Stunting and the Associated Factors among Under-five Children in Shire Endaslassie Town, Tigray, North West Ethiopia

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Abstract

Background: Globally, 158 million under five children suffer from childhood stunting. On the continent, 87 million stunted were in Asia, 59 million were in Africa and 6 million were in Latin America and Caribbean. In Ethiopian the number of stunting children declines from 6.13 million in 2012 to 5.85 million in 2015 with the prevalence of 38% as per 2016 EDHS. Objective: To determine the prevalence and associated factors of stunting among 6–59 months of age in Shire Endaslassie Town, northwest Ethiopia.

Methods: A community-based cross-sectional study was conducted in Shire Endaslassie, northwestern Ethiopia, from April 7 to 20, 2017. Multistage sampling technique was used to select 356 study subjects. Child and family status were assessed using the structured questionnaire and anthropometric measurement was conducted to measure nutritional status of the children. Data were cleaned by EPI-Info version 3.5.1, and height for age was converted to Z-score with ENA-SMART software. A multivariable logistic regression analysis was used to investigate factors associated with stunting. An adjusted odd (AOR) with 95% confidence interval (CI) is used to show the strength of the association, and variables with P values <0.05 are considered statistically significant.

Results: The prevalence of stunting was 35% (95% CI: 30 %–40%) among study participants. Unprotected water source [AOR = 3.20, 95%CI: (1.74, 5.73)], Monthly income< 3000 ETB [AOR = 2.59, 95%CI: (1.44, 4.66)], providing breast feeding when only child cry [AOR = 2.22, 95%CI: (1.24, 3.99) were positively associated with stunting, while, having enough time to prepare meal [AOR = 0.50, 95%CI: (0.30, 0.81)], usage of family planning [AOR = 0.26, 95%CI: (0.12, 0.56)] were found to be preventive factor.

Conclusion The prevalence of stunting was high in the study area. We found that stunting was significantly correlated with monthly income, water source, having enough time to prepare time, time of breastfeeding, and usage of family planning. Therefore, intervention focusing on supporting housewives, family planning, and education on child feeding and nutrition should be implemented.

Background

Prevalence of under-five stunting and wasting are a sensitive indicator of community health and nutrition. Stunting or height for age is one of three anthropometric measurements commonly used as an indicator of child growth [1]. Stunting is defined as height for age Z(HAZ)score below minus two Z-score of world health organization (WHO) growth reference standards. It also reflects linear growth and its deficit indicates long term cumulative effect of individual health condition [2]. Child stunting can happen in the first 1000 days after conception and its contributed by socioeconomic status, Dietary intakes, maternal nutrition status, childbirth size at birth, poor breastfeeding practices (delayed initiation, nonexclusive breastfeeding and early cessation of breastfeeding) infection, micronutrient deficiency and the environment [13].

Growth failure in the first two years of life is associated with reduced stature in adulthood and age-adjusted height deficit between stunted and non-stunted children was 6.6cm for women and 9cm in men

[5]. Stunting has negative consequence both on individual health as well as on economic growth of the country. Adult with short stature has outcomes lower earing and poor productivity in labor market with an estimated 20% with adult non-stature [9,10]. It is also associated with higher morbidity and mortality [3,4]. Stunting is associated with higher risk of choric illness like elevated blood pressure, renal dysfunction, alerted glucose concentration and increase harmful lipid profile [6-8]. Generally, the impact will be expressed in terms of delayed mental development, poor educational performance, reduced intellectual capacity, and low economic productivity. Generally, it is a strong predictor of human capital and social progress.

Globally, 158 million children of under five age group suffer from childhood stunting, in 2016. Continent wise 87 million stunted were in Asia, 59 million were in Africa and 6 million were in Latin America and Caribbean. Five sub-regions have child stunting rates that exceed 30%: western Africa (31.4%), middle Africa (32.5%), eastern Africa (36.7%), southern Asia (34.1%) and Oceania (38.3%; excluding Australia and New Zealand). Asia and Oceania have experienced slow or minimal progress in reducing child stunting. However, stunting has declined twice in Latin America and the Caribbean, when compared with Africa from 2000 to 2016 [11].

