 children, aged 6-59 months. The structured questionnaires were used to collect data. Data analysis was done by SPSS version 20 and ENA for SMART, 2011 software.

Results: The study result reveals that 35.4% of 6-59 months old children were stunted, with even higher rates among male children 138 (53.1%). Children more likely to be stunted included: those between 24 and 35 months (AOR=2.29; 95%CI:1.10, 4.82), those whose mothers had no education (AOR=5.38; 95%CI:2.27, 12.77), those from a low income household (AOR=3.92; 95%CI:2.54, 6.06), those who were physically small at birth (AOR=2.10; 95%CI:1.13, 3.93), having birth order of 4 and above (AOR=2.32; 95%CI:1.28, 4.21), those who breastfed for longer than 24 months (AOR=2.49; 95%CI:1.03, 6.00), and those whose mothers did not use a cup to feed their children (AOR=2.08; 95%CI:1.05, 4.15).

Conclusion: The findings of this study have proven stunting were a high prevalent problem in the study area. The child's age, mother's education level, household income, birth order, size at birth, duration of breastfeeding and cup feeding were found to be associated factors of stunting. All of the factors, except birth order, could be reversed through thoughtful programming. The findings of this study suggest that there is potential need for linking nutrition interventions in the study area.

Keywords: Child stunting; 6-59 Months children; Malnutrition; Ethiopia

Introduction

Malnutrition is an underlying cause of more than 2.6 million child deaths every year, a third of the total of child deaths. Every hour of every day, 300 children die because of malnutrition but it's not recorded on death certificates and, as a result, it's not effectively addressed [1,2].

Worldwide, an estimated 171 million children are stunted because of poor nutrition in the earliest months of life. More than a third of children in Asia are stunted, which accounts for almost 100 million of the global total. In Africa, almost two in five children are stunted that is a total of 60 million children [2,3].

Stunting is defined by a Height-for-Age (HAZ) Z-score below two SDs of the median WHO standards [4]. The first 1,000 days of life beginning with conception, through a mother's pregnancy and up until the age of two is the most critical period in a child's development [3].

Stunting is an indicator of chronic malnutrition, meaning long-term or accumulated nutritional deficiency resulting from lack of adequate dietary intake over a long period of time and/or recurrent illness. Stunting is caused by inadequate diet and by infection as immediate level. These primary causes of malnutrition are influenced by food access and availability, healthcare, water and sanitation, and the way a child is cared for such as whether the infant is breastfed and whether basic hygiene practices are used which includes hand-washing [3,5,6].

Stunting in early childhood also results in diminished cognitive and physical development, which puts children at a disadvantage for the rest of their lives. They may perform poorly in school, and as adults they may be less productive, earn less and face a higher risk of disease than adults who were not undernourished as children [6,7].

Height at two years of age is clearly associated with enhanced productivity and human capital in adulthood, so early nutrition is also an important contributor to economic development in which a 1% loss in adult height due to childhood stunting is associated with a 1.4% loss in productivity [5]. Progress in reducing childhood malnutrition in

developing countries has been slow. The larger burden for Africa is stunting that is the failure to grow in stature [8].

Stunting is continued to be one of the most important public health problems in Ethiopia. In urban Ethiopia based on 2011 EDHS the prevalence of stunting in under five children was 32% which is with 2.2% increase in five years from 2005 EDHS [9,10].

Therefore, this study is aimed to assess the magnitude of stunting and associated factors among under five children in Hossana town, Southern Ethiopia. Furthermore, the findings of this study will enable policy makers, public health advocates, nutritionists and researchers used as baseline data to design appropriate and effective interventions.

Subjects and Methods

Study area and period

This study was conducted in Hossana town. Hossana is located 230 km south west from the capital city of Ethiopia being the capital city of Hadiya zone. The study period was as of March 15 to April 15, 2013.

Study design and populations

Community based cross sectional study design was used to assess the magnitude of stunting and associated factors among 6-59 months old children in Hossana town. All sampled respondents of the Hossana town from the randomly selected kebele who were present during study period were included.

Sample size and sampling procedures

The sample size was calculated using single population proportion formula by considering 32% of estimated proportion of under five children were stunted in Ethiopia, margin of error 5%, a 5% level of significance (two sided) i.e. 95% confidence interval of certainty. Based on the above assumptions, with an additional 10 percent contingency for non-response, the final sample size was 334. Considering the design effect of 2 and with an additional 10 percent contingency for non-response; the total sample size was 734. Simple random sampling technique was used to select study participants from each kebele.

