Nutritional Status and Associated Factors Among Children Below Five Years of Age in Somali Region, Ethiopia: Evidence From 2016 Ethiopian Demographic and Health Survey

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Abstract

Background: Childhood under-nutrition is far-reaching in low and middle-income nations. Under-nutrition is one of the major open wellbeing concerns among newborn children and youthful children in Ethiopia. This study aimed to assess the prevalence of under-nutrition and its related variables among under-five children in Somali Region, Ethiopia.

Methods: The data for this study was extricated from the Ethiopian Demographic and Health Survey (EDHS) 2016. The data collected from 1339 children born 5 years before was considered within the analysis. A multivariable binary logistic regression analysis was utilized at a 5% level of significance to decide the individual and community-level variables related to childhood malnutrition.

Results: the incidences of stunting, underweight and wasting were 27.4%, 28.7% and 22.7%, respectively. About 16.1% of children were both stunted and underweight; the extent of both being underweight and wasted was 11.7%, the prevalence of both stunted and wasted children was 5.5%, and all three malnutrition conditions were 4.7% children. Among the variables considered in this study, age of the child in months, type of birth, anemia level, size child at birth, sex of the child, mothers' BMI and sources of drinking water were significantly related to stunting, underweight and wasting in Somali Region.

Conclusions: The prevalence of stunting, underweight and wasting was relatively high. Under-nutrition is one of the major open wellbeing concerns among children in Somali region. The impact of these variables ought to be considered to develop strategies for decreasing the lack of healthy sustenance due to malnutrition in the study areas. Hence, intercession should be centered on making strides the under-nutrition determinant variables of the children to be solid, to improve the child's wholesome status, and decrease child mortality quickly.

Introduction

Globally, approximately 151 million children under five years of age suffer from chronic malnutrition and 67 million under-five were wasted in 2017 [1]. Lack of healthy sustenance is of open wellbeing significance in creating nations and is dependable for over half of child passing each year from preventable causes [2]. Among this malnourished under-five, 55% of all stunted children under-five years of age have been from Asia and 39% were living in Africa, whereas 69% of all wasted children under-five years of age dwelled in Asia and 27% of wasted under-five lived in Africa [3].

Malnutrition among under-five declined from 32.6–22.2% between 2000 and 2017 around the world [4]. In 2018, UNICEF detailed that around 3.1 million children passed on of under-nutrition and malnutrition contributes to more than half of worldwide child deaths [5]. Although there's a global decay within the malnutrition rates of under-5, the chance of lack of healthy sustenance remains tall and it is the major cause of under-five morbidity and mortality of African particularly sub-Saharan Africa [6]. Childhood under-nutrition is broad in low and middle-income nations. In these nations, it is an imperative and backhanded cause of child mortality. Around the world, stunting and wasting beside intrauterine development limitations are mindful of about 2.1 million deaths in under-five children that contain 21% of all deaths [7].

Ethiopia has illustrated promising advances in decreasing levels of under-nutrition over the past two decades. Be that as it may, under-nutrition is one of the major open wellbeing concerns among newborn children and youthful children within the nation [8, 9]. The pattern levels of under-nutrition remain high that the nation still has to continue considerable speculation in nourishment [10]. In 2016, about 155 million children beneath the age of years were enduring from stunting. Under-nutrition contributes about 45% of deaths among children beneath the age of 5 years [11]. All-inclusive a million children were underweight, 51 million were stunted and 17 million children were wasted in 2013 Besides, under-nutrition is credited with lacking feeding; defective feeding practices hones rehashed contaminations like diarrheal infections, acute respiratory infections and worm pervasions [12–14]. Under-five children are the foremost vulnerable age group for under-nutrition especially the under-nutrition in creating nation like Ethiopia. The issue of under-nutrition within the early stages of life can increment chance infections, morbidity, and mortality alongside diminished mental and cognitive advancement [15].

