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Research Article

Under-Nutrition among Children Aged 6 - 23 Months in the Hotspot and Non-Hotspot Pastoral Areas, Northeast Ethiopia: A Comparative Cross Sectional Study

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Abstract

Background: Child malnutrition is responsible for about half of child mortality. This study aimed to assess the factors associated with malnutrition among children aged 6 - 23 months in the hotspot and non-hotspot districts of Afar Regional State, Ethiopia.

Methods: A community-based cross-sectional study was conducted in hotspot and non-hotspot districts of Afar Regional State in June 2016 on randomly selected 1129 mother-child pairs. Data were analysed using SPSS version 20. Anthropometric measurements of children were analysed using WHO Anthro version 3.2.2. Logistic regression was used to identify the predictors of nutritional status. Statistical significance was declared at $p < 0.05$.

Result: The overall magnitude of underweight, stunting and wasting was 31.9%, 26.7%, and 36.8%, respectively. Children in hotspot areas had higher odds of underweight [AOR (95% CI): 1.34 (1.04, 1.74)] and wasting [AOR (95% CI): 1.49 (1.17, 1.93)] compared to those from non-hotspot districts. Higher likelihood of underweight was found among male [AOR: 1.70; 95% CI (1.14, 2.52)], non-vaccinated children [AOR ((95% CI): 1.54 (1.16, 2.05)] and those from households not having latrine [AOR (95% CI): 1.62 (1.14, 2.47)]. Likewise, residence, sex, age, antenatal check-up, dietary diversity score and history of prelacteal feeding were significantly associated with stunting.

Conclusion: Children in hot spot districts had an increased likelihood of being affected by all forms of child under-nutrition. Therefore, training and awareness creation activities on proper infant and young child feeding practices are vital to tackle child malnutrition.

***Keywords**: Afar; Hotspot; Stunting; Underweight; Wasting*

Background

Child malnutrition is responsible for about half of mortality among children aged under five years [1]. Globally, the prevalence of stunting, underweight and wasting in children under-five years is 26%, 16% and 8%, respectively [2]. According to United Nation Children's Fund (UNICEF), WHO and the World Bank joint database 2013 report on child malnutrition, globally an estimated 101 (16%) million under-five children were underweight, and the majority (33%) of them resides in Southeast Asia [3].

Thirty-six percent of children in low-income countries are malnourished compared with 12% and 1% in middle-income countries and the United States of America, respectively [4]. In Sub-Saharan Africa, about 21% of children are underweight where child malnutrition is the second leading cause of morbidity and mortality [3].

Malnutrition varies from country to country depending on economical, ecological, social, and other factors. At the present situation, the most serious nutritional problems in resource-limited settings like Ethiopia are mainly due to the low intake of foods [5]. In Ethiopia, child malnutrition is one of the most serious public health problem [6]. According to the recent Ethiopian demographic and health survey, 38% of children under-five years were stunted, while 24% underweight and 10% wasted. Furthermore, Afar region is highly affected by child under-nutrition, where 41%, 18% and 36% were stunted, wasted and underweight, respectively [7].

Despite this fact, the magnitude and the factors associated with child malnutrition in the hot spot and non-hot spot areas of the Afar region are not well documented.

Aim of the Study

This study, therefore, was aimed to assess the magnitude and the factors associated with malnutrition among children aged 6 - 23 months in the hotspot and non-hotspot districts of Afar Regional State, Ethiopia.

Methods

Study setting and design

A community based comparative cross-sectional study was conducted among children aged 6 - 23 months in hotspot and non-hotspot districts of Afar region in June 2016. Afar is a semi-arid region and the majority of the population is pastoralist. The region is administratively organized in five zones. In this region, there are a total of 13 hotspots (priority one) and 5 non-hotspot (priority three) districts.

Sample size determination and sampling procedure

The sample size was determined by two population proportion formula using 67.8%, 12.8% and 46.1% prevalence (P2) of stunting, wasting and underweight in non-hotspot areas, respectively [8]. For the hotspot area, the prevalence (P1) of 10% difference from the non-hotspot area was considered: 77.8%, 22.8%, 56.1% for stunting, wasting and underweight, respectively. Then, the calculated sample sizes were multiplied by a design effect of 1.5. The maximum sample size (1188) was determined using the magnitude of underweight. Finally, 594 were taken from the hotspot and 594 from the non-hotspot areas.