Measurement and variables

Dependent variable: Stunting (Height-for-age)

Independent variables: Socio-demographic factors, Environmental factors, Health care factors and Dietary factors.

Socio economic and demographic factors: Age, ethnicity, religion, marital status of the mother, mother's education, father's education, mother's occupation, father's occupation, household monthly income, birth order, preceding birth interval. Environmental factors: Source of drinking water and latrine facility availability. Health care factors: child's weight and size at birth, child immunization status, child morbidity, mother's antenatal care visits, mother's age at pregnancy, mother's place of delivery. Dietary factors: ever breast feeding, time for initiation of breast feeding, colostrums feeding, pre-lacteal feeding, duration of breastfeeding, age for introduction of complementary food method of feeding. Stunting means children whose height-for-age Z-score is below minus two standard deviations (-2 SD) from the median of the WHO reference population are considered short for their age (stunted). Recurrent episodes of diarrhea is to mean child who have 2 or more an episode of diarrhea begins with a 24-hour period with

three or more loose or watery stools and an episode of diarrhea is considered to have ended after 48 hours without three or more loose or watery stools within a 24-hour period Which Is determined as perceived by mother. Fully vaccinated is to mean children who have received vaccination against tuberculosis (BCG), three doses each of the DPT and polio vaccines, and a measles vaccination by the age of 12 months. Currently on vaccination with age mean children who have receiving a vaccination according to the schedule because of their age. Non-Fully vaccinated is to mean children who have not received three doses each of the DPT, a vaccination against tuberculosis (BCG), and polio vaccines, and a measles vaccination by the age of 12 months according to the standard immunization schedule. Size at birth means based on mothers' estimation and verbal report. Pre-lacteal feeding is to mean children given something other than breast milk during the first three days of life. Duration of breastfeeding means the number of months of breastfeeding among children. Complementary feeding means the child receives both breast milk or a breast milk substitute and solid (semi-solid or soft) foods. Low income is to mean households with monthly income below mean income of the sample 1,745ETB. High income is to mean households with monthly income 1,745ETB and above the mean income of the sampled households.

Data collection instrument and procedure

Data on stunting and demographic, socio-economic, environmental healthcare and dietary factors among children age (6-59 months) was collected using structured questionnaire. The questionnaire was adapted from different literatures of similar studies in English to increase the comparability of the finding. Anthropometry measurements mainly height for age was used. For height, length measurement for children below 24 months was taken in laying down or recumbent position and standing height was taken for children 24-59 months and the measurement was taken to the nearest 0.1 cm using UNICEF standard Height Measuring Board with the subjects shoeless [11,12], and for age, the child's age was collected from the mother and confirmed by using birth certificate or vaccination cards and also we were used a "local-events calendar" [11,12].

Data quality management, processing and analysis

Questionnaires were translated to local language and then back translated to English to maintain its consistency. Training was given for data collectors and pretest was done on 5% of the study subjects on similar population out of study area. Supervisors and principal investigator performed immediate supervision on a daily basis. The collected data were entered in SPSS 20.0 version for analysis. Anthropometric measurement data was entered and analyzed by Emergency Nutrition Assessment (ENA) for SMART 2011 software. Descriptive analysis was used to describe the percentages and number of distributions of the respondents by socio-demographic factors, environmental factors, health care factors and dietary factors. Furthermore, bivariate and multivariable logistic regression analyses were used to identify the influencing factors using backward variable selection techniques. All explanatory variables that were associated with outcome variable in bivariate analysis with p-value of 0.25 or less were included in the initial logistic models. The Crude Odds Ratio (COR) and Adjusted Odds Ratios (AOR) together with their corresponding 95% confidence intervals were computed and interpreted accordingly. A P-value<0.05 was considered to declare a result as statistically significant in this study.

Ethical consideration

Ethical clearance was obtained from the Institute of Public Health, University of Gondar Ethical committee. Prior to data collection, a formal letter was obtained from University of Gondar and submitted to each kebele. The purposes and importance of the study was explained and written informed consent was secured from each mother of the children. Confidentiality was maintained at all levels of the study.

All study participants was informed that participation in this research project have no incentives or direct benefit. Participant's involvement in the study was on voluntary basis. Participants who are unwilling to participate in the study and those who wish to quit their participation at any stage were informed to do so without any restriction.