Child under-nutrition and mortality rates are sensible reactions to both wellbeing programs and financial conditions such as pay, unemployment, and lack of education [16]. In Ethiopia, the predominance of under-nutrition is high [17–21] which ranges from 14.6% in Addis Ababa to 46.3% in Amhara region for stunting, 3.5% in Addis Ababa to 22.5% in Somalia region for wasting and 5% in Addis Ababa to 35.5% in Afar region for underweight [22]. The country has begun executing health extension packages in which nourishment is one of the most components included in the health extension package.

Even though studies have been carried out on the recognizable proof of components that are related to children under five years old of malnutrition in the Somali region, none of them employments the national representative data for the Somali region. The exertion made in decreasing under-five children's malnutrition in the region is still high, and more effort is required to move forward the obstructions for advance diminishment. More research studies are, subsequently, required to inform policymakers to execute suitable mediation programs. To address these gaps, an all-inclusive cross-sectional analysis of the recent 2016 Ethiopian Demographic Health Survey (EDHS) was done, to survey the prevalence and investigate the major risk factors of malnutrition among under-five children in Somali region, Ethiopia.

Methods

Description of study design and area

Cross-sectional study design was used for this study. The study was conducted in Somali regional state which is located in the east and southeast of Ethiopia. According to the 2007 Census, the state's population birth weight was 4,439,147 of which 1,970,363 were males. The urban residents of the region were 621,210 and its rural residents 3,817,937 [23].

Inclusion and exclusion variables

Mothers/caregivers who had young children under five years old who live in the Somali regional state for at least 6 months were included in the study and those who had mental illnesses interfering with the interview were not considered in the study.

Data Sources

The data on this study was extricated from the EDHS 2016. The 2016 EDHS utilized two-stage stratified sampling to choose households. In the first stage, there were 645 enumeration areas (202 in urban and 443 in rural areas) based on the 2007 Ethiopia Population and Housing Census (PHC). In the second stage, A total of 18,008 households were considered, of which 16,650 (98% of response rate) households were eligible. The women were interviewed by distributing questioners and information on their birth history [24]. Of 1339 (700 males and 639 females) under-five children from Somali region were considered for this consider.

Variables of the study

The subordinate factors for this consideration were the malnutrition status of under-5 year children (stunting, underweight and wasting). Children whose height-for-age Z-score is below minus two standard deviations (−2SD) from the median of the reference population is considered as stunted. If the weight-for-age Z-score is below minus two standard deviations (−2 SD) from the medium of reference population then the child is underweight. Children whose weight for height Z-score is below minus two standard deviations (−2SD) from the median of the reference population are considered as wasted [25]. Illustrative factors were chosen after conducting a point by point writing survey [25-30] additionally accessible with complete data in the EDHS, 2016 data set was included within the current investigation. Selected illustrative factors were divided into two levels which included socio-demographic-maternal and child-level variables. Socio demographic-maternal variables chosen were types of residence, household wealth index, mother's educational level, mother's body mass list (BMI), religion, and type of toilet facility, sex of household head and Sources of drinking water. Child-level components were the sex of the child, child age, type of birth, Number of living children and child size at birth.

Statistical data analysis

The data was extricated, altered, and analyzed by using SPSS form 23 for Windows. The descriptive statistics such as frequencies and proportions were used to summarize the dissemination of chosen foundation characteristics of the sample. To assess the impact of each socio-demographic-maternal and child-level components on under-five stunting, wasting, and underweight (odds ratio (OR) with 95% confidence intervals (CI), logistic regression analysis was fitted. Bivariate logistic regression was performed and a variable with a P-value of less than 0.25 was transported into a multivariable binary logistic regression analysis to identify the determinant of malnutrition of under-five children. Finally, variables with P-values < 0.05 in the multivariable logistic regression model was taken as statistically significant.

Results

In this study, a total of 1339 under-five children were included. In the Afar region, the incidences of stunting, underweight and wasting were 27.4%, 28.7% and 22.7%, respectively. Almost 16.1% of children were both stunted and underweight; the proportion of underweight and wasting was 11.7%, the proportion of stunted and wasted was 5.5%, and all three malnutrition conditions were only 4.7% children.