In Ethiopian, stunting declines from 6.13 million in 2012 to 5.85 million in 2015. According to 2016, Ethiopian demographic health survey stunting is reduced to 38% from 40.4% in 2014. Region-wise, it ranges from 15 % in Addis Ababa city administration to that of 46% in the Amhara region [12].

Ethiopia has endorsed major global and national initiatives to see children free from under nutrition including stunting. The Seqota Declaration to end stunting in children under two by 2030 and the Health Sector Transformation Plan to reduce childhood stunting in under-five years from 40% to 26% by the end of the year 2020 are part of the national initiatives [14]. Therefore, the study was conducted with the aim of identifying the prevalence and determinate factor of stunting in Shire Endaslassie town, Tigray, Northern West Ethiopia.

Methods

Study area and design

A community-based cross-sectional study was conducted in Shire Endaslassie, North Western Ethiopia, from April 7 to 20, 2017. The town is 1074 km away from the capital Addis Ababa and located at 14°6'N 38°17'E with an altitude of 1953 meters above sea level [15].

Sample size and sampling procedures

The study population included children aged 6–59 months in the 3 randomly selected kebeles (local smallest administrative unit) in Shire Endesillasie Town. Seriously ill Children during the whole data collection season and children with spinal curvature (Kiphosis, scoliosis and kiphoscoliosis) were excluded from the study. Three out of five total kebeles in the town were selected using the lottery

method. The total sample size (n = 356) was distributed to each selected kebele proportionally using probability proportional to size of population. The total number of each kebele was obtained from the local kebele administrative office. The sample interval (k) for each kebeles was calculated for each kebeles, and the first household in each kebeles was identified using a random number from k number of households. Finally a systematic random sampling technique was used to select participants from each household. For households with more than one eligible child, random sampling was used to select one child for the study. Mothers or caregivers were interviewed on socio demography, housing condition, child variables (eating habits and history of illness) with a pre tested structured questionnaires. Interview questions were revised, edited, and those found to be unclear were modified after pretest. Trained and experienced data collectors were used to conduct a face to face interview. Anthropometric measurement was conducted on target children to measure the nutritional status. A horizontal wooden length board and a vertical wooden height were used to measure the length of children 6–23 months of age and height of children aged 24–59 months respectively. Both length and height are measured nearest to the 0.1 cm.

Data Processing and Analysis procedures

The collected data using the interview was coded, entered and cleaned for its completeness and errors, and analyzed using SPSS version 24 statistical software packages. Quantitative variables were expressed as mean (± Standard Deviation), or median (interquartile range); qualitative variables were expressed as a percentage. The anthropometric measurement of height for age (HAZ) was calculated by ENA SMART software, and children less than − 2 SD were classified as stunted. Children with HFA between − 2 and − 3 SD were classified as moderately stunted and < -3 SD were classified as severely stunted. The monthly income of the household was categorized based on Ethiopian Birr and the baseline was 3000 ETB. The stunted versus non-stunted groups were compared using Chi^2. Bivariate and multivariable logistic regression were done. Factors potentially associated with stunting in univariate analysis with a p-value of < 0.25 were included in a backward logistic regression. The strength of association was presented using the odds ratio and 95% confidence intervals and variables with P-values of < 0.05 were considered statistically significant.

Results

Socio demography characteristics of the respondent

The total of 337 respondents participated in this study with respondents' rate of 90.7 % (337/356). The majority of the respondents 288(85.5%) orthodox region follower and 301(89.3%) were married. regarding maternal educational status, 287(85.2%) were attained primary school and above. nearly one third of the household 101(30%) earned more than 3000 birrs per month. The detail is displayed in Table 1.

