

Prevalence of Stunting and Associated Factors among First-Cycle Primary School Children in Asella Town Oromia, Regional State, South East Ethiopia

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Abstract

Background: The estimated global prevalence of malnutrition among school-aged children as indicated by the prevalence of stunting is approximately 28.7% with a height-for-age Z-score < -2 standard deviations below the population median.

Objectives: To assess prevalence of stunting and associated factors among first-cycle primary school children in Asella town, Oromia regional state.

Methods: Schools based cross sectional study design was conducted among 762 public and private first-cycle primary schools students from October to January 2018 in Asella town. Multi-stage random sampling method was used to select study subjects and schools. Pretested and semi-structured questionnaire was used to collect the data. Epi info version 7 was used for data entry and SPSS version 21 and WHO Anthro Plus software were used for analysis. Bi-variate analysis were under taken in binary logistic regression to determine crude odds ratio of all risk factors independently and risk factors with p-value < 0.25 were selected and re-entered to multiple variables logistic regression and analyzed again to determine the adjusted odds ratio. Then variables with p-value < 0.05 were declared as risk factors of stunting.

Results: Prevalence of stunting is 19.4%, about, 4.4% are severely stunted and 15% moderately stunted. Children living in a family whose monthly income is between 1000 and 3000 ETB have 2.11 times more likely to be stunted than children who live in a family earning above 3000 ETB, (AOR: 2.11, 95% CI (1.04, 4.25). Children's whose family size is seven and above are 2.82 times more likely to be stunted than children's whose family size is less than seven.

Children who breastfed for less than six months were 3.51 times more likely to be stunted than those who breastfed for more than six months.

Conclusion: Prevalence of stunting or chronic malnutrition in Asella town is low. There is significant association between monthly income, family size and duration of breast-feeding for less than six months and diary product consumption like milk with the prevalence of stunting. Nutrition programs that focus on improving childhood nutrition and promoting linear growth, conducting focused public education to increase using of family planning and exclusive breast feeding are needed to reduce and eradicate stunting among the community.

Keywords: Stunting; Height for age; First cycle; Primary school; Children and Asella

Introduction

Linear growth failure in childhood is the most prevalent form of mal nutrition globally. The estimated global prevalence of malnutrition among school-aged children as indicated by the prevalence of stunting, is around 28.7% (171 million children), with a HAZ score less than two standard deviations below the population median. Stunting is acknowledged as the best indicator for child growth that indicates chronic under nutrition [1].

Hunger and malnutrition among children in developing countries including Ethiopia continue to impair health, quality of life and survival. Under nutrition contributes to 53% of the 9.7 million deaths of children under five each year in developing countries. It is estimated that a child dies every six seconds from hunger related causes and one out of four children in developing countries are underweight. Every child whose physical and mental development is stunted by hunger and mal-nutrition stands to lose 5 to 10 percent in lifetime earnings.

Child stunting is a result of long-term chronic consumption of a low-quality diet in combination with infectious diseases and environmental problems [2].

Poor health and malnutrition are important underlying factors for low school enrollment, absenteeism, poor classroom result and early

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school dropout, as reflected in the world declaration on education for all. Stunted children do not get their full growth potential and become stunted adolescents and adults. The functional consequences of stunting continue in adulthood, with reduced work capacity and in women, increased risk of mortality during childbirth and adverse birth outcomes [3].

In developing countries, an estimated 99 million children of primary-school age are not enrolled and from enrolled, only 78% complete primary school. Most children who fail to complete are from sub-Saharan Africa and south Asia. Only around half of the children enroll in secondary schools [4]. Furthermore, children in some developing countries have much lower achievement levels than children in developed countries in the same grade. School-age children are particularly vulnerable to under nutrition as the priority in nutrition interventions is often to prevent malnutrition during fetal development and the first years of life; the most critical period for growth and development [5].