Among the participants, 555 children (41.4%) were 0–24 months old, 501 (37.4%) were 25–47 months old and 283 (21.1%) were 48–59 months old. The male children constituted 700 of the sample population (52.3%), and the females constituted 639 (47.7%). Nearly 1069 (79.8%) of the children were taken from rural areas while the, remaining 270 (20.2%) of children were taken from urban areas. More than half of the children (62.4%) were anemic and the rest of the children (37.6%) were non-anemic. The most children were born in single birth type (98.2%), and only 1.8% of children were born multiple birth type. The majority of children (56.5%) were from overweight mothers, 24.6% of children were from normal-weight mothers and only 18.8% of children were from underweight mothers. Regarding the educational status of the household, 85.4% of households did not attend at all, 10.7% of household attended primary school and 3.8% of households attended secondary and higher education. The majority (63.8%) of the children were born at normal size, 32.3% were in large size and 24.6% of the children were born in small size at birth. Similarly, more than half (63.8%) of the respondents had no toilet facilities, and 36.2%% had toilet facilities. Nearly one child in five children (81.9%) was from the household who used unimproved water while the remaining 18.1% of children were from the household who used improved water sources. The majority of children (75.8%) were born from poor wealth index families, 18.4% of children were from rich wealth index family and the rest 5.8% of children were from medium wealth index families. The number of children who lived in household members of 1–2, 3–4 and > 4 was 20.9%, 30.4% and 48.7%, respectively. More than half of the respondents were male household headed and the rest 32.3% of the respondents were female household headed.

Factors Associated With Stunting

According to the multivariable logistic regression analysis, age of a child, type of birth, toilet facility and anemia level were significantly associated with being stunted. The risk of being stunted was 1.94 and 1.66 times more likely among children that were aged 25–47 and 48–59 as compared to those aged 0–24 months, respectively. Male children were 0.23 times less likely to be stunted as compared to female children. The odds of stunting among children who were born in multi birth types were 2.86 times higher as compared to those born in single birth type. Children from the household who had not toilet facility were 1.45 times more likely to be stunted as compared to the children household who had a toilet facility. Children born from the medium and rich households were 0.44 and 0.22 times less likely to develop stunting as compared to those born from poor households. Being stunted of anemic children was 2.36 times more likely to be stunted as compared to non-anemic children (Table 1).

Table 1
Bivariate and multivariable logistic regression of determinants associated with stunting on childhood under 5 years old in Somali Region, Ethiopia, EDHS 2016

Variables		**Stunting**	**COR (95% CI)**	**AOR (95% CI)**
	Yes	No		
Age of child in months				
0–24	115 (20.7%)	440 (79.3%)	1	1
25–47	172 (34.4%)	328 (65.6%)	2.01 (1.52, 2.64)	1.94 (1.41, 2.69)***
48–59	80 (28.3%)	203 (71.7%)	1.51 (1.08, 2.10)	1.66 (1.12, 2.46)*
Sex of child				
Male	202 (28.9%)	497 (71.1%)	1	1
Female	165 (25.8%)	474 (74.2%)	1.17 (0.92, 1.49)	0.77 (0.58, 1.02)
Place of residence				
Urban	69 (25.7%)	200 (74.3%)	1	1
Rural	298 (27.9%)	771 (72.1%)	1.12 (0.83, 1.52)	0.73 (0.45, 1.19)
Type of birth				
Single birth	357 (27.2%)	957 (72.8%)	1	1
Multiple birth	10 (41.7%)	14 (58.3%)	1.92 (0.84, 4.35)	2.86 (1.10, 7.37)*
Mothers` BMI				
Over weight	55 (21.8%)	197 (780.2%)	1	1
Normal weight	213 (28.2%)	543 (71.8%)	1.41 (1.01, 1.97)	1.07 (0.73, 1.58)
Under weight	99 (30.0%)	231 (70.0%)	1.54 (1.05, 2.25)	1.24 (0.80, 1.93)
Size of child at birth				