Table 1
Social demographical of the respondent and level of stunting their children in Shire Endassielase, Northwest Tigray, Ethiopia, 2017

Socio demographical characteristics	Level of stunting			Total	X2, P, df
	Normal (%)	Moderate (%)	Severe (%)		
Religion					
Orthodox	192(66.6)	74(25.7%)	22(7.6)	288(85.5)	4.3,0.64,6
Muslim	22(53.7)	16(39.0)	3(7.3)	41(12.2)	
Protestant	5(62.5)	3(37.5)	0(0)	8(2.4)	
Marital status					
Married	199(66.1)	79(26.2)	23(7.6)	301(89.3)	9.3 ,0.15,6
Divorced	9(52.9)	7(41.2)	1(5.9)	17(5.0)	
Windowed	1(16.7)	4(66.7)	1(16.7)	6(1.8)	
Separated	10(76.9)	3(21.3)	0(0)	13(3.9)	
Maternal Educational level					32.7, < 0.0001,8
Unable to read and write	16(76.2)	4(19.0)	1(4.8)	21(6.2)	
Able to read and write	11(39.7)	18(62.1)	0(0)	29(8.6)	
Elementary (1upto 8)	59(57.3)	37(35.9)	7(6.8)	103(30.6)	
Secondary	63(69.2)	17(18.3)	11(12.1)	91(27.0)	
12+	70(75.3)	17(18.3)	6(6.5)	93(27.6)	
Ethnicity					
Tigraway	206(66.2)	81(26.1)	24(7.7)	311(92.3)	11.8 ,0.02 ,4
Amahra	13(59.1)	8(34.4)	1(4.5)	22(6.5)	
Oromo	0(0)	4(100)	0(0.0)	4(1.2)	
Family size					
< 3	74(73.3)	20(19.8)	7(6.9)	101(30.0)	7.2, 0.12 ,4
3_5	128(61.1)	64(30.5)	18(8.6)	210(62.3)	
> 6	19(65.4)	9(34.6)	0(0.0)	26(7.7)	
Monthly income					

Socio demographical characteristics	Level of stunting			Total	X2, P, df
	Normal (%)	Moderate (%)	Severe (%)		
< 500	23(71.9)	7(21.9)	2(6.3)	32(9.5)	27.2, < 0.0001,6
500–2000	45(47.4)	44(46.3)	6(6.3)	95(28.2)	
2000–3000	72(66.1)	28(25.7)	9(8.3)	109(32.3)	
> 3000	79(36.1)	14(15.1)	8(7.9)	101(30.0)	
X^2 = chi-square, P = Level of significant df = degree of freedom					

Maternal characteristics

The majority of mothers 273(81.1%) got their first delivery at age of 20 up to 34-year-old. Only 43(12.7%) mothers had more than six deliveries. Maternal characteristics like usage of family planning were associated with child stunting with significant level of $p < 0.0001$. The detail is depicted in Table 2.

Table 2
Maternal characteristics of the study participants and level of stunting of their children in Shire Endaslassie, North West, Tigray, Ethiopia 2017

Maternal characteristics	Level of stunting			Total	X^2, P, df
	Normal (%)	Moderate (%)	Severe (%)		
Age at first marriage					
< 20	93(62.8)	42(28.2)	13(8.8)	148(43.9)	0.9 ,0.64,2
20–34	126(66.7)	51(27.0)	12(6.3)	189(56.1)	
Age at first delivery					
< 20	35(56.5)	22(35.5)	5(8.1)	62(18.4)	9.4,0.05,4
20–34	184(67.4)	70(25.6)	19(7.0)	273(81.1)	
> 34	0(0.0)	1(50.0)	1(50.0)	2(0.6)	
Number of pregnancies					
≤ 2	132(68.4)	43(22.3)	18(9.3)	193(57.3)	13.8 ,0.08, 4
3_5	66(65.3)	29(28.7)	6(5.9)	101(30.0)	
> 6	21(48.8)	21(48.8)	1(2.4)	43(12.7)	
Have history of abortion					
Yes	13(72.2)	5(27.8)	0(0.0)	18(5.3)	1.5, 0.47, 2
No	206(64.6)	88(27.6)	25(7.8)	319(94.7)	
Work outside of home					
Yes	105(60.3)	54(31.0)	15(8.6)	174(51.6)	3.4, 0.18, 2
No	114(69.9)	39(23.9)	10(6.1)	163(49.4)	
Have enough time to prepare food					
Yes	205 (70.2)	65(22.3)	22(7.5)	292(86.6)	31.4, < 0.001, 2
No	14(31.1)	28(62.2)	3(6.7)	45(13.4)	
Preparation of meals for under five children					
Together with adult	27(45.0)	31(51.7)	2(3.3)	60(17.8)	21.4, < 0.0001,2
Separately	192(69.3)	62(22.4)	23(8.3)	277(82.2)	
Usage of family planning					