Stunting is widely believed to occur mainly in early childhood (mostly by three years of age) and through a cumulative process. Stunted children at school-age are most likely to have been exposed to under nutrition since early childhood and that the degree of stunting tends to increase throughout the school-age years. However, children can exhibit catch-up growth if their environment improves. This suggests that interventions in school-age children can supplement efforts in the preschool years to reduce levels of stunting and related effects on children's health and education [6,7]. Early childhood care programs and primary schools which improve children's health and nutrition can increase the learning and educational outcomes of school children. Education of good quality can lead to better health and nutrition outcomes for children, especially girls and thus for the next generation of children as well [8].

Assessment of growth in children not only serves as one of the best global indicators of children's nutritional status but also provides an indirect measurement of quality of life of an entire population. Improving the nutrition of women and children will contribute to overcoming some of the big health challenges facing the world, including the burden of chronic and degenerative disease and maternal mortality [9,10].

According to the growth and assessment surveillance unit of the World Health Organization (WHO) 2010, the global prevalence of malnutrition among school-aged children, as indicated by the prevalence of stunting, is 28.7%. Asia is the most affected region for all three indicators. Based on the estimates, the risk of being malnourished as measured by being underweight is 1.2 times higher in Asia than in Africa and 3 times higher in Africa than in Latin America [11]. Currently, over two-thirds (76%) of the world's malnourished children live in Asia especially South-central Asia while 21% are found in Africa and 3% in Latin America. Eastern Africa suffering a higher rate of stunting which is 45%.

Stunting has continued to be one of the most important public health problems in Ethiopia. In recent years Ethiopia has only had limited success in reducing the prevalence of stunting with annual reduction of 1.3% over the past eleven years from 51% in 2005 to 44% in 2011. In the trend in the reduction of child under nutrition between 2000 and 2016, the prevalence of stunting has decreased considerably from 58% in 2000 to 38% in 2016, an average decline of more than 1 percentage per year [12].

In Ethiopia, previous studies show that there are a big regional variations in prevalence of stunting among schoolchildren which ranges from 4.5% to 57%, indicating that mal nutrition is a public health problem. In addition, maternal size is also associated with specific reproductive outcomes. Short women, are at greater risk for obstetric complications because of smaller pelvic size. There is also a strong association between maternal height and birth weight which is independent of maternal body mass [13]. In a study conducted in 10 countries in sub-Saharan Africa, male children are consistently more likely to become stunted than female children. There is also an inter-generational effect. About 200 million children under 5 years of age fail to reach their potential in cognitive development because of a combination of risk factors such as poverty, poor health and nutrition and inadequate caring practice. These conditions play an important part in the intergenerational transmission of poverty [14]. Maternal undernutrition contributes to fetal growth restriction, which increases the risk of neonatal deaths and for survivors of stunting by 2 years of age. Suboptimum breastfeeding results in an increased risk for mortality in the first 2 years of life. In a study conducted in 2011, it is estimated that undernutrition in the aggregate including fetal growth restriction, stunting, wasting and deficiencies of vitamin A and zinc along with suboptimum breast feeding is a cause of 3.1 million child deaths per year [15].

Materials and Methods

Study area

The study was conducted at ten selected schools in Asella town, Tiyo Woreda, Arsi zone, Oromia regional state, South east Ethiopia. In Asella, there are 30 primary schools: 21 and 9 private and government schools respectively. There are about 15,427 students in both schools [16].

Study design and period

School based cross-sectional quantitative study design was conducted among school children in total sample size of 762 in Asella town, Oromiya regional state from Sep 13 to Sep 30 2018.

Source and study population

Source population: All schools children attending first cycle (grades 1-4) schools located in Asella town.

Study population: Selected students attending the first cycle (grades 1-4) from randomly selected schools and parents or care givers of the students.

Inclusion criteria

Children of age group of grade 1-4 student. All those who were present on the day of data collection.

Exclusion criteria

School children who were unable to stand by themselves by physical deformities of limbs and spines were excluded because of difficulty in height measurement [17].

Almost six out of ten respondents 410 (57.3%) belong to the age groups of 5-9 years, few 42 (5.9%) were among the age group 13-14 years. The mean age was 9.2336+SD 1.9089. Almost half of the participants 363 (50.8%) were females. About 396 (55.4%) of the respondents were orthodox christians. More than half, 385 (53.8%) of students belong to Oromo ethnic groups, while nine (1.3%) were Tigray.