AOR: adjusted odds ratio; COR: crude odds ratio; CI: confidence interval; * significant p value < 0.05; ** significant p value < 0.01; ***significant p value < 0.001, 1 = reference

Variables		Stunting	COR (95% CI)	AOR (95% CI)
Large	105 (24.2%)	328 (75.8%)	1	1
Medium	162 (28.1%)	414 (71.9%)	1.22 (0.92, 1.63)	1.17 (0.85, 1.62)
Small	100 (30.4%)	229 (69.6%)	1.36 (0.99, 1.88)	1.24 (0.86, 1.79)
Present of toilet facility				
Yes	111 (22.9%)	374 (77.1%)	1	1
No	256 (30.0%)	597 (70.0%)	1.73 (0.51, 1.03)	1.45 (1.12, 1.87)**
Sex of household head				
Male	259 (28.6%)	648 (71.4%)	1	1
Female	108 (25.1%)	323 (74.9%)	0.84 (0.64, 1.09)	0.95 (0.71, 1.28)
Household wealth index combined				
Poor	298 (29.4%)	717 (70.6%)	1	1
Medium	14 (17.9%)	64 (82.1%)	0.53 (0.29, 0.95)	0.56 (0.28, 1.11)
Rich	55 (22.4%)	190 (77.6%)	0.70 (0.50, 0.97)	0.78 (0.43, 1.40)
Number of living children				
1–2	70 (25.1%)	209 (74.9%)	1	1
3–4	109 (26.8%)	298 (73.2%)	1.09 (0.77, 1.55)	1.03 (0.68, 1.56)
> 4	188 (28.8%)	464 (71.2%)	1.21 (0.88, 1.67)	1.01 (0.68, 1.49)
Sources of drinking water				
Improved	62 (25.7%)	179 (74.3%)	1	1

AOR: adjusted odds ratio; COR: crude odds ratio; CI: confidence interval; * significant p value < 0.05; ** significant p value < 0.01; ***significant p value < 0.001, 1 = reference

Variables		Stunting	COR (95% CI)	AOR (95% CI)
Unimproved	305 (27.8%)	792 (72.2%)	1.11 (0.81, 1.53)	0.82 (0.55, 1.23)
Anemia level				
Non-anemic	34 (18.6%)	149 (81.4%)	1	1
Anemic	284 (34.0%)	551 (66.0%)	2.26 (1.52, 3.37)	2.36 (1.55, 3.61)***
AOR: adjusted odds ratio; COR: crude odds ratio; CI: confidence interval; * significant p value < 0.05; ** significant p value < 0.01; ***significant p value < 0.001, 1 = reference				

Factors Associated With Under-weight

Results of the multivariable binary logistic regression model revealed that the age of the child, size of the child at birth, and anemia level were significantly associated with underweight. The children who were 25–47 and 48–59 aged groups were 1.67 and 1.70 times more likely to develop underweight as compared to those who were 0–24 aged groups. Compared to children large size at birth, the odds of underweight among children in the medium and small size at birth were 1.17 and 1.55 times higher. The odds of being wasting were 0.11 times lower among female children than male children. The anemic children were 1.65 times more likely to be underweight as compared to non-anemic children (Table 2).

Table 2
Bivariate and multivariable logistic regression of risk factors associated with under-weight on childhood less than 5 years in Somali Region, Ethiopia, EDHS 2016