Maternal characteristics	Level of stunting			Total	X^2, P, df
Yes	168(73.0)	44(19.1)	18(7.8)	203(68.7)	27.3, < 0.0001,2
No	50(46.7)	49(46.6)	6(5.7)	105(31.3)	
X2 = chi-square, P = Level of significant df = degree of freedom					

Housing and environmental condition

The majority of the households 213(63.2%) used piped water for drinking. The common waste disposal system among the study population is pit 316(93.8%) and 313(92.8%) households have latrine as displayed in Table 3.

Table 3
Housing and environmental condition of the study participants and their level of stunting in Shire Endaslassie, North West, Tigray, Ethiopia, 2017

Housing condition	Level of stunting			Total	X^2, P, df
	Normal (%)	Moderate (%)	Severe (%)		
Roof					
Corrugated	113(63.1)	60(33.5)	6(3.4)	179(53.1)	13.5,0.001,2
Thatched	106(67.1)	33(20.9)	19(12.0)	158(46.9)	
Floor-type					
Cement	148(67.0)	56(25.3)	17(7.7)	221(65.6)	24.1,0.65,4
Ceramics	22(57.9)	14(36.8)	2(5.8)	38(11.3)	
Muddy	49(62.8)	23(29.5)	6(7.7)	78(23.1)	
Window					
Yes	199(64.4)	85(27.5)	25(8.1)	309(91.7)	2.4 ,0.29,2
No	20(71.4)	8(28.6)	0(0.0)	28(8.3)	
Number of rooms					
Only one room	45(60.0)	24(32.0)	6(8.0)	75(22.3)	5.2, 0.27, 4
Two room	88(65.7)	40(29.9)	6(4.5)	134(39.8)	
Three and above	86(67.2)	29(22.7)	13(10.2)	128(38.0)	
Kitchen status					
Separated	128(66.7)	52(27.1)	12(6.3)	192(57.0)	1.02,0.59,2
Not separated	91(62.8)	41(28.3)	13(9.0)	145(43.0)	
Water source					
Protected well	66(55.9)	40(33.9)	12(10.2)	118(35.0)	10.4, 0.03, 4
Unprotected well	2(33.3)	3(50.0)	1(16.7)	6(1.8)	
Pipe water	151(70.9)	50(22.5)	12(5.6)	213(63.2)	
Latrine availability					
Yes	212(67.2)	76(24.4)	25(7.7)	313(92.8)	24.5, < 0.0001,2
No	7(16.1)	17(73.9)	0(0)	24(7.2)	
Waste disposal					

Housing condition	Level of stunting			Total	X^2, P, df
	Normal (%)	Moderate (%)	Severe (%)		
Pit	213(67.4)	78(24.7)	25(7.9)	316(93.8)	21.4, < 0.0001,2
Open	6(28.6)	15(71.4)	0(0.0)	21(6.2)	
*X2 = chi-square, P = Level of significant df = degree of freedom					

Characteristics of the under-five children

The proportion of male children participated in the study were 172(51%) and 158(46.9%) were at the age of 24–47 months with a mean age of 3.6 ± 1.2 year. Regarding birth order 164(48.7%) was the first child for their family and 323(95.8%) were fully vaccinated as depicted in Table 4.