Regarding educational status of student's parents, 309 (43.2%) of students fathers have completed college and above, on the other hand 22 (3.2%) did not attended formal education. Nearly four out of ten of students mothers 277 (38.7%) have completed primary schools; only

56 (7.8%) did able to attend formal education. The employment status of students parents were 309 (43.2%) and 265 (37.1) governmental employees and housewives respectively. Whereas, their marital status is as follows: 633 (88.5%) were married and 25 (3.5) widowed. The average monthly income of students parents, 287 (40.1%), between 1000-3000 ETB; only 89 (12.4%) were 5000 and above ETB. The average family size in this study finding revealed that eight out of ten respondents, 578 (80.8) were 4-6 in number: While 66 (9.2%) were seven and above, the remaining (9.9%) being in 1-3 family number (Table 1).

Variables (n=715)	Frequency	Percentage (%)
Child age		
5-9 years	410	57.3
10-12 years	263	36.8
13-14 years	42	5.9
Child gender		
Male	352	49.2
Female	363	50.8
Level of grades		
Grade 1	192	26.9
Grade 2	190	26.6
Grade 3	174	-
Grade 4	159	22.2
Ethnicity		
Oromo	385	53.8
Amhara	266	37.2
Silte	34	4.8
Tigrie	9	1.3
Gurage	21	2.9
Religion		
Muslim	243	34
Orthodox	396	55.4
Protestant	66	9.2
Catholic	10	1.4
Marital status of family		
Married	633	88.5
Divorced	54	7.6
Widowed	25	3.5
Never married	3	0.4

No formal education	56	7.8
Primary education (1-8)	277	38.7
Secondary education (9-12)	227	31.7
College and above	155	21.7
Mother's occupation		
Government employee	175	24.5
NGO employee	15	2.1
Merchant	142	19.9
Self-employee	114	15.9
House wife	265	37.1
Others (specify)	4	0.6
Husband's educational status		
No formal education	22	3.1
Primary education (1-8)	124	17.3
Secondary education (9-12)	183	25.6
College and above	309	43.2
Husband's occupation		
Government employee	309	43.2
NGO employee	24	3.4
Merchant	148	20.7
Self-employee	137	19.2
Farmer	17	2.4
Others (specify)	3	0.4
Monthly income		
<1000	149	20.8
1000-3000	287	40.1
3100-5000	190	26.7
>5100	89	12.4
Family size		
1-3	71	9.9
4-6	578	80.8
7	66	9.2
Note: Mother's occupation: Others [†] occasional small scale trade, local drink seller; Husband's occupation: Others [†] daily laborer, casual driver, Jobless		

Table 1: Socio demographic and other selected characteristics of first-cycle primary school children in Asella town Oromia, regional state Ethiopia, 2018.

Environmental factors

From respondents who participated in this study almost all 706 (98.7%) of the households use pipe water as a main source of drinking water. In this study, more than nine out of ten students families, 688 (96.2%) find functional latrine in their compound. Of this majority of

household's latrine, 501 (70.1%) are traditional pit latrines: However, only 66 (9.2%) have ventilated improved pit latrines (Table 2).

Variables (n=715)	Frequency	Percentage (%)
Source of water in the household		
Pipe water	706	98.7
Public tap/stand pipe	9	1.3
Functional toilet facility in the house hold		
Yes	688	96.2
No	27	3.8
Type of latrine		
Flush toilet	101	14.1
Traditional pit latrine	501	70.1
VIP	66	9.2
Others (specify)	20	2.8
Note: Type of latrine *public latrine, *communal latrine, *open filed		

Table 2: Environmental factors of first-cycle primary school children in Asella town Oromia, regional state Ethiopia, 2018.