Variables	Underweight		COR (95% CI)	AOR (95% CI)
	Yes	No		
Age of child in months				
0–24	124 (22.3%)	431 (77.7%)	1	1
25–47	171 (34.1%)	330 (65.9%)	1.80 (1.37, 2.36)	1.67 (1.22, 2.28)***
48–59	89 (31.4%)	194 (68.6%)	1.60 (1.16, 2.20)	1.70 (1.17, 2.46)**
Sex of child				
Male	204 (29.1%)	496 (70.9%)	1	1
Female	180 (28.2%)	459 (71.8%)	0.95 (0.76, 1.21)	0.89 (0.68, 1.16)
Place of residence				
Urban	73 (27.0%)	197 (73.0%)	1	1
Rural	311 (29.1%)	758 (70.9%)	1.11 (0.82, 1.49)	0.72 (0.45, 1.17)
Type of birth				
Single birth	376 (28.6%)	939 (71.4%)	1	1
Multiple birth	8 (33.3%)	16 (66.7%)	1.25 (0.53, 2.94)	1.26 (0.48, 3.33)
Mothers` BMI				
Over weight	60 (23.8%)	192 (76.2%)	1	1
Normal weight	215 (28.4%)	542 (71.6%)	1.27 (0.91, 1.77)	1.10 (0.75, 1.61)
Under weight	109 (33.0%)	221 (67.0%)	1.58 (1.09, 2.28)	1.29 (084, 1.98)
Size of child at birth				

AOR: adjusted odds ratio; COR: crude odds ratio; CI: confidence interval; * significant p-value < 0.05; ** significant p-value < 0.01; significant p-value < 0.001, 1 = reference

Variables		Underweight	COR (95% CI)	AOR (95% CI)
Large	109 (25.2%)	324 (74.8%)	1	1
Medium	160 (27.7%)	417 (72.3%)	1.14 (0.86, 1.51)	1.17 (0.85, 1.61)
Small	115 (35.0%)	214 (65.0%)	1.60 (1.71, 2.19)	1.55 (1.08, 2.21)*
Present of toilet facility				
Yes	259 (30.3%)	595 (69.7%)	1	1
No	125 (25.8%)	360 (74.2%)	1.25 (0.98, 1.61)	0.84 (0.60, 1.18)
Sex of household head				
Male	265 (29.2%)	642 (70.8%)	1	1
Female	119 (27.5%)	313 (72.5%)	0.92 (0.71, 1.19)	0.98 (0.73, 1.31)
Household wealth index combined				
Poor	302 (29.8%)	713 (70.2%)	1	1
Medium	24 (30.8%)	54 (69.2%)	1.05 (0.64, 1.73)	0.96 (0.53 ,1.74)
Rich	58 (23.6%)	188 (76.4%)	0.73 (0.53, 1.01)	0.59 (0.33, 1.06)
Number of living children				
1–2	73 (26.1%)	207 (73.9%)	1	1
3–4	122 (30.0%)	285 (70.0%)	1.21 (0.86, 1.71)	1.16 (0.78, 1.75)
> 4	189 (29.0%)	463 (71.0%)	1.16 (0.84, 1.59)	1.11 (0.75, 1.63)
Sources of drinking water				
Improved	69 (28.5%)	173 (71.5%)	1	1

AOR: adjusted odds ratio; COR: crude odds ratio; CI: confidence interval; * significant p-value < 0.05; ** significant p-value < 0.01; significant p-value < 0.001, 1 = reference

Variables		Underweight	COR (95% CI)	AOR (95% CI)
Unimproved	315 (28.7%)	782 (71.3%)	1.01 (0.74, 1.37)	0.89 (0.61, 1.32)
Anemia level				
Non-anemic	46 (25.0%)	280 (70.9%)	1	1
Anemic	287 (34.4%)	548 (65.6%)	1.57 (1.09, 2.26)	1.65 (1.12, 2.43)*
AOR: adjusted odds ratio; COR: crude odds ratio; CI: confidence interval; * significant p-value < 0.05; ** significant p-value < 0.01; significant p-value < 0.001, 1 = reference				

Factors Associated With Wasting

Based on multivariable logistic regression analysis, sex of the child, Mothers's BMI, size of child at birth and sources of drinking water were significantly associated with wasting. The results of the adjusted showed that male children were 0.35 times less likely to be wasting compared to female children. The risk of being wasting among children who were born from underweight and normal-weight mothers were 1.64 and 1.38 times higher compared to those born from overweight mothers. The children who had small size at birth were 1.58 times more likely to be wasting compared to those who had large size at birth. Children whose households used unimproved water were 1.66 times more likely to be wasting as compared to the children's household used improved water (Table 3).