A stratified multi-stage sampling technique was employed to include the study participants. First, from five zones, two zones (zone 1 and 4) were randomly selected. Then, from three non-hotspot and two hotspot districts in zone 1, one district was randomly selected from each category (Aysaita and Elida'ar, respectively). Similarly, from zone 4 one district from each category (Teru from hotspot and Ewa

from the non-hotspot district) was randomly selected. Thirty percent of kebeles from each district were selected by lottery method. Then, the sample size was proportionally allocated to each kebele based on the number of eligible children using health extension registration book. Finally, a simple random sampling technique was used to select eligible children. If there were more than one eligible child in one household unit, one child was selected randomly using the lottery method. Children who were seriously ill and had congenital deformity were excluded from the study.

Study variables

The dependent variables were underweight, stunting and wasting. A child with z-score of weight for age (WAZ), height for age (HAZ) and weight for height (WHZ) less than -2 standard deviation (SD) from the WHO standards were considered as underweight, stunted and wasted, respectively [9]. The independent variables were socio-demographic characteristics, child feeding practices, maternal and child health care, water and sanitation-related factors.

Data collection instrument and procedures

Data were collected using an interviewer-administered questionnaire and anthropometry measurements. The study tool was initially prepared in English and translated to Afar'af (the local language). Eight diploma and four degree graduated health professionals were recruited as data collectors and supervisors, respectively. The data collectors and supervisors were trained for two days. Before actual data collection, the tool was pre-tested on 5% of the sample size outside the study area and the tool was revised based on the pre-test results. Weight of children was measured to the nearest 0.1 kg. Weighing scale was calibrated by two-kilogram standard weight on daily basis. The length of children was measured in a recumbent position to the nearest 0.1 cm. Child's age was recorded using written official documents (vaccination cards and baptismal certificates). For those who did not have written documents, maternal recall was considered. The consistency of the collected data and completeness of the questionnaire was assessed by supervisors on daily basis.

Data processing and analysis

Data were coded, cleaned and entered into Epi-Info version 7.1.4 and then exported to SPSS version 20 for analysis. Child's weight, length, sex and age were exported to WHO Anthro version 3.2.2 software. Univariable and multivariable logistic regression analyses were carried out to identify the predictors of child nutritional status. Variables with p-value < 0.25 in the univariable analysis were included in the multivariable analysis. Crude and adjusted odds ratio (AOR) with 95% confidence interval was estimated and variables with a p-value < 0.05 was used to declare the statistical significance. Furthermore, model fitness was checked and confirmed for all outcome variables using Hosmer-Lemeshow model fitness test; thus, the p-value was 0.49, 0.89 and 0.11 for underweight, stunting and wasting, respectively.

Results

Socio-demographic characteristics of the study participants

A total of 1129 mother-child pairs (551 from hotspot and 578 from non-hotspot) were included in the study with a response rate of 95%. The mean (± SD) age of the mothers was 28.49 (± 4.82) years and more than 65% of them were between the age of 25 and 34 years. The majority (87.6%) of the study participants resided in rural areas, 91.5% were currently married and about three-fourth (71.2%) of them were unable to read and write. Almost all (98.9%) of the study participants were Muslims. The mean (± SD) family size was 5.10 (± 1.34) (Table 1).

Variables	Hotspot (n = 551)	Non-hotspot (n = 578)	Total (n = 1129)
Age of Mothers			
15 - 19	10 (1.8)	15 (2.6)	25 (2.2)
20 - 24	98 (17.8)	108 (18.7)	206 (18.2)
25 - 29	189 (34.3)	187 (32.4)	376 (33.3)
30 - 34	181 (32.8)	191 (33.0)	372 (32.9)
35 and above	73 (13.2)	77 (13.3)	150 (13.3)
Mean ± SD	28.58 ± 4.75	28.42 ± 4.89	28.49 ± 4.82
Household head			
Mother	336 (61.0)	272 (47.1)	608 (53.9)
Father	115 (39.0)	306 (52.9)	521 (46.1)
Residence			
Urban	65 (11.8)	75 (13.0)	140 (12.4)
Rural	486 (88.2)	503 (87.0)	989 (87.6)
Ethnicity			
Afar	539 (97.8)	569 (98.4)	1108 (98.1)
Amhara	12 (2.2)	9 (1.6)	21 (1.9)
Religion			
Muslim	546 (99.1)	571 (98.8)	1117 (98.9)
Orthodox	5 (0.9)	7 (1.2)	12 (1.1)
Marital status			
Single	24 (4.4)	23 (4.0)	47 (4.2)
Married	495 (89.8)	538 (93.1)	1033 (91.2)
Separated	14 (2.5)	9 (1.6)	23 (2.0)
Divorced	10 (1.8)	6 (1.0)	16 (1.4)
Widowed	8 (1.5)	2 (0.3)	10 (0.9)
Mother's educational status	405 (73.5)	443 (76.6)	848 (75.1)
Unable to read and write	80 (14.5)	61 (10.6)	141 (12.5)
Informal education	66 (12.0)	74 (12.8)	140 (12.4)
Formal education			
Husband's educational status	372 (67.5)	432 (74.7)	804 (71.2)
Unable to read and write	73 (13.2)	46 (8.0)	119 (10.5)
Informal education	106 (19.2)	100 (17.3)	209 (18.2)
Formal education			