Table 4
Characteristics of under-five children and their level of stunting in Shire Endaslassie, North West, Tigray, Ethiopia, 2017

Characteristics	Level of stunting			Total	X^2, P, df
	Normal (%)	Moderate (%)	Severe (%)		
Sex					
Male	111(64.5)	49(28.5)	12(7.0)	172(51.0)	0.2,0.9,2
Female	108(65.5)	44(26.7)	13(7.9)	165(49.0)	
Age of child (in months)					
< 24	41(56.2)	30(41.1)	2(2.7)	73(21.7)	10.4, 0.03,4
24–47	107(67.7)	38(24.1)	13(8.2)	158(46.9)	
48–59	71(67.0)	25(23.6)	10(9.4)	106(31.4)	
Birth order					
First	120(73.2)	30(18.3)	14(8.5)	164(48.7)	17.6 ,0.001,4
Second	48(58.5)	26(31.7)	8(9.8)	82(24.3)	
Third and above	51(56.0)	37(40.7)	3(3.3)	91(27.0)	
Immunization status					
Unvaccinated	2(100)	0(0)	0(0)	2(0.6)	7.3, 0.12,4
Partially vaccinated	5(41.7)	7(583)	0(0)	12(3.6)	
Fully vaccinated	212(65.6)	86(26.6)	25(7.7)	323(95.8)	
Have a history of severe illness					
Yes	12(60.0)	8(40.0)	0(0.0)	20(5.9)	2.8,0.2,2
No	207(65.3)	85(26.8)	25(7.9)	317(94.1)	
Having a habit of breastfeeding					
Yes	216(67.1)	88(27.3)	18(5.6)	322(95.5)	1.3, 0.52,2
No	3(20.0)	5(33.3)	7(46.7)	15(4.5)	
Time of breastfeeding					
When cry	125(59.2)	76(36.0)	9(4.7)	211(62.1)	24.3, < 0.001,2
According to time	95(74.8)	17(13.4)	15(11.8)	127(37.9)	

Characteristics	Level of stunting			Total	X^2, P, df
	Normal (%)	Moderate (%)	Severe (%)		
time of weaning					
< 4 month	124(59.0)	76(36.2)	10(4.8)	210(62.3)	23.4, < 0.001, 2
4–6 month	94(74.6)	17(13.5)	15(11.9)	126(37.4)	
> 6 month	1(100.0)	0(0)	0(0)	1(0.3)	
Frequency of feeding					
< 4 time	7(70.0)	2(20.0)	1(10.0)	10(3.0)	0.33,0.84,2
5 and above	211(69.9)	90(27.7)	24(7.4)	325(97.0)	
X^2 = chi-square, P = Level of significant df = degree of freedom					

Prevalence of stunting

The prevalence of stunting was 118(35%) in the study population from which25/118(21.3) were severely stunted. The prevalence of stunting was higher among male 61(18.1%), whereas, the female participant contributes 13 (3.9%) to severely stunted. Age group between 24–47 months was affected by stunting when compared with other age group. Prevalence of stunting in different age group is described in the following table.

Table 5
Prevalence of stunting by sex and age group among under-five in Shire Endassilasie town, Northwest, Tigray, Ethiopia in 2017

Characteristics	Normal (%)	Moderate (%)	Severe (%)	Total (%)	Prevalence of stunting (%)
Sex					
Male	111(33)	49(14.5)	12(3.6)	172(51.0)	**61(18.1)**
Female	108(32.0)	44(13.1)	13(3.9)	165(49.0)	**57(16.9)**
Total	219(65)	93(27.6)	25(7.4)	337(100)	118(35.0)
Age of child (in months)					
< 24	41(12.2)	30(8.9)	2(0.6)	73(21.4)	**32(9.5)**
24–47	107(31.8)	38(11.3)	13(3.9)	158(46.9)	**51(15.1)**
48–59	71(21.1)	25(7.4)	10(3.0)	106(31.5)	**35(10.4)**
Total	219(65%)	93(27.6)	25(7.4)	337(100)	118(35)

Factors associated with stunting

Maternal educational status (COR = 1.94,95%CI (1.13–3.32)), monthly income (COR = 2.42(1.43–4.22), Having enough time to prepare meal, preparation of meals for children (COR = 2.76(1.56–4.88), water source (COR = 2.18,95%(1.37–3.49), Latrine availability (COR = 0.20,95%CI (0.10–0.48), Waste disposal (COR:5.20,95% CI (1.94–13.7) and other five variables were entered to multivariate binary logistics regression model as depicted in Table 6.

Table 6
Factors of stunting in under-five in Shire Endassilasie town, north, West, Tigray, Ethiopia in 2017

Characteristics	Height for age		COR (95%CI)	P-value
	Stunted (%)	Normal (%)		
Maternal education level				
Secondary and below	95(80.5)	149(68.0)	1.94(1.13–3.32)	0.02
12+	23(19.5)	70(32.0)	1	
Monthly income				
≤ 3000birr	96(81.4)	140(63.9)	2.42(1.43–4.22)	0.001
>3000 birr	22(18.6)	79(36.1)	1	
Have enough time to prepare meals				
Yes	86 (73.5)	203(93.5)	0.19(0.10–0.38)	< 0.0001
No	31(25.5)	14(6.5)	1	
Preparation of meals for under-five children				
Together with adult	33(28.2)	27(12.4)	2.76(1.56–4.88)	< 0.0001
Separately	84(71.8)	190(87.6)	1	
Water source				
Unprotected water source	56(47.5)	64(29.5)	2.18(1.37–3.49)	0.001
Protected water source	62(52.5)	155(70.8)	1	
Latrine availability				
Yes	101(32.5)	212(67.7)	0.20(0.10–0.48)	< 0.0001
No	17(14.4)	7(3.2)	1	
Waste disposal				
Open	15(12.7)	6(2.7)	5.20 (1.94–13.7)	0.001
Pit	103(87.3)	213(97.3)	1	
Birth order				
Third and above	40(33.9)	51(23.3)	1	
Second	34(28.8)	48(21.9)	1.10(0.61–2.02)	0.74

Characteristics	Height for age		COR (95%CI)	P-value
	Stunted (%)	Normal (%)		
First	44(37.3)	120(54.3)	2.13(1.25–3.67)	0.006
Time of breastfeeding				
When cry	86(72.9)	124(56.6)	2.10(1.26–3.34)	0.004
According to time	32(27.1)	95(43.4)	1	
Usage of family planning				
Yes	63(53.4)	168(76.7)	0.35(0.22–0.56)	< 0.0001
No	55(46.6)	51(23.3)	1	
Time of weaning age				
< 4 month	86(72.9)	124(56.6)	2.10(1.26–3.34)	0.004
>4month	32(27.1)	95(43.4)	1	

In multivariate logistic regression, the water source was significantly associated with stunting. Accordingly, family using unprotected water sources for drinking were 3.20 more likely to have stunted AOR = 3.20, 95%CI (1.74–5.73) child compared to families using protected water sources. Monthly income was also one of the independent predictors of stunting: those who were earning below 3000(103$) were 2.59 times more likely to be stunted (AOR = 2.59, 95% (1.44–4.66) compared to those earned less than 3000 birrs (103$) per month. The significantly associated factors are illustrated in the following table (Table 7)

Table 7
Independent predictor of stunting under-five in Shire Endassilasie town, north, West, Tigray, Ethiopia in 2017

Characteristics	Height for age		AOR (95%CI)	P-value	S. E
	Stunted (%)	Normal (%)			
Water source					
Unprotected water source	56(47.5)	64(29.5)	3.20(1.74–5.73)	< 0.0001	0.30
Protected water source	62(52.5)	155(70.8)	1		
Monthly income					0.30
≤ 3000birr	96(81.4)	140(63.9)	2.59(1.44–4.66)	0.002	
>3000 birr	22(18.6)	79(36.1)	**1**		
Having enough time to prepare meals					0.39
Yes	86 (73.5)	203(93.5)	0.26(0.12–0.56)	0.001	
No	31(25.5)	14(6.5)	1		
Time of breast feeding					
When cry only	86(72.9)	124(56.6)	2.22(1.24–3.99)	0.007	0.29
According to time	32(27.1)	95(43.4)	1		
Usage of family planning					
Yes	63(53.4)	168(76.7)	0.59(0.31–0.90)	0.02	0.27
No	55(46.6)	51(23.3)	1		