Table 3
Bivariate and multivariate logistic regression of risk factors associated with wasting on childhood less than 5 years old in Somali Region, Ethiopia, EDHS 2016.

Variables		**Wasting**	**COR (95% CI)**	**AOR (95% CI)**
	Yes	No		
Age of child in months				
0–24	120 (21.6%)	435 (78.4%)	1	1
25–47	117 (23.4%)	384 (76.6%)	1.10 (0.83, 1.48)	1.07 (0.76, 1.49)
48–59	67 (23.7%)	216 (76.3%)	1.12 (0.80, 1.58)	1.14 (0.76, 1.72)
Sex of child				
Male	181 (25.9%)	519 (74.1%)	1	1
Female	123 (19.2%)	516 (80.8%)	0.68 (0.53, 0.89)	0.65 (0.48, 0.88)**
Place of residence				
Urban	65 (24.1%)	205 (75.9%)	1	1
Rural	239 (22.4%)	830 (77.6%)	0.91 (0.66, 1.24)	0.79 (0.48, 1.31)
Type of birth				
Single birth	300 (22.8%)	1015 (77.2%)	1	1
Multiple birth	4 (16.7%)	20 (83.3%)	0.68 (0.23, 1.99)	0.61 (0.17, 2.15)
Mothers` BMI				
Over weight	47 (18.7%)	205 (81.3%)	1	1
Normal weight	168 (22.2%)	589 (77.8%)	1.24 (0.87, 1.78)	1.38 (0.91, 2.11)
Under weight	89 (27.0%)	241 (73.0%)	1.61 (1.08, 2.40)	1.64 (1.03, 2.64)*
Size of child at birth				
Large	90 (20.8%)	343 (79.2%)	1	1

AOR: adjusted odds ratio; COR: crude odds ratio; CI: confidence interval; * significant p-value < 0.05; ** significant p-value < 0.01; significant p-value < 0.001, 1 = reference

Variables		Wasting	COR (95% CI)	AOR (95% CI)
Medium	130 (22.5%)	447 (77.5%)	1.11 (0.82, 1.50)	1.19 (0.84, 1.67)
Small	84 (25.5%)	245 (74.5%)	1.13 (0.93, 1.84)	1.58 (1.07, 2.31)*
Present of toilet facility				
Yes	191 (22.4%)	663 (77.6%)	1	1
No	113 (23.3%)	372 (76.7%)	1.05 (0.81, 1.37)	1.06 (0.74, 1.53)
Sex of household head				
Male	211 (23.3%)	696 (76.7%)	1	1
Female	93 (21.5%)	339 (78.5%)	0.91 (0.69, 1.19)	0.86 (0.63, 2.16)
Household wealth index combined				
Poor	229 (22.6%)	786 (77.4%)	1	1
Medium	20 (25.6%)	58 (74.4%)	1.18 (0.70, 2.01)	1.17 (0.63, 2.16)
Rich	55 (22.4%)	191 (77.6%)	0.99 (0.71, 1.38)	0.93 ()0.51, 1.69
Number of living children				
1–2	60 (21.4%)	220 (78.6%)	1	1
3–4	93 (22.9%)	314 (77.1%)	1.09 (0.75, 1.57)	1.02 (0.66, 1.58)
> 4	151 (23.2%)	501 (76.8%)	1.11 (0.79, 1.55)	102 (0.68, 1.55)
Sources of drinking water				
Improved	67 (27.7%)	175 (72.3%)	1	1
Unimproved	237 (21.6%)	860 (78.4%)	1.72 (1.52, 2.99)	1.66 (1.44, 3.98)*
Anemia level				

AOR: adjusted odds ratio; COR: crude odds ratio; CI: confidence interval; * significant p-value < 0.05; ** significant p-value < 0.01; significant p-value < 0.001, 1 = reference