Maternal and child health care factors

More than half of students mothers, 434 (60.7%) did not complete antenatal care ANC4. Moreover, 242 (33.8%) of students mothers have completed ANC4, of while, 39 (5.5%) have never followed up ANC. Among all students mothers, 66 (9.2%) delivered their child at

home and 463 (64.8%) did not attend postnatal care by health professionals. In this study, 452 (63.2%) of children had average birth weight (2.5 kg-4 kg). From the 715 children, 684 (95.7%) children were immunized and out of them 579 (81%) were fully immunized. Among children, 45 (6.3%) and 19 (2.7%) had diarrhea and fever respectively during two weeks of period prior to data collection (Table 3).

Variables (n=715)	Frequency	Percentage (%)
ANC follow up		
None	39	5.5
1	93	13
2-3	341	47.7
4+	242	33.8
Place of delivery, n=715		
Hospital	373	52.2
Health center	249	34.8
Private health sector	27	3.8
Home	66	9.2
PNC follow up, n =715		
Yes	252	35.2
No	463	64.8
Birth weight		

Smaller than average (<2.5 kg)	99	13.8
Average (2.5 kg-4 kg)	452	63.2
Big baby (>4 kg)	62	8.7
I don't know	102	14.3
Immunization status		
Yes	684	95.7
No	31	4.3
Category of vaccination		
Fully vaccinated	579	81
Not fully vaccinated	73	10.2
I do not remembered	32	4.5
Diarrhea in the last two weeks		
Yes	45	6.3
No	670	93.7
Ill with fever in the last two weeks		
Yes	19	2.7
No	696	97.3

Table 3: Maternal and health care factors of first-cycle primary school children in Asella town Oromia, regional state Ethiopia, 2018.

Dietary factors

Breast-feeding is almost universal in the study area, children ever breast-fed were 696 (97.4%) of these, 322 (46.2%) children started breast-feeding within the first hour of birth. Nearly half of 342 (49.1%) the children were fed breast 1-2 years. Most respondents 463 (64.8%) started complementary feeding at the aged of 6 months.

The finding of this study reveals that, 611 (85.5%) of parents offer Injera for their children. More than 95% of school children in this study consume animal products, 250 (35%) consume meat at least one times per week, on the other hand 116 (16.2%) never eat meat per week. Dairy products, fruits and vegetables consumed by children in the current study area reveals that, 272 (38%), 78 (10.9%) and 298 (41.7%) of the respondents consume at least one times per day respectively. Of the total 715 children nearly half 351 (49.1%) eat four times per day but the rest 68 (9.8%) respondents eat less than three times per day (Table 4).

Variables (N=715)	Frequency	Percentage (%)
Ever breast fed child (n=715)		
Yes	696	97.3
No	19	2.7
Time of imitation of breast fed (n=696)		
≤ 1 hour of birth	322	46.2
Within the first 24 hours	320	46
>24 hours	36	5.2
I don't remembered	18	2.6
Duration of breast feeding (n=696)		
<6 months	174	25
6-12 months	81	11.6

12-24 months	342	49.1
>24 months	99	14.2
Age complementary food started (n=715)		
At 6 months	463	64.8
Not timely imitation of breast feeding	252	35.2
Type of food offer		
Bread	505	70.6
Injera	611	85.5
Porridge	587	82.1
Others	15	2.1
Food from animals source consume		
Yes	685	95.8
No	30	4.2
Meat consume per week		
Daily	11	1.5
One times/week	250	35
2 times/week	80	11.2
Greater than 3 times/week	58	8.1
Once every 2 weeks	48	6.7
Monthly	152	21.3
Never	116	16.2
Dairy products consume like milk per week		
Daily	272	38
One times/week	50	7
2 times/week	241	33.7
Greater than 3 times/week	100	14
Never	52	7.3
Fruit consume per week		
Daily	78	10.9
1 times/week	320	44.8
2 times/week	159	22.2
Greater than 3 times/week	83	11.6
Once every two weeks	37	5.2
Monthly	30	4.2
Never	8	1.1
Vegetable consume per week		

Daily	298	41.7
1 times/week	36	5
2 times/week	239	33.4
Greater than 3 times/week	142	19.9
Types of foods usually consumed/given to children		
Barley	355	49.7
Wheat	563	78.7
Teff	652	91.2
Rice	456	63.8
Others	17	2.4
How many times feed your child per day		
1-2 times/day	68	9.5
3 times/day	296	41.4
4 times/day	351	49.1
Note: *Type of food offer: Mashed potato, beso and bula; *Types of foods usually consumed/given to children: Corn and kocho		

Table 4: Dietary factors of first-cycle primary school children in Asella town Oromia, regional state Ethiopia, 2018.