Mother's occupation			
Housewife	420 (76.2)	435 (75.3)	855 (75.7)
Merchant	42 (7.6)	42 (7.3)	84 (7.4)
Private org. employee	17 (3.1)	24 (4.2)	41 (3.6)
Gov't employee	32 (5.8)	36 (6.2)	68 (6.0)
Daily labourer	12 (2.2)	17 (2.9)	29 (2.6)
Pastoralist	28 (5.1)	24 (4.2)	52 (4.6)
Husband's occupation			
Farmer	46 (8.3)	63 (10.9)	109 (9.7)
Government employee	60 (10.9)	67 (11.6)	127 (11.2)
Merchant/Trader	20 (3.6)	16 (2.8)	36 (3.2)
Daily labourer	40 (7.3)	41 (7.1)	81 (7.2)
Pastoralist	385 (69.9)	391 (67.6)	776 (68.7)
Family size			
3 - 5	373 (67.7)	391 (67.6)	764 (67.7)
≥ 6	178 (32.3)	187 (32.4)	365 (32.3)

Table 1: *Socio-demographic characteristics of mothers in hotspot and non-hotspot pastoral areas, Northeast Ethiopia, 2016 (n = 1129).*

Child characteristics

The mean (± SD) age of children was 13.24 (± 5.57) months. More than sixty percent of children included in the study were males (Table 2).

Variables	Hot spot (n = 551)	Non-hot spot (n = 578)	Total (n = 1129)
	Frequency (%)	Frequency (%)	Frequency (%)
Age (in month)			
6 - 11	275 (49.9)	222 (38.4)	497 (44.0)
12 - 23	276 (50.1)	356 (61.6)	632 (56.0)
Mean ± SD	12.63 ± 5.56	13.82 ± 5.53	13.24 ± 5.57
Sex			
Male	335 (60.8)	358 (62.0)	693 (61.8)
Female	216 (39.2)	220 (38.0)	436 (38.4)
Birth order			
1 - 4	462 (83.8)	491 (84.9)	953 (94.4)
≥ 5	89 (16.2)	87 (15.1)	176 (15.6)
Birth interval (year)			
First birth	36 (6.5)	44 (7.6)	80 (7.1)
1 - 2 years	400 (72.6)	432 (74.7)	830 (73.7)
3 - 4 years	115 (20.9)	102 (17.6)	217 (19.2)

Had diarrhoea			
Yes	174 (31.6)	215 (37.2)	389 (34.5)
No	338 (61.3)	343 (59.3)	681 (60.3)
Don't know	39 (7.1)	20 (3.5)	59 (5.2)
Had fever			
Yes	173 (31.4)	214 (37.0)	387 (34.3)
No	346 (62.8)	351 (60.7)	697 (61.7)
Don't know	32 (5.8)	13 (2.2)	45 (4.0)
Had respiratory disease			
Yes	121 (22.0)	140 (24.2)	261 (23.1)
No	394 (71.5)	422 (73.0)	816 (72.3)
Don't know	36 (6.5)	16 (2.8)	52 (4.6)

Table 2: *Characteristics of children aged 6 - 23 months in hotspot and non-hotspot pastoral areas, Northeast Ethiopia, 2016 (n = 1129).*

Child feeding and caring practices

About 46% of children initiated breastfeeding immediately after birth, 39.5% were deprived of colostrum, and about 66% were exclusively breastfed for six months (Table 3).

Variables	Hotspot (n = 551)	Non-hotspot (n = 578)	Total (n = 1129)
	Frequency (%)	Frequency (%)	Frequency (%)
Initiation of breastfeeding (n = 1128)			
Immediately	246 (21.8)	279 (24.7)	525 (46.5)
Hours	284 (25.2)	277 (24.5)	561 (49.7)
Days	20 (1.8)	22 (1.9)	42 (3.7)
Prelacteal feeding			
No	167 (30.3)	194 (33.6)	361 (32.0)
Yes	384 (23.6)	384 (66.4)	768 (68.0)
Prelacteal feeds given (n = 768)			
Water	130 (16.9)	128 (16.6)	258 (33.6)
Butter	175 (22.8)	217 (28.3)	392 (51.0)
Milk	79 (10.3)	39 (5.1)	118 (15.4)
Squeezed out colostrum			
No	306 (55.5)	377 (65.2)	683 (60.5)
Yes	245 (44.5)	201 (34.8)	446 (39.5)
Antenatal check-up			
No	376 (68.2)	377 (65.2)	753 (66.7)
Yes	175 (31.8)	201 (34.8)	376 (33.3)
Number of ANC visit (n = 376)			
1 - 3	90 (23.9)	101 (26.9)	191 (50.8)
≥ 4	85 (22.6)	100 (26.6)	185 (49.2)

Advice on child feeding during ANC (n = 376)			
No	39 (10.4)	48 (12.8)	87 (23.1)
Yes	136 (36.2)	153 (40.7)	289 (76.9)
Place of childbirth			
Home	317 (57.5)	316 (54.7)	633 (56.1)
Health institution	234 (42.5)	262 (45.3)	496 (43.9)
Mode of delivery			
Caesarean	18 (3.3)	11 (1.9)	29 (2.6)
Vaginal	533 (96.7)	567 (98.1)	1100 (97.4)
Postnatal check-up			
No	407 (73.9)	405 (70.1)	812 (71.9)
Yes	144 (26.1)	173 (29.9)	317 (28.1)
Advice on child feeding at PNC (n = 317)			
No	12 (3.8)	15 (4.7)	27 (8.5)
Yes	132 (41.6)	158 (49.8)	290 (91.5)
Child vaccinated			
No	222 (40.3)	192 (33.2)	414 (36.7)
Yes	329 (59.7)	386 (66.8)	715 (63.3)

Table 3: *Child caring practices in hotspot and non-hotspot pastoral areas, Northeast Ethiopia, 2016 (n = 1129).*

Household sanitation characteristics

About 66% of the households use a river as a source of drinking water. Only 59% of households have latrine (Table 4).

Variables	Hotspot	Non-hotspot	Total
	Frequency (%) (n = 551)	Frequency (%) (n = 578)	Frequency (%) (n = 1129)
Source of drinking water			
River	386 (70.1)	356 (61.6)	742 (65.7)
Public tap	110 (20.0)	140 (24.2)	250 (22.1)
Spring	55 (10.0)	82 (14.2)	137 (12.1)
Treat water			
No	296 (53.7)	297 (51.4)	593 (52.5)
Yes	255 (46.3)	281 (48.6)	536 (47.2)
Have latrine			
No	217 (39.4)	243 (42.0)	460 (40.7)
Yes	334 (60.4)	335 (58.0)	669 (59.3)
Wash hand after toilet			
No	161 (29.2)	162 (28.0)	323 (28.6)
Yes	390 (70.8)	416 (72.0)	806 (71.4)
Waste disposal			
Open field	416 (75.5)	484 (83.7)	900 (79.7)
Pit	122 (22.1)	85 (14.7)	207 (18.3)
Burning	13 (2.4)	9 (1.6)	22 (1.9)

Table 4: *Water source and sanitation practices among households in hotspot and non-hotspot pastoral areas, Northeast Ethiopia, 2016 (n = 1129).*

The magnitude and factors associated with under-nutrition

The overall prevalence of underweight, stunting and wasting among children aged 6-23 months was 31.9% [95% CI: (29.2%, 34.6%)], 26.7% [95% CI: (24.1%, 29.2%)] and 36.8% [95% CI: (33.9%, 39.6%)], respectively. District level analysis showed that the prevalence of underweight, stunting and wasting in hotspot area was 34.80% [95% CI: 30.9%, 38.8%], 27.4% [95% CI: 23.7%, 31.1%], and 40.50% (95% CI: 36.4, 44.6)], respectively. On the other hand, 29.1% [95% CI; 25.4%, 32.3%], 26.0% [95%CI: 22.4%, 29.5%], and 33.2% (95% CI: 29.4%, 37.1%] of children in the non-hotspot area suffered from underweight, stunting and wasting, respectively.