Results

Demographic and socio-economic characteristics

A total of 734 children aged 6-59 months were included in analysis with response rate 100%. Of the 734 under-five children in the study, 374 (51%) were female and, 234 (31.9%) found in the age group 12-24 months. The mean age of the participants was 26.72 ± 13.07 months (Table 1).

Variables		Frequency	Percent
Sex of Child	Male	360	49.0
	Female	374	51.0
Children's age in month	6-11	91	12.4
	12-23	234	31.9
	24-35	200	27.2
	36-47	137	18.7
	48-59	72	9.8
Mother's age at Pregnancy	Less than 20years	49	6.7
	20 to 35 years	672	91.6
	More than 35years	13	1.8
Marital status of the mother	Married	682	92.9
	Divorced	34	4.6
	Widowed	15	2.0
	Never married	3	.4
Ethnicity	Hadiya	471	64.2
	Kembata	113	15.4
	Silte	58	7.9
	Guraghe	49	6.7
	Amhara	27	3.7
	Oromo	16	2.2
Religion	Protestant	504	68.7

	Orthodox	117	15.9
	Muslim	84	11.4
	Catholic	29	4.0
Mother's education	No education	86	11.7
	Primary	258	35.1
	Secondary	268	36.5
	More than secondary	122	16.6
Father's education	No education	45	6.1
	Primary	186	25.3
	Secondary	292	39.8
	More than secondary	211	28.7
Mother's occupation	House wife	406	55.3
	Government employee	83	11.3
	Non-Government employee	29	4.0
	Merchant	122	16.6
	Self-employee	280	38.1
Father's occupation	Government employee	223	30.4
	Non-Government employee	49	6.7
	Merchant	182	24.8
	Self-employee	280	38.1
Household monthly income in ETB	Low income House hold	409	55.7
	High income House hold	325	44.3

Table 1: Demographic and socio-economic characteristics of children among 6 to 59 months in Hossana town, Southern Ethiopia, 2013 (n=734).

Health care and environmental characteristics

547(74.5%) of children participated in the study were normal size and 132(18.0%) were small size at birth according to the mother verbal reports. From the children, majority, 728(99.2%) received vaccination and 686(94.2%) children were fully immunized (Table 2).

Dietary characteristics

Breast feeding was almost universal in the study area children who breast fed were 723(98.5%). 523(71.3%) children started breast feeding within the first one hour (Table 3).

Magnitude of stunting among 6-59 months children

In the analysis stunting was defined as having a z score below -2 SD of the WHO standards. The prevalence of stunting among children of 6-59 months in the study area was 35.4% (34.6-36.3; 95%:C.I.). The prevalence was 79(30.4%) in children age group 12-23 months. Of the total 138 (53.1%) of male children were stunted.

Variables		Frequency	%
ANC visits of mother	None	34	4.6
	1	18	2.5
	2-3	292	39.8
	4 and above	390	53.1
Mother's age at Pregnancy	Less than 20years	49	6.7
	20 to 35 years	672	91.6
	More than 35years	13	1.8
Mothers place of delivery	Public facility	563	76.7
	Private facility	27	3.7
	Home	144	19.6
PNC attendance of Mother	Yes	83	11.3
	No	651	88.7
Birth order	1	351	47.8
	2-3	286	39.0
	4 and above	97	13.2
Preceding birth interval(n=383)	Less than 24 months	160	41.8
	More than 24 months	223	58.2
Child's size at birth	Small	168	22.9
	Normal	477	65.0
	Large	89	12.1
Immunization Status	Fully immunized	686	94.2
	Currently on immunization	36	4.9
	Not fully immunized	6	.8
Diarrhea in the past 2 weeks	Yes	122	16.6
	No	612	83.4
Had recurrent diarrhea in the past 2 weeks	Yes	36	4.9
	No	698	95.1
Main source of drinking water	Piped into dwelling	363	49.5
	Piped to yard/plot	274	37.3
	Public tap /Stand pipe	97	13.2
Toilet facility availability	Yes	717	97.7
	No	17	2.3
*ANC-Antinatal care			

Table 2: Health care and environmental characteristics of children among 6 to 59 months in Hossana town, Southern Ethiopia, 2013 (n=734).