Prevalence of stunting

Among 715 first cycle primary students who participated in this study, 139 (19.4%) students were stunted. Children whose height-for-age Z-score is below minus two standard deviations (-2 SD) from the median of the WHO reference population, with the corresponding 95% confidence interval (16.53287, 22.34825). Of this 75 (54%) were within the age group 5-9 years, 55 (39.5%) are between 10-12 years and only nine (6.5%) are between 13-14 years. From the 139 (19.4%) stunted children, 107 (15%) are moderately stunted and 32 (4.4%) are severely stunted. Therefore, the overall prevalence of stunting in this study is 19.4%.

Factors associated with stunting

In the binary logistic regression analysis, monthly income, mother's educational status, family size, duration of breast feeding, age when complementary food started and dairy products consumption like milk per week are found to be predictors of stunting at a P value of less than 0.25. Consequently, these variables were subjected to multiple logistic regression analysis by considering all the factors. Simultaneously, four of the most contributing factors remained to be significantly and independently associated with stunting (monthly income, family size, duration of breast feeding and dairy products consumption milk per week). Monthly income has statistically significant association with outcome variable. Children living in a family whose average monthly income is between 1000 and 3000 ETB have 2.11 times the risk of being stunted than children who live in a family earning equal to or above 5000 ETB, (AOR: 2.11, 95% CI (1.04, 4.25)).

In these, study children who fed breast below six months and between one up to two years of duration of breast-feeding had

statistically significant association with stunting. Children who fed breast for less than six months are 3.51 times more likely to be stunted than above six month duration of breast feeding (AOR=3.51, 95% CI (1.669, 7.382)). Also children who fed their mother's breast in average for 1-2 years of duration is 2.113 more likely to be stunted as compared to two and above two years breast fed children (AOR=2.113, 95% CI (1.028, 4.342)).

Yet again, children who never consume dairy products like milk per week are 3.50 more likely to be stunted than children who consume milk daily (AOR=3.04, 95% CI (1.697, 7.237)). Furthermore, children who consume milk two times per week also are 1.743 times more likely to be stunted as compared to those consuming milk and dairy products daily or three times per week (AOR=1.743, 95% CI (1.085, 2.800)).

Discussion

Nutritional status of children is an important indicator of their health. The previous reports showed that high prevalence of stunting among school in different parts of Ethiopia. The finding of this study revealed that, the prevalence of stunting among first cycle schoolchildren 5-14 years living in Asella town is 19.4%. This is similar to the finding in Addis Ababa, which is 19.6% but it is higher when compared with Delo-mena district, south eastern Ethiopia which was 4.5%, Kersa, Eastern Ethiopia, 8.9%, Adama 12.6% and Haik town, south Wollo zone, North-eastern Ethiopia, 11.3%.

The prevalence of stunting is lower in Sudan 7.1% and in South west Nigeria around 17.4% compared to our study area. This variation might be due to the difference in geography, traditions, costumes, agro-ecological factors, economical differences of each study area, types of agricultural product, knowledge on feeding practice. However, the prevalence of stunting was lower in comparison with Fogera district Northwest Ethiopia 30.7%, Debre Markos town and Gozamen Woreda, east Gojjam zone, Amhara regional state, Ethiopia,

48.1%, Humbo district, southern Ethiopia, 57% and the latest national survey of the health and nutrition of school children Ethiopia is 22.3%. Prevalence of stunting were higher in different countries, like Bangladesh 60%, Indonesia 38.87% and Egypt 34.2%. This difference might be due to increment of food prices, inappropriate infant and young child feeding practices, child health care, socioeconomic and cultural differences rather than differences in their genetic potential to achieve maximum height.