The multivariable logistic regression analysis showed that higher odds of underweight among children in hotspot district [AOR (95% CI): 1.34 (1.04, 1.74)] and those who did not ever receive immunization [AOR (95% CI): 1.54 (1.16, 2.05)]. Besides, a lower likelihood of underweight was found among children aged 6 - 11 months [AOR (95% CI): 0.53 (0.40, 0.71)] than those aged between 12-23 months (Table 5).

Predictors	Underweight (n = 1129)		Crude OR (95% CI)	Adjusted OR (95% CI)
	Yes	No		
Residence				
Urban	34	106	0.65 (0.43, 0.98)	0.89 (0.57, 1.38)
Rural	326	663	1	1
District				
Hotspot	192	359	1.30 (1.02, 1.67)	1.34 (1.04, 1.74)*
Non-hotspot	168	410	1	1
Antenatal check-up				
No	261	492	1.48 (1.13, 1.95)	1.12 (0.82, 1.53)
Yes	99	277	1	1
Child age (month)				
6 - 11 month	127	370	0.59 (0.45, 0.76)	0.53 (0.40, 0.71)*
12 - 23 month	233	399	1	1
Sex of child				
Male	235	458	1.28 (0.98, 1.66)	1.70 (1.14, 2.52)*
Female	125	311	1	1
Source of water				
River	247	495	2.03 (1.29, 3.18)	1.63 (1.01, 2.65)*
Public tap	86	164	2.13 (1.30, 3.51)	1.49 (0.85, 2.61)
Spring	27	110	1	1
Child vaccinated				
No	161	253	1.65 (1.28, 2.13)	1.54 (1.16, 2.05)*
Yes	199	516	1	1
Latrine ownership				
No	167	293	1.41 (1.09, 1.81)	1.62 (1.14, 2.47)*
Yes	193	476	1	1
Dietary diversity score				
Poor	278	581	0.97 (0.72, 1.29)	1.24 (0.89, 1.74)
Good	89	181	1	1

Table 5: *Univariable and multivariable logistic regression analysis of underweight among children aged 6 - 23 months in hotspot and non-hotspot pastoral areas, Afar Region, Northeast Ethiopia, 2016.*

**: Significant at P-value < 0.05 in multivariate logistic regression analysis. Hosmer and Lemeshow model fitness test (P = 0.49).*

Regarding the predictors of stunting, maternal history of antenatal care (ANC) visit, birth interval, age and sex of child were found to have a statistically significant association with stunting. Children whose mother did not attend ANC had more than two times increased likelihood to suffer from stunting than their counter group [AOR (95% CI): 2.44 (1.51, 3.96)]. The result also showed lesser odds of stunting among children aged 6-11 [AOR (95% CI): 0.67 (0.50, 0.90)]. Besides, sex, birth interval and dietary diversity were also found to have a significant influence on stunting (Table 6).

Predictors	Stunting (n = 1129)		COR (95% CI)	AOR (95% CI)
	Yes	No		
District				
Hotspot	151	400	0.93 (0.71, 1.21)	1.08 (0.82, 1.43)
Non-hotspot	150	428	1	1
Residence				
Urban	35	105	1.10 (0.73, 1.66)	1.66 (1.04, 2.66)*
Rural	266	723	1	1
Antenatal check-up				
No	237	516	2.24 (1.64, 3.05)	2.44 (1.51, 3.96)*
Yes	64	312	1	1
Child age (month)				
6-11 month	112	385	0.68 (0.52, 0.89)	0.57 (0.42, 0.79)*
12-23 month	189	443	1	1
Postnatal check-up				
No	231	581	1.40 (1.03, 1.91)	0.69 (0.43, 1.07)
Yes	70	247	1	1
Sex of child				
Male	211	482	1.68 (1.27, 2.23)	1.82 (1.35, 2.46) *
Female	90	346	1	1
Mother's education				
Unable to read and write	240	608	1.58 (1.02, 2.45)	1.38 (0.84, 2.26)
Informal education	33	108	1.22 (0.69, 2.16)	1.69 (0.91, 3.15)
Formal education	28	112	1	1
Child vaccinated				
No	123	291	1.28 (0.97, 1.67)	1.00 (0.73, 1.34)
Yes	178	537	1	1
Household had latrine				
No	129	331	1.12 (0.86, 1.47)	0.91 (0.68, 1.21)
Yes	172	497	1	1
Source of water				
River	202	540	1.52 (0.97, 2.39)	1.22 (0.74, 2.03)
Public tap	72	178	1.65 (0.99, 2.72)	1.21 (0.67, 2.18)
Spring	27	110	1	1
Dietary diversity score				
Poor	238	617	1.29 (0.94, 1.78)	1.64 (1.12, 2.39)*
Good	63	211	1	1
Prelacteal feeding				
No	69	292	0.55 (0.40, 0.74)	0.58 (0.39, 0.84)*
Yes	232	536	1	1

Table 6: *Univariable and multivariable logistic regression analysis of stunting among children aged 6-23 months in hotspot and non-hotspot pastoral areas, Northeast Ethiopia, 2016.*

**: Significant at P-value < 0.05 in multivariate logistic regression analysis. Hosmer and Lemeshow model fitness test (P = 0.89).*

The likelihood of wasting was about 0.5 higher among children in the hot spot area [AOR (95% CI): 1.49 (1.17, 1.93)] than those in the non-hot in spot districts. It was also found that children with the age of 6-11 months [AOR (95% CI): 0.58 (0.44, 0.78)] were less likely to be affected by wasting than older children (Table 7).

Predictors	Wasting (n = 1129)		COR (95% CI)	AOR (95% CI)
	Yes	No		
District				
Hotspot	223	328	1.34 (1.07, 1.74)	1.49 (1.17, 1.93)*
Non-hotspot	192	386	1	1
Residence				
Urban	43	97	0.74 (0.50, 1.08)	0.69 (0.45, 1.06)
Rural	372	617	1	1
Child age (month)				
6 - 11 month	144	353	0.54 (0.42, 0.69)	0.58 (0.44, 0.78)*
12 - 23 month	271	361	1	1
Mother's education				
Unable to read and write	322	526	0.95 (0.66, 1.37)	0.91 (0.60, 1.37)
Informal education	38	103	0.57 (0.35, 0.94)	0.64 (0.37, 1.10)
Formal education	55	85	1	1
Postnatal check-up				
No	306	506	1.15 (0.88, 1.51)	1.16 (0.84, 1.60)
Yes	109	208	1	1
Child vaccinated				
No	165	249	1.23 (0.96, 1.58)	1.24 (0.93, 1.64)
Yes	250	465	1	1
Household had latrine				
No	183	277	1.24 (0.97, 1.59)	1.13 (0.87, 1.46)
Yes	232	437	1	1

Table 7: *Univariable and multivariable logistic regression analysis of wasting among children aged 6-23 months in hotspot and non-hotspot pastoral areas, Northeast Ethiopia, 2016.*

**Significant at P-value < 0.05 in multivariate logistic regression analysis. Hosmer and Lemeshow model fitness test (P = 0.11).*

Discussion

This study revealed that 31.9%, 26.7% and 36.8% of children were underweight, stunted and wasted, respectively. This finding is comparable with the findings reported in the drought-prone area of Ethiopia [10] and Northern Ethiopia [11]. However, this finding is slightly higher than the result of different studies in Ethiopia [12-16], Kenya [17], Burkina Faso [18], Indonesia [19] and Dhaka city [20]. This variation might be due to a slight difference in age of children included in the study, for instance, the current study included only 6 - 23 months, the age group at higher risk of malnutrition immediately after weaning. The discrepancy might also be related to variations in the socio-demographic characteristics of the study participants.

In this study, more than one-fourth of children were stunted, which is consistent with the findings reported from Indonesia (28%) [19], Northeast Ethiopia (28%) [21] and Southern Ethiopia (27%) [22]. On the other hand, the prevalence of stunting in this study is much lower than the finding from the studies in Ethiopia [10-16,23,24], with the prevalence ranging from 32% to 52%, Bangladesh (36%) [25], Burkina Faso (35%) [18], Yogyakarta, Indonesia (40%) [26] and Kenya (31%) [17]. In contrast, our finding is relatively higher than the results reported in Vietnam (10%) [27], China (11%) [28], Cameroon (13%) [29], Dhak city (17%) [20], Cambodia (19%) [30], Kemba, Southern Ethiopia (19%) [31], Mynamar (20%) [32], India (22%) [33], and Somali, Ethiopia (23%) [34]. This discrepancy might be due to the differences in agricultural practices and sustainability of food donation programs in the study areas.