Discussion

The intention of this study was to measure the prevalence and associated factors of stunting among preschool children of shire Endassilasie. Stunting is a cumulative process that can begin in utero and continues to about three years after birth. In the study area, the prevalence of stunting was 35 %. There was a slight age difference in stunting between the study group as the prevalence was 18.1% and 16.9 among male and female respectively. Significant difference among age group was also detected marking higher prevalence among 24–47 months of age group (15.1%), followed by 48–59 months (10.4%) then the least among study participant were age group of less than 24 months with the prevalence of 9.5%.

The 35% stunting prevalence testifies that the population in this area is affected by high risk of malnutrition according to the WHO classification of severity of malnutrition [16]. The prevalence of stunting among the study population was almost the same when compared with the study conducted in other areas with reasonably high malnutrition burden. For instance the study conducted in Bangladesh,

Indonesia and Pakistan showed the stunting prevalence of 36.1%, 33.7% and 55% respectively [18, 19, 24]. The same finding was also recorded in the study conducted at Jigjiga town Eastern Ethiopia showing 34.9% of under five were stunted [17]. However, the study conducted in northern part of Ethiopia showed the lower result when compared to the result obtained from this study. For example the detected prevalence in Libo Kemekem, Lalibela town, Wukro town and Medabay Zena were 49.4%, 47.3%, 49.2% and 56.7% respectively [20–23]. The difference could be attributed to the difference in the study period, variation in the age category of target populations, Geographic location and the recently initiated nutrition-sensitive intervention activities in the study area.

The finding our study was higher when compared to the study conducted in Southern part of Ethiopia. with this, the stunting prevalence of the study finding in Kembata, Hawassa and Wolaita Sodo shows 18.8%, 26.6% and 27% respectively [25–27]. In Ethiopia there is the difference in socioeconomic, culture, feeding habits, environmental factors, and public service utilization of the community in the study area between Southern and Northern part. Therefore, it's believed that the difference in stunting prevalence might have been contributed by such variation in socio cultural differences between southern and northern part of the country. Additionally, the finding of this study showed that the stunting prevalence increases with the age of the child. This association is inline with other studies conducted in the North and Northwest Ethiopia [29, 30]. This might be due to the nutritional status of the mother since stunting has a chronic and cyclic nature. Additionally, poor dietary practice, weaning, lower and inappropriate breast and complementary feeding practices have an effect on child growth as age increases. The other possible explanation for the increased risk of stunting might be due to environmental factors like poor sanitation and hygiene practice which increase the risk of choric malnutrition.

There is also variation in stunting prevalence between male and female. This result in line with studies conducted in Ethiopia [31], Nigeria [32] and the sub-Saharan countries [33]. This could be because of social factors like favoritism towards daughters [33]. Environmental factors such as parasitic infections like intestinal helminths could be worse the existing malnutrition. Additionally, biological factors including the common child illness predominately affect males than females and this in turns contribute for the higher prevalence among males [31].

Choric malnutrition arises from multifaceted and interrelated circumstances in which food security is the core factor. The present study showed that monthly income was significantly associated with stunting. The odd of being stunted is substantially higher among the low income group. This finding suggests that a child's health status depends upon the socio-economic status of their families. Similar association was seen in studies conducted in Holeta Town [34], Wolayta sodo [27], Lasta district [35]. This could be due to the fact that rich households have greater purchasing power of food to maintain the health of their children. However, being rich is not guaranteed according to the WHO report, stunting may also arise due to inadequate knowledge of food, feeding practices, inappropriate food allocation, and poor hygiene practices [36].