Stunting is an indicator of chronic malnutrition and it reflects the cumulative effect of under nutrition, socioeconomic factors and recurrent infections. For these reasons, wide variations in the prevalence of stunting have been observed in different countries. In our study area, we found that stunting were significantly associated with age (5-9 years) but not with gender.

Bivariate test results showed that stunting had a close relationship with the monthly income of households. Children whose household's monthly income is between 1000-3000 ETB were 2.11 times more likely to be stunted compared to those household's monthly income is 5000 and above ETB (AOR: 2.11, 95% CI (1.04, 4.25)). This is similar to the study done in Mieso Woreda, Somali region and Ethiopia. The results of these studies are also similar with a study done in Indonesia which showed (AOR 3.6, 95% CI. Where household income was positively associated with height for age z-score.

In addition to income, stunting is also closely related to the number of family members ($p < 0.005$). In this study, children belonged to households with large family size (of seven and above family members) were 2.82 times more likely to be stunted than those who belonging to households with less than seven family members. This is related to the division of food among the family, the more the number of family the smaller food portion consumed by children. While most of them came from low income families. The results of this study, the prevalence of stunted children in Asella town, are in line with studies done by Oktarina that a close relationship between the number of family members and the prevalence of stunting.

Similar finding was documented in a study conducted in different regions of Ethiopia including Mieso, Woreda, Somali region, Ethiopia, Humbo district southern Ethiopia, Fogera district Northwest Ethiopia Amara regional state and Addis Ababa, Ethiopia. Study done in Bangladesh showed that family number 5-8 is strongly associated with stunting. This could be a marker of household poverty, supporting the fact that stunting is more of a social issue with roots in inequalities across the social strata in the society. A large number of household members could contribute to low levels of child care and dietary intake. There is also a risk of over crowding and its consequences like the spread of diseases, such as chronic respiratory infections and diarrhea, which are known causes of malnutrition.

This study found that, children who breastfed for less than 6 months were 3.51 times more likely to be stunted than those who breastfed for more than six months duration. Also, children who fed their mother's breast in average for 1-2 years of duration were 2.11 times more likely to be stunted compared with those children who breastfed for 2 yrs and above years of duration. The finding is supported by a meta-analysis study conducted in Ethiopia. This could be explained by the fact that breast-feeding is the natural and perfect form of infant feeding for meeting a child's nutritional needs during the first six months of life. This in turn implies that as the duration of exclusive breast feeding approaches to the recommended duration, there risk of chronic malnutrition.

Conclusion

Depending on the facts of the study, child stunting or chronic malnutrition problem is observed in Asella town was 19.4%. There is significant relation seen between monthly income, family size, duration of breast-feeding and dairy products consumption per week with stunting. The finding of this study revealed that, children who never consumed dairy products like milk per week were 3.50 times more likely to be stunted than milk consumer children. Furthermore, children who consumed milk 2 times per week were 1.74 times more likely to be stunted as compared to those children who consumed milk and dairy products daily or three times per week. In a study conducted in Malaysian primary school, the effect of school milk programmers in 6-9-years-old children showed that there was a reduction in underweight, stunting and wasting after two years. A meta-analysis of 12 trials examining the association between dairy consumption and height showed that supplementation of approximately 245 ml on daily basis resulted in an additional 0.4 cm growth per year. Our current results also confirmed a positive association between dairy products consumption and growth.

Ethical Considerations

Ethical approval and clearance was obtained from Arsi university health science collage/ethics committee. In addition, supportive letter was issued from Arsi university to Asella health bureau and for Asella educational office and was delivered to the respective responsible body for their cooperation. In addition, informed verbal consent was obtained from study participant mothers/care givers to confirm their willingness for participation after they reached agreement and understanding of the objective of the study. Informed oral and written consent was obtained from mother/care givers prior to participation in the study and data were kept confidential throughout the study by using coding instead of any personal identifiers and are meant only for the purpose of the study. The administrative staff and teachers were well informed about the scope and extent of the study.

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Disclosure

We all, the authors of this research article declared that we have no competing interest.

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