The result of this study also showed that the prevalence of wasting was nearly three times the national prevalence (10%) [7,15] and the prevalence in the rural areas of the country [13,14]. Besides, it is significantly higher compared to the prevalence reported from the studies in different parts of Ethiopia [10-12,19,22-24,34] and other countries [17-20,26,28-30]. This could be explained by the difference in socio-economic and food security status of the study areas, where almost all foodstuffs are purchased in the study setting.

Multivariable logistic regression analysis revealed that the age of the child was a predictor of underweight, similar to the findings in Northern Ethiopia [11,23] and Indonesia [19]. However, this finding is inconsistent with that of Burkina Faso, which reported higher odds of underweight among children under the age of 12 months [18]. The discrepancy might be due to the age difference of the study participants, for instance, a study in Burkina Faso included all under-five children. Furthermore, the vaccination status of children was also positively associated with underweight. This finding is supported by the evidence from Northeast Ethiopia [10] and Vietnam [27], where there was a higher likelihood of underweight among children who did not receive vaccination.

Consistent with the findings in the previous studies [12,15,18,35], this study found that being male had a higher likelihood of suffering from underweight compared to females. Children from households owning latrine were 1.62 times less likely to be underweight compared to the reference group. Moreover, the odd of underweight was higher among children from households using a river as the main source of water. This finding is not supported by the result of the study in Ethiopia [15], which found a higher risk of underweight among children from households used water from safe sources. The discrepancy might be due to a great difference the number of participants included in the studies.

The current study also revealed that residence, sex and age of a child, history of prelacteal feeding and maternal history of antenatal checkup were identified as the factors associated with stunting. For instance, male children had about 82% increased odds of being stunted compared with females. This finding is in line with the studies in Ethiopia [12,13,15,22,31,36], Myanmar [32] and Burkina Faso [18]. However, the finding is inconsistent with the study in Northern Ethiopia [16]. It was also revealed that children from rural areas had been 0.66 less odds of being stunted compared to those from the urban residence. This finding is similar to the study in Bangladesh [25], which reported a 19% reduced risk of stunting among rural children.

The likelihood of stunting among children whose mothers did not attend antenatal checkup was 2.44 times higher as compared to those whose mothers did not have antenatal attendance. This finding is in agreement with the studies in Ethiopia [16,37]. This might be due to the fact that mothers, who had antenatal visit, may probably get advice about the principles of child-caring practice. The current study also showed that the odds of wasting was lower among children resided in the non-hot spot area and those aged 6 - 11 months. This finding is not in line with the finding in Burkina Faso which revealed the decrease in the odds of wasting as the age increases [18].

Conclusion

Children in hot spot district had an increased likelihood of being affected by all forms of child under-nutrition compared to those from non-hot spot district. Therefore, child and maternal health care interventions like immunization and antenatal care should be strength-

ened to reduce the magnitude of the problem in the study area. Furthermore, training and awareness creation activities on infant and young child feeding practices are vital to tackle child malnutrition.

Abbreviations

ANC: Antenatal Care; AOR: Adjusted Odd Ratio; CI: Confidence Interval; HAZ: Height for Age; SD: Standard Deviation; SPSS: Statistical Packaging for Social Science; SSA: Sub-Sahara Africa; UNICEF: United Nations Children's Fund; WHO: World Health Organization; WAZ: Weight for Age; WHZ: Weight for Height

Ethics Approval and Consent to Participate

The study was approved by the Research Ethics Review Committee (RERC) of College of Medical and Health Sciences at Samara University dated May 12, 2016 (reference number: ERC/0018/2016). An official letter was also received from Afar regional health bureau. Written informed consent was obtained from the study participants before data collection. Confidentiality was maintained throughout the study.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets used and analysed during the study are available from the corresponding author on reasonable request. All co-authors gave full responsibility to the corresponding author to share and discuss with editors and reviewers.

Competing Interests

The authors declare that no competing interests exist.

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Authors' Contributions

RA, AMB and MLL conceived and designed the study. RA supervised the data collection. RA and MLL performed data analysis and interpretation. AMB assisted data analysis and interpretation. MLL drafted and finalized the manuscript. All authors read and approved the final manuscript.

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