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Prevalence and Predictors of Stunting among Children of Age Between 6 to 23 Months in Four Districts of Wolaita Zone, Southern Ethiopia

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Abstract

Background: Stunting is one of public health problem which causes morbidity and mortality in the first two years of life. It is used to assess nutritional status of children by measuring their length/height and age. The purpose of this study was to assess prevalence and factors associated with stunting among children of ages between 6 to 23 months in four districts of Wolaita Zone, Southern Ethiopia.

Methods: Community based cross sectional study was employed among children of ages between 6 to 23 months in January 2020. A multistage sampling technique was used to select the study participants. A total of 767 participants were included in our study. Data were entered into Epi data version 3.1 and exported to SPSS 20.0 statistical software for analysis. Bivariate and multivariate analysis was done to assess factors associated with stunting. Odds ratio with 95% CI was used to identify independent predictors of stunting.

Result: Among 767 children, 759 were participated in the study with response rate of 98.9%. The prevalence of stunting in our study was 71.5%. Children born from mothers whose age were between 25-34 years and 35-45 years were 2.3 times; [AOR=2.3, (95% CI=1.37, 3.86)] and 3.09 times; [AOR=3.09, (95% CI=1.55, 6.18)] more likely developed stunting than mothers whose age were between 15-24 years respectively. Children born from mothers who did not attend formal education were 2.45 times; [AOR=2.45, (95% CI=1.25, 4.83)] more likely developed stunting than mothers who attended formal education. Children whose age were between 6-12 months and 12-18 months were 10.12 times; [AOR=10.12, (95% CI=6.34, 16.4)] and 6.16 times; [AOR=6.16, (95% CI=3.92, 9.68)] more likely developed stunting than children whose age were between 19-24 months respectively. Children who ever sick within 2 weeks prior to data collection were 1.68 times; [AOR=1.68,(95% CI 1.15,2.45)] more likely developed stunting than those who ever not sick within 2 weeks; however, those who fed colostrum were 49% less likely developed stunting than their counter part; [AOR=0.61 (95% CI=0.37,0.98)]. Children who were delivered at home were 2.38 times; [AOR=2.38, (95% CI 1.51,3.75)] more likely developed stunting than those delivered at health facility; however, those whose mother ever got postnatal care were 49% less likely developed stunting than those whose mother ever not got postnatal care after delivery; [AOR= 0.61 (95% CI=0.41,0.91)].

Conclusion: The prevalence of stunting in study area is high. Maternal age, maternal education, child's current age, child sickness, colostrum feeding practice, place of delivery and postnatal care utilization were independent predictors for child stunting. Thus concerned body working on child health should consider these factors to reduce the burden of stunting.

Keywords: Stunting; Age of 6 to 23 months; Wolaita zone; Southern ethiopia

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Introduction

Stunting, a sign of chronic under nutrition, is defined as the percentage of children whose height for age is below minus two standard deviations from the median of the World Health Organization (WHO) [1]. It is a major public health problem in developing countries such as Ethiopia [2]. Stunting can occur in all age groups, but the impact is more severe among children age 6-23 months as this period is critical for child development and in high demands for nutrients [3,4]. It also results in increased child morbidity, impaired cognitive development, poor school performance and increased risk of mortality [5,6]. This indicates that the need for more resources devoted to prevent under nutrition during the critical window from conception to the first two years of age (also referred to as the "first 1000 days") [4].

Globally, at least 1 in 3 children under five is malnourished and about 149 million children under 5 suffer from stunting [7,8]. In Ethiopia 2 out of every 5 children are stunted and about 37% of children under five are short for their age or stunted and 12% are severely stunted (below -3 SD) and the prevalence increases steadily with age, from 22% among children 6-8 months up to 44% of children 48-59 months [4,9]. There are some regional variations in stunting, which ranges from a high of 49% in Tigray to a low of 14% in Addis Ababa. Its prevalence is 44% in Southern region of Ethiopia and rural children are much more likely to be stunted than those from urban areas [4,10]. Different study showed the prevalence of stunting among children aged 6 to 23 months ranges from 18.7 to 33.7 percent in Ethiopia [11-13]. Children aged 6 to 23 months are usually vulnerable to stunting as they often suffer from inadequate quantity, quality and diversity of foods during the early stages of life [4,8]. Knowledge about the prevalence and associated factors of stunting is an important requirement for developing nutritional intervention strategies. However; there were limited studies on stunting among children under two years of life in the study area. Therefore, the aim of this study was to identify the prevalence and predictors of stunting among children of age between 6 to 23 months in four districts Wolaita Zone. The finding of this study will help development and improvement of implementation and intervention strategies to reduce child mortality and morbidity.