Variables		Frequency	%
Ever breast fed child	Yes	723	98.5
	No	11	1.5
Time for initiation of Breast Feeding (n=723)	Within 1hour	523	71.3
	Within 24 hours	194	26.4
	More than 24 hours	6	.8
Child received pre-lacteal feeds (n=723)	Yes	137	18.9
	No	586	81.1
Child fed colostrums (n=723)	Yes	644	89.1
	No	79	10.9
Duration of breastfeeding (n=723)	Less than 12 months	171	23.7
	12 - 24 months	474	65.6
	More than 24 months	78	10.8
Age complementary food started	At 6 months	501	68.3
	Before and after 6months	233	31.7
Cup for feeding	Yes	260	35.4
	No	474	64.6
Spoon for feeding	Yes	697	95.0
	No	37	5.0
Hand for feeding	Yes	548	74.7
	No	186	25.3
Bottle for feeding	Yes	364	49.6
	No	370	50.4

Table 3: Dietary characteristics of children among 6 to 59 Months in Hossana town, Southern Ethiopia, 2013 (n=734).

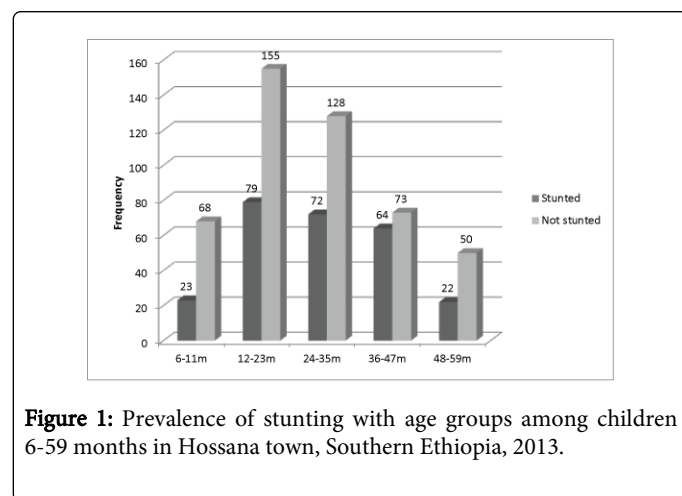


Figure 1: Prevalence of stunting with age groups among children 6-59 months in Hossana town, Southern Ethiopia, 2013.

Explanatory Variables	Stunting		COR 95%CI	AOR 95%CI	P-Value
	Yes	No			
Children's age in month					
6-11	23	68	1	1	
12-23	79	155	1.51(0.87,2.59)	2.47(0.85,7.21)	0.098
24-35	72	128	1.66(0.96,2.89)	2.29(1.10,4.82)	0.029
36-47	64	73	2.59(1.45,4.63)	2.29(1.10,4.76)	0.027
48-59	22	50	1.30(0.65,2.59)	3.34(1.58,7.06)	0.002
Mothers Education					
No education	50	24	13.24(6.53,26.81)	5.38(2.27,12.77)	<0.001
Primary	122	143	5.42(3.08,9.54)	1.69(0.85,3.40)	0.137
Secondary	71	199	2.27(1.27,4.04)	1.388(0.70,2.76)	0.350
Above secondary	17	108	1	1	
Monthly income in ETB					
Less than 1745	206	203	5.09(3.59,7.23)	3.92(2.54,6.06)	<0.001
1745 and more	54	271	1	1	
Birth order					
First	104	247	1	1	
2-3	110	176	1.48(1.07,2.07)	1.35(0.88,2.05)	0.17
4 and above	46	51	2.14(1.35,3.39)	2.32(1.28,4.21)	0.006
Child's size at birth					
Small	114	54	2.59(1.53,4.39)	2.10(1.13,3.93)	0.020
Normal	106	371	0.35(0.22,0.56)	0.30(0.17,0.53)	<0.001
Larger	40	49	1	1	
Duration of Breast Feeding					
Less than 12 months	46	135	1	1	
12 - 24 months	172	301	1.77(1.19,2.62)	2.35(1.18,4.66)	0.015
More than 24 months	42	38	3.40(1.94,5.99)	2.49(1.03,6.00)	0.042
Cup for feeding					
Yes	218	42	1	1	
No	454	20	4.37(2.51,7.63)	2.08(1.05,4.15)	0.037

Table 4: Factors associated with prevalence of stunting among children 6-59 months in Hossana town, Southern Ethiopia 2013 (n=734).