Additionally, this study identified that water source is one the factor associated with child stunting. Children from households using unprotected water sources are more likely to be stunted than children from households that are using protected sources. This is also supported by other similar studies conducted in Arba Mich[37], Medebay Zena [23]. Other study conducted out of Ethiopia showed similar finding; for instance study conducted in Tanzania [38], Zambia and other 59 countries [39] showed the same results. Unsafe drinking water causes diarrheal diseases thereby inhibiting nutrient absorption, which can lead to under nutrition and stunting.

Our results show that having enough time to prepare a meal is inversely associated with the child stunting. The odd of stunting among busy mothers to prepare a meal for their child is 3.8 times compared to children's from mothers that have enough time to prepare meal. Consistent finding has been observed in studies conducted in Southern [25, 40] and Eastern [41] part of Ethiopia and Bangladesh [42]. This commonly related to the mother's occupational status that impacts the intimacy with their child. Additionally, mothers who spent most of their time out of a home cannot provide sufficient care for their child. Therefore, busy mothers have short period to breastfeed their child, enforced to cease breastfeeding early that increase exposure to bottle feeding and improper complementary feeding practice.

This study also identified a significant association between stunting and time of breast feeding. Children who breast feed as per the feeding frequency have less chance of being stunted compared to children that feed in response to crying. A imilar association was seen in the studies conducted in Guto Gida of East Wollega [43], Sidama [44] and Lasta district [35]. Proper breastfeeding has an impact on averting early infant death as well as reducing child stunting. However, breast feeding practice could be affected by socioeconomic factors like low parental education especially mother's education, mothers' employment and another poor socio-economic status.

Another identified association was family planning usage and child stunting. Mothers who use family planning have lower chance of having stunted children when compared to nonusers of family planning. This finding was in line with studies conducted in the Sodo Zuria District of Ethiopia [45] and India [46]. The observed association might be due to loss of macro and micronutrient that occurs due to repeated pregnancy, delivery and breast feeding. Moreover, unplanned childbearing could elevate the risk of intrauterine growth restriction (IUGR), low birth weight (LBW), premature birth, and small birth size [47].

Even though this study shows reliable finding when compared with domestic and international journals, it exhibits the following limitations. The study cannot declare a temporal relationship between stunting and other independent variables because cross-sectional design was used for this study. Even though standard procedures were used for the measurement of height/length, measurement errors are inevitable especially within evaluators. Moreover, there might be a recall bias in reporting the age of children.

Conclusion

Our findings demonstrate a higher prevalence of stunting in Shire *Endaslassie*'s district and this justify that malnutrition is the major public health concern in this area. This study also revealed that a monthly

income, water source, frequency of feeding, time of breastfeeding and usage of family planning are the major predictor of stunting. Therefore, strong nutrition-specific and sensitive intervention should be implemented in the study area to avert the long effect of malnutrition.

Abbreviations

EDHS: Ethiopian Demographic Health Survey HAZ: Height for age z score, IUGR: Intra Uterine growth restriction, LBW: low birth weight, WHO: World Health Organization

Declarations

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Ethics approval and consent to participate

A letter of permission and cooperation was taken from the Department of Public Health, College of Medicine and Health Sciences of Aksum University and it was given to Shire Endaslassie town Health Office. Information on the study was given to the participants, including purpose and procedures, potential risk and benefits using oral consent, so that, they provide accurate and honest responses. Since all study participants were less than 16 years, assent was obtained from the children/adolescents and permission was obtained from respective parents/caretakers. The confidentiality of information was assured and insured. Participants were treated with respect and willingly participated in the study with no payment or coercion.

Consent for publication

Not applicable

Availability of data and materials

All data used are available within the manuscript

Competing interests

The Authors declared no competing interest

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Authors' contributions

NT and MZ wrote the proposal, participated in data collection, analyzed the data and drafted the paper.

DG approved the proposal, participated in data analysis and revised the drafts of the paper. All authors read and approved the final manuscript.

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