Methods and Materials

Study design and setting

We conducted community based cross sectional study in January 2020 in four districts (Kindo Koysha, Boloso Sore, Duguna Fango and Damot Pulasa) of Wolaita Zone, Southern Ethiopia. Wolaita is located at a distance of 328 km South of the capital city (Addis Ababa). Based on the 2007 census conducted by the Central Statistical Agency of Ethiopia (CSA), the population of Wolaita zone was projected to be 2,067,163 for the year 2019/20 (making it one of the most densely populated areas in the region) [14]. Among them, 97 % were Wolaita ethnic groups, 50.1% were men and 15.61% were under five children. Currently Wolaita zone is administratively divided in to sixteen districts and six town administrations. We selected twenty kebele (smallest administrative unit in Ethiopia) in four districts to select study participants. The zone has three hospitals, 71 health centers, 372 health posts and 98 private clinics.

Sample size determination and sampling procedure

Sample size was calculated using OpenEpi (Epidemiological Statistics for Public Health, version 2.2) by assuming the proportion of stunting to be 18.7% [12], confidence level of 95%, 4% degree of precision, 5% for non-response rate and design effect of 2. The final sample size was 767. A multistage sampling technique was used to select study participants. Four rural districts out of sixteen rural districts and twenty kebele out of 98 kebele from the selected four districts were chosen by simple random sampling technique (lottery method). Then the total sample size was allocated proportionally to the selected kebele based on the number of children. A list of households with children aged between 6 to 23 months was obtained from health post EPI registration book. Then simple random sampling method (generated by computer) was used to select the study participants from each selected kebele.

Measurement and tools

Pre-tested interviewer administered structured questionnaire adopted from different literatures were used to collect data. The questionnaire addressed socio demographic characteristics of children and mothers/care givers, maternal and child health services, child feeding practices and environmental factors. The instrument was initially prepared in English and translated into local language (Wolaitigna), then retranslated by another person to check consistency. It was pre-tested in 5% of sample size in non-selected district.

Data collection and analysis

Data were collected using structured questionnaire via face to face interview from mothers/care givers by twenty data collectors. Height was measured in a lying position to the nearest 0.1 cm using a standard board with sliding headpiece. The ages of children were obtained from immunization card (if available) or from mothers/care givers verbal report. The indices were calculated using WHO Anthroplus version 1.0.4 statistical software. Questionnaire were checked daily for its completeness by five supervisors then it were edited, coded and entered into Epi data version 3.1 and exported to SPSS 20.0 statistical software for analysis. After cleaning data for inconsistencies and missing values, descriptive statistics were done. Bivariate analysis was done for all explanatory variables to identify their association with stunting (height for age less than minus two standard deviation). Variables with p-value less than 0.2 in the bivariate analysis were included in multivariate analysis using backward logistic regression procedure. Odds ratios with 95% confidence intervals were used to determine the association between stunting and independent variables. Model fitness was assessed using Hosmer and Lemeshow test. Collinearity and interaction between independent variables were checked and not found.

Ethical consideration

Ethical clearance was obtained from Wolaita Sodo University

ethical review committee. Letter of cooperation was obtained from Wolaita Zonal health department and four district health office to respective health centers and health posts. Verbal informed consent was obtained from the mothers/care givers.