Variables		Wasting	COR (95% CI)	AOR (95% CI)
Non-anemic	44 (23.9%)	140 (76.1%)	1	1
Anemic	209 (25.0%)	626 ()75.0%	1.06 (0.73, 1.54)	1.09 (0.73, 1.61)
AOR: adjusted odds ratio; COR: crude odds ratio; CI: confidence interval; * significant p-value < 0.05; ** significant p-value < 0.01; significant p-value < 0.001, 1 = reference				

Discussion

In the present study, the prevalence of stunting, underweight and wasting were 27.4%, 28.7% and 22.7%, respectively. In this study, stunting is lower than the studies conducted in in Ethiopia (38.3%) [25], in Shabelle zone, Somali region (30.4%) [31], in Shinille District (33.4%) [32], in Tigray region 39.1% [5] and Takusa district 36.5% [33]. The prevalence of underweight in this finding is higher the studies conducted in Ethiopia (23.3%) [25], in Tigray (23.9%) [5], Dale district19% [34] and Takusa district 19.5% [33]. This figure is lower than the previously reported stunting (46.9%) and underweight (33%), but higher than wasting (11.6%), and in Tigray region [17]. A similar study conducted in Nairobi Peri-Urban Slum reported a higher prevalence of stunting (30.2%) but lower underweight (14.9%) [35]. Similar studies conducted in Ethiopia reported a higher prevalence of stunting (46.3%), the comparable prevalence of underweight (28.4%), but lower prevalence of wasting (9.8%) [36]. This might be due to the fact that there is a difference in barriers to under-nutrition such as cultural difference and other socio-demographic characteristics.

The prevalence of wasting in this study is higher compared to the study conducted in Ethiopia 10.1% [25], in Haramaya district 10.7% [37], in Dale district 14% (32), in Tigray region [5] in Pakistan 10.7% [38] and Nairobi Peri-Urban slum 4.5% [35]. This divergence might be due to the difference in socioeconomic background, variation in sample size, dietary habits and type of meals among the study population. Similar studies conducted in Hidabu Abote District in the Oromia region reported a higher prevalence of stunting (47.6%) and underweight (30.9%), but a lower prevalence of wasting (16.7%) [39]. A study conducted in rural Ethiopia also reported a higher finding 41.2% of stunting, but a lower finding 27% of underweight [40], whereas a study conducted in Nigeria reported a higher prevalence of stunting 47.6% but a lower prevalence of underweight 25.6% [41]. While a study in the Bure Town of West Gojjam Zone (Amhara region) [42] reported a lower prevalence of stunting, underweight and wasting (24.9%, 14.30% and 11.1%, respectively). A similar study in east Gojjam Zone [43] reported lower prevalence of underweight (15.3%) and wasting (10%), but higher stunting (44.7%). This could be due to there is a difference in obstacles to under-nutrition such as cultural differences and other socio-demographic characteristics.

Almost 16.1% of children were both stunted and underweight; the proportion of underweight and wasting was 11.7%, the proportion of stunted and wasted was 5.5%, and all three malnutrition conditions were only 4.7% children. The prevalence of both underweight and wasting at this finding is higher than the study finding in Amhara region (7.3%) [44]. The prevalence of both stunted and underweight at this study is lower than compared to the study conducted in Ethiopia 19.47% [25] and Amhara region (23.1%) [44], but much higher than the study conducted in Kilimanjaro Region, Tanzania 33% [45]. The prevalence of all the three conditions at this finding is lower than the study conducted in Amhara region (4.5%) [44], in Kilimanjaro Region, Tanzania 12% [45], but higher than in Ethiopia 3.87% [25]. The variation might be due to socioeconomic background, geographical characteristics of the study area, access to health care, cultural difference in dietary habits and care practices.