Factors associated with stunting among 6-59 months children

In the study sex of child, father education, mother occupation and father occupation, ANC visits of mother, preceding birth interval and immunization status of the child, household main source of drinking

water and also child received pre-lacteal feeds, child feed colostrums, age complementary food started, hand feeding and bottle feeding were significantly associated with stunting in bivariate analysis but the association disappears in the multivariate logistic regression analysis.

The finding of the study indicated that, Child's age, mother's education, monthly income, and size at birth, birth order, duration of breast feeding, and cup feeding were identified as determinants of stunting among children in the study area in the multivariate logistic regression analysis.

Child's age was one of the risk factors which significantly associated with stunting in the study area. Comparing with children 6-11 months, children within age group 24-35 months were 2.29 times more likely to develop stunting (AOR=2.29; 95%CI:1.10, 4.82). and children within age group 36-47 months were 2.29 times more likely to develop stunting than children age 6-11months (AOR=2.29; 95%CI: 1.10, 4.76). The result also indicated that, children within age group 48-59 months were 3.34 times more likely to develop stunting than children age 6-11 months (AOR=3.34; 95%CI:1.58, 7.06).

From the analysis, children whose mothers had no education were 5.4 times more likely to be stunted as compared to mother with educational status of above secondary (AOR=5.38; 95%CI:2.27, 12.77). Children from household with low monthly income were 3.92 times more likely to be stunted than children from high monthly income (AOR=3.92; 95%CI: 2.54, 6.06).

Children who had born with small size were 2.10 times more likely to be stunted than children born larger (AOR=2.10; 95%CI: 1.13, 3.93). The result also showed that children who had normal birth size were 70% less likely to develop stunting as compared to children with large birth size (AOR=0.30; 95%CI:0.17, 0.53).

The result of the study indicated that, birth order of the child was associated with risk of stunting. Children of 4 and above birth order were 2.3 times more likely to be stunted than children of first birth order (AOR=2.32; 95%CI: 1.28, 4.21).

Duration of breast feeding was associated with risk of stunting in the study. Children who had been breast feed for 12-23 months long were 2.35 times more likely to be stunted than children who breast feed for than less than 12 months long (AOR=2.35; 95%CI:1.18, 4.66). In the study finding children who had breast feed for more than 24months long were 2.49 times more likely to be stunted than children who breast feed for than less than 12 months long (AOR=2.49; 95%CI: 1.03, 6.00).

Cup feeding as method of feeding was also associated with risk of stunting in the study. In the study mothers not used cup to feed their children were 2.08 times more likely to be stunted than mothers used cup to feed their children (AOR=2.08; 95%CI:1.05, 4.15) (Table 4).

Discussion

This study tried to assess the prevalence of stunting and associated factors among 6-59 months children. Based on the findings, the prevalence of stunting in this study was 35.4% (34.6-36.3 95% C.I). This study was in line with study conducted in Ghana, 36% [13]. The magnitude of stunting in this study was higher than study conducted in Peru 26.6% [14], Brazil 29.9% [15], Sirlanka 11.8% [16], South Africa 20.2% [17] and Egypt 13.8% [18] and the national prevalence in EDHS 2006, 29.8% [10] and EDHS done in 2011, 32% [9]. However, the prevalence of stunting in the study was lower than study conducted in, Nepal 37% [19], India 51.6% [20], Lao PDR 40% [21], Cambodia 38.6% [22] also the study conducted in Democratic Republic of Congo 43.9% [23], Uganda 41.6% [24], Tanzania 44% [25], Kenya 40% [26], Sudan Khartoum 51% [27] and Ethiopia 42% [28]. This difference might be due to population migration from rural to

urban in order to get better job and living condition, decreased purchasing power of the community, increment of food prices, inappropriate infant and young child feeding practices and child health care.

Child's age was one of the factors significantly associated with stunting in the study area. Comparing with children 6-11 months, children within age group 24-35 months, 36-47 months and 48-59 months were more likely to be stunted. The finding was in agreement with the study in Ethiopia [28] and Egypt [18]. This might be due to stunting in children age 24 months and above were resulted from poor nutritional status of mother's at pregnancy, inappropriate infant and young child feeding practices and other related factors which were needed to be undergone beginning from conception, through a mother's pregnancy and up until the age of two which was the most critical period in a child's development after child reaches above 24 months of age stunting was irreversible.

Mother's education was another variable which significantly associated with stunting. Children whose mothers had no education were more likely to be stunted as compared to mother with educational status of above secondary. This finding was consistent to the study conducted in India [20], Tanzania [25], and Nairobi Kenya [26] and also in Ethiopia [9,28,29]. This might be due to mother who had no education had shortage of knowledge which related to better child feeding and caring, low income and low living conditions.

Birth order of children is one of the demographic variables explaining the risk of stunting in children. Children of 4 and above birth order were more likely to be stunted than children of first birth order. This finding was in line with the study conducted In Cambodia [22], Nairobi Kenya [26], and Egypt [18]. This might be due to family unable to satisfy child dietary and other health care related services because of more number of children and might also be due to low awareness of family planning.

Children from household with low monthly income were more likely to be stunted than children from high monthly income households. This might be children from low income households had low access to adequate dietary intake in kinds and the amounts and also it may be due to increment of food prices, decreased purchasing power of the family and also shortage of other important materials and utilities.

Children who had born with small size were more likely develop stunting than children born larger. The finding was in line with the study conducted In Kenya [26]. This may be due to the mother's health and nutritional status before and during pregnancy in which determined size of the child during intra-uterine period and also those small sized children were frequently exposed to an infection which leads to mal absorption of nutrients in their body.

The result of the study also indicated that children who had normal birth size were less likely to develop stunting as compared to children with large birth size. The finding of this study might be due to children having optimal birth weight was mostly protective to most disease conditions related to proper growth and maturity of their body may help them to sustain the external environment.

Duration of breast feeding was associated with risk of stunting in the study. Children who had been breast feed for 12-23 months long and more than 24 months long were more likely to be stunted than children who breast feed for than less than 12 months long. The association between continued breast-feeding and stunting was also

observed in similar studies conducted in Cambodia [18], Disha et al. in Zambia and Ethiopia [30] and also study conducted in Gojam North west Ethiopia [29]. This might be due to poor maternal nutrition status which mothers who are breastfeeding need two additional meals a day and had direct relation with breast milk quality and quantity, even if the duration of breast feeding long poorly attached and positioned breast feeding could affect the optimal breast feeding of children and mothers of children continue breast feeding without providing adequate, safe, appropriate solid, semi-solid and soft foods for the children which directly related to children growth.

Cup feeding as method of feeding was also associated with risk of stunting in the study. In the study children whose mothers not used cup to feed them were more likely to be stunted than children whose mothers used cup to feed children. The studies which directly support this finding was not available at this point in time but WHO/UNICEF child feeding guideline support the use of cup as a method can prevent the contamination. This might be due to mothers low awareness about the advantages of cup feeding and mothers of children who were not used cup as method of feeding they may use bottle as alternative method which was not recommended at any age to feed the children which was high risk of infection. The possible limitation of the study is being a cross-sectional study may cause difficulty in identifying cause-effect relationship. And recall bias is the other fear of the researcher. In conclusion, the study revealed that stunting is high prevalent problem among children 6-59 months of age in Hossana town, Southern Ethiopia. Child's age, mother's education, household income, birth order, size at birth, duration of breast feeding and cup feeding were found to be associated factors of stunting among 6-59 months children in the study area.

At last, based on the above findings of the study, the following recommendations are forwarded:

For Federal Ministry of health

Need to expand programmes which links nutrition interventions and social protection to reach young children and pregnant or breastfeeding mothers in urban communities.

For Hossana town Health office

Need to plan nutrition interventions to effectively address the nutritional conditions with participation of stakeholders and community at large.

For health extension workers

Need to give nutrition education for the community about maternal and child nutrition to accelerate prevention of stunting by focusing the most critical periods of child development.

Need to actively involve and give training to the mothers and care givers of children with practical demonstration of how to prepare and give optimal foods for infant and young child.

For researchers

Need to conduct further studies to determine the predictors of stunting using different analytic and longitudinal studies.

Competing interests

The authors declared that they have no competing interests.

Authors' contributions

Beminet Moges wrote the proposal, participated in data collection, analyzed the data and drafted the paper. Amsalu Feleke and Solomon Meseret approved the proposal with some revisions, supervised in data collection and analysis, commented on the analysis and improved the first draft. Feleke Doyore and Beminet Moges revised subsequent drafts of the paper and Feleke Doyore prepared this manuscript.

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