Results

Among 767 children, 759 were participated in the study with response rate of 98.9%. In our study, 543 (71.5%) of the study participant were stunted (whose height for age below -2SD). Majority of mothers/care givers were in the age group 25-34 years 513 (67.6%), protestant by religion 575 (75.7%), married 738 (97.2%), house wife by occupation 631 (83.1%), unable to read and write 374 (49.3%) and house hold headed by husband 517 (68.1%). Concerning income 634 (83.5%) was from farming source and owning less than three hectares 663 (87.4%) (**Table 1**).

Child health related characteristics and feeding practice

About 392 (51.6%) of children involved in the study were female by sex, 300 (39.5%) were in age group between 6 to 12 months, 421 (55.5%) ever not sick with in the last 15 days prior to data collection time and 536 (70.6%) completed vaccination for their age. About 600 (79.1%) of mothers fed colostrum at birth; however about 148 (19.5%) ever started weaning diet before six months, 96 (12.6%) fed breast milk less than 8 times per day and 157(20.7%) gave weaning diet less than or equals to 3 times per day (**Table 2**).

Table 1. Socio-demographic characteristics of mothers/care givers of children aged 6 to 24 months in four districts of Wolaita Zone, January 2020.

Variable	Frequency	Percent
Stunted		
Yes	543	71.5
No	216	28.5
Age of mother		
15-24	106	14
25-34	513	67.6
35-45	140	18.4
Religion		
Orthodox	153	20.2
Protestant	575	75.7
Others	31	4.1
Marital status		
Married	738	97.2
Others	21	2.8
Wife occupation		
House wife	631	83.1
Others	128	16.9
Wife education		
Un able to read and write	374	49.3
Primary (1-8)	325	42.8
Secondary and above	60	7.9
House hold head		
Husband	517	68.1
Wife	242	31.9
HH income source		
Farming	634	83.5
Others	125	16.5
Farm land		
< 3 hectar	663	87.4
>= 3 hectar	96	14.6

Health related characteristics

Among respondents about 646 (85.1%) attended antenatal care, 466 (61.4%) delivered at health facility; however 394 (51.9%) did not attend postnatal care after home or health facility delivery. Concerning environmental factors about 715 (94.2%) own private latrine, 518 (68.2%) practiced hand washing during critical time, 648 (85.4%) used protected water source; and only 144 (19%) were practicing proper waste disposal system. About 353 (46.5%) of mothers/care givers attended food preparation demonstration

Table 2. Child health related characteristics and their feeding practice in four districts of Wolaita Zone, January 2020.

Variable	Number	Percent
Sex of last child		
Male	367	48.4
Female	392	51.6
Age of last child		
6-12	300	39.5
13-18	257	33.9
19-24	202	26.6
Nº of total under 5 children per house hold		
1-3	352	46.4
4-6	407	53.6
Ever sick in the last 2 weeks		
Yes	338	44.5
No	421	55.5
Child Vaccine status		
Ever not started	34	4.5
Up to date	189	24.9
Completed	536	70.6
Feed colostrum		
Yes	600	79.1
No	159	20.9
Ever started weaning before 6 months		
Yes	148	19.5
No	611	80.5
BF frequency per day		
<8	96	12.6
8-12	404	53.2
>12	259	34.1
Dietary Diversity		
<=3 food groups	115	15.2
4-6 food groups	331	43.6
>=7 food groups	313	41.2
Meal frequency		
<=3x/day	157	20.7
>=4x/day	602	79.3

given by AMREF Health Africa (NGO working in the study area); however only 71(9.4%) of mothers/care givers took food ration (**Table 3**).

Multivariate analysis

Nine variables; age of mothers, maternal education, paternal education, child's current age, child sickness, child vaccination status, colostrum feeding practice, place of delivery and ever got PNC after delivery were candidate variables for multivariate analysis. After adjusting for confounding variables, seven variables; age of mothers, maternal education, child's current age, child sickness, colostrum feeding practice, place of delivery and ever got PNC after delivery were significantly associated with the outcome variable.

Children born from mothers whose age were between 25-34 years and 35-45 years were 2.3 times; [AOR=2.3 , (95% CI=1.37, 3.86)] and 3.09 times; [AOR=3.09, (95% CI=1.55, 6.18)] more likely developed stunting than mothers whose age were between 15-24 years respectively. Children born from mothers who were unable to read were 2.45 times; [AOR=2.45, (95% CI=1.25, 4.83)] more likely developed stunting than mothers whose educational status were secondary and above. Children whose age were between 6-12 months and 12-18 months were 10.12 times; [AOR=10.12, (95% CI=6.34, 16.4)] and 6.16 times; [AOR=6.16, (95% CI=3.92, 9.68)] more likely developed stunting than children whose age were between 19-23 months respectively. Children who ever sick within 15 days prior to data collection were 1.68 times; [AOR=1.68,(95% CI 1.15,2.45)] more likely developed stunting than those who ever not sick within 15 days however, those who fed colostrum were 49% less likely developed stunting than their counter part; [AOR= 0.61 (95% CI=0.37,0.98)]. Children who were delivered at home were 2.38 times; [AOR=2.38, (95% CI 1.51,3.75)] more likely developed stunting than those delivered at health facility; however, those whose mother ever got postnatal care were 49% less likely developed stunting than those whose mother ever not got postnatal care after delivery; [AOR=0.61 (95% CI=0.41,0.91)] (**Table 4**).

Table 3. Health related characteristic of mothers/care givers of children aged 6 to 23 months in four districts of Wolaita Zone, January 2020.

Variable	Number	Percent
Ever attended ANC at last pregnancy		
Yes	646	85.1
No	113	14.9
Place of delivery for last child		
Home	293	38.6
Health facility	466	61.4
Ever got PNC after home/HF delivery		
Yes	365	48.1
No	394	51.9
Own private latrine		
Yes	715	94.2
No	44	5.8
Hand washing practice during critical time		
Yes	518	68.2
No	241	31.8
Water source		
Protected	648	85.4
Unprotected	111	14.6
Practice proper waste disposal		
Yes	144	19
No	615	81
Ever attended food preparation demonstration		
Yes	353	46.5
No	406	53.5
Ever took food ration from any organization		
Yes	71	9.4
No	688	90.6

Table 4. Independent predictors of stunting among children aged 6 to 23 months in in four districts of Wolaita Zone, January 2020.

Variable	Stunting status		COR(95% CI)	AOR (95% CI)
	Stunted N° (%)	Not stunted N° (%)		
Age of mother				
15-24	56(10.3)	50(23.2)	1	1
25-34	373(68.7)	140(64.8)	2.38(1.55,3.65)	2.3(1.37,3.86)*

35-45	114(21)	26(12)	3.92(2.21,6.93)	3.09(1.55,6.18)*
Maternal education				
Un able to read and write	289(53.2)	85(39.4)	2.43(1.38,4.28)	2.45(1.25,4.83)*
Primary (1-8)	219(40.3)	106(49.2)	1.48(0.84,2.59)	1.44(0.74,2.81)
Secondary and above	35(11.5)	25(6.4)	1	1
Child current age (in months)				
6-12	255(47)	45 (20.8)	7.80(5.11,11.90)	10.12(6.34.16.4)*
13-18	203(37.4)	54(25)	5.17(3.43,7.79)	6.16(3.92,9.68)*
19-23	85(15.6)	117(54.2)	1	1
Ever sick in the last 15 days				
Yes	267(49.2)	71 (32.9)	1.98(1.42,2.75)	1.68(1.15,2.45)*
No	276(50.8)	145(67.1)	1	1
Feed Colostrum				
Yes	417(76.8)	183(84.7)	0.6(0.39,0.91)	0.61(0.37,0.98)*
No	126(23.2)	33(15.3)	1	1
Place of delivery for last child				
Home	246 (45.3)	47(21.8)	2.98(2.07, 4.29)	2.38(1.51,3.75)*
Health facility	297(54.7)	169(78.2)	1	1
Ever got PNC after delivery				
Yes	234(43.1)	131(60.6)	0.49(0.36,0.68)	0.61(0.41,0.91)*
No	309(56.9)	85(39.4)	1	1

1= reference category
*statistically significant

Discussion

Adequate nutrition during infancy and early childhood is very important for child growth, health and development. Stunting is much more common nutrition problem that mainly affects developing countries like Ethiopia. In this study the prevalence of stunting was 71.5%. This is higher than different studies conducted in our country [11-13,15] and other developing countries [16-20]. This might be due to seasonal effect of study period and high population density in the study area.

In our study children born from older mothers (above 25 years) were more likely stunted than those children born from younger mothers. This might be due to the fact that older mothers might have many more children in house hold competing for diet required for child growth than younger mothers. This finding is in line with the studies conducted in Kemba district of Southern Ethiopia [12]. However, the finding is inconsistent with the study conducted in Malawi such that infants born to younger mother were more likely stunted than older mothers [16]. This might be due to difference in socioeconomic difference between two countries.

In this study children born from mothers who did not attend formal education were higher odds of being stunted than those children born from mothers who attended formal education. This might be due to the fact that those mothers who attended formal education have better awareness on child nutrition than their counter parts. Similar finding was observed in studies conducted in different parts of Ethiopia; Kemba, Mekele, North Shewa, Ataye districts [12,21-25]. However, it is inconsistent with the study conducted in Arsi Negele district of Southern Ethiopia such those children born from mothers who attended formal education were more likely stunted than their counter parts [26].

This study revealed that as the age of the child increased, the odds of stunting decreased such that younger children (age below 18 months) were more likely stunted than older children of ages above 18 months. This might be due poor breast feeding and complementary diet initiation practice of mothers in the study area. This finding is consistent with the study conducted in Southern parts of Ethiopia [27,28]. However, it is inconsistent with studies conducted in Northern Ethiopia, Kenya and Cambodia such that prevalence of stunting increases steadily with the ages of children [4,9,15,20].

In our study the likelihood of stunting was higher among children who ever sick two weeks prior to data collection than their counter parts. This finding is consistent with study conducted in different part of Ethiopia such that illness increased the risk of stunting [15,22,24,29,30]. This might be due to that during illness nutritional requirement increases despite loss of appetite and illness might affect poor absorption of balanced diet which exposes the child for stunting.

Children who fed colostrum were about 49 percent less likely stunted than those children who did not fed colostrum at birth. This might be due to consumption of first breast milk rich on antibodies, vitamins and minerals prevent child from infection which is risk factor for stunting. The finding is in line with the study conducted in Zambia that poor breast feeding practice was risk factor for stunting [18].

This study revealed that children born at home were more likely being stunted than those who delivered at health facility. This might be due to the fact that those mothers who attended health facility were equipped with adequate knowledge about child feeding. This finding is consistent with the study conducted in Zambia such that the odds of stunting were higher among children born at home that at health facility [18].

Those children whose mother utilized postnatal service were about 49 percent less likely stunted than those children whose mother did not utilized postnatal service. This might be due to the fact that mothers who attended postnatal service have high chance to get advice regarding breast feeding and complementary diet from health care professionals on proper child feeding practice. This finding is consistent with the study conducted in Kemba district of Southern Ethiopia such that postnatal service utilization was preventive factor for stunting [12,21].

Strength and limitation of the study

Since majority of information collected was based on the ability of remembering, the result was subjected to recall bias specially the age of child. Absence of data on maternal nutrition, heights of the mothers, household food security and parasitic infections could affect stunting of children. However, maximum effort has been done to avoid recall bias and got accurate age by asking for immunization card of the participants if available.

Conclusion

The prevalence of stunting in study area is high. Maternal age, maternal education, child's current age, child sickness, colostrum feeding practice, place of delivery and postnatal care utilization were independent predictors for child stunting. Thus concerned body working on child health should consider these factors to reduce the burden of stunting.

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Competing interests

The authors declare that they have no competing interests.

Authors' contributions

WK: Involved from the inception to design, acquisition of data, analysis and interpretation, drafting the manuscript. WF: Involved in the analysis & interpretation of data, manuscript preparation & revises the manuscript. KN: Involved in analysis & interpretation of data, manuscript preparation & revises the manuscript. Finally all authors read and approved the final manuscript.

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