According to the multivariable logistic regression analysis, the age of a child, type of birth, toilet facility and anemia level was significantly associated with being stunted. The risk of being stunted was 1.94 and 1.66 times more likely among children that were aged 25–47 and 48–59 as compared to those aged 0–24 months, respectively. This finding is in line with the studies conducted in Ethiopia [25], in Haramaya district [37], in Pakistan [38], in Amhara region [44] and in Kilimanjaro Region, Tanzania [45], but against the study conducted in Tigray region [5]. This might be because as children's' growth older, they may have fewer access attentions and not provide sufficient food from their families. Male children were 0.23 times less likely to be stunted as compared to female children. This result is in agreement with the study conducted in Bule Hora district, South Ethiopia [46], but in contradiction the studies conducted in Tigray region [5] and Pakistan [38]. The odds of stunting among children who were born in multi birth types were 2.86 times higher as compared to those born in single birth type. This finding is consistent with the study carried out in Tigray region [5]. The reason behind might be in multi birth type, there could be food competition between children and it leads to malnutrition; and the mothers' breasts may not produce enough milk for both children.

Children from the household who had not toilet facility were 1.45 times more likely to be stunted as compared to the children household who had a toilet facility. This result is in contradiction with the studies conducted in Tigray region [5] and in Bule Hora district, South Ethiopia [46]. This might be since lack of toilet facility is the main cause for intestinal parasites and microorganisms which leads to loss of appetite leading to poor nutritional status; this might repeated infection causes depressed immunity and making the severity and duration of disease more sever contributing to the poor nutritional status of the children. Children born from the medium and rich households were 0.44 and 0.22 times less likely to develop stunting as compared to those born from poor households. This fining supported with the literature reported that the poor wealth index is strongly correlated with under-five stunting [5, 42, 47–49]. The possible explanation for this might be mothers from households having the rich or middle wealth status were more likely to provide micronutrients in reached foods and seek medical treatment for their children. Being stunted of anemic children was 2.36 times more likely to be stunted as compared to non-anemic children. This finding has supported the study conducted in Ethiopia [25]. This is because the anemia causes the children to reduce feed intake and leads to malnutrition.

The children who were 25–47 and 48–59 aged groups were 1.67 and 1.70 times more likely to develop underweight as compared to those who were 0–24 aged groups. This finding is supported by the study conducted in Ethiopia [25], but in contradiction the study conducted in Tigray region [5] and Pakistan [38].

This might be due to the fact that as children’s’ growth older, they may have less access to attentions and not provide sufficient food from their families. Compared to children large size at birth, the odds of underweight among children in the medium and small size at birth were 1.17 and 1.55 times higher. This study is in line with the study conducted in Tigray region [5] and in Pakistan [38]. The odds of being wasting were 0.11 times lower among female children than male children. Our results showed that male children were more likely to be stunted as compared to female children. The finding is consistent with the previous research reported that male children are more vulnerable to develop malnutrition because they require comparatively more calories for growth and development [50]. One of the reasons for low caloric intake in children is their low socioeconomic status as observed in our study. The anemic children were 1.65 times more likely to be underweight as compared to non-anemic children.

The results of the adjusted showed that male children were 0.35 times less likely to be wasting compared to female children. This finding is consistent with finding in Tigray region [5], but against in previous studies indicated that boys had a significantly worse nutritional status than girls [5]. The risk of being wasting among children who were from underweight and normal-weight mothers were 1.64 and 1.38 times higher compared to those born from overweight mothers. This study is in line with findings in Pakistan [38], in Ethiopia [25], in India [51] and Vietnam [52]. This finding is also similar to other previously conducted studies [37, 53]. The children who had small size at birth were 1.58 times more likely to be wasting compared to those who had large size at birth. This result is supported by the study conducted in Tigray region [5]. Children whose household used unimproved water were 1.66 times more likely to be wasting as compared to the children household used improved water. This finding is supported with finding in Haramaya district, Eastern Ethiopia [37]. This might be because impure water is a vehicle for intestinal parasites which leads to loss of appetite leading to poor nutritional status; this might repeated infection causes depressed immunity and making the severity and duration of disease more sever contributing to the poor nutritional status of the children.

Conclusion

This study revealed individual- and community-level factors determined childhood malnutrition in Somali region children. Among the factors considered in this study, age of the child in months, type of birth, anemia level, size of child at birth, sex of a child, mothers’ BMI and sources of drinking water were significantly associated with stunting, underweight and wasting. The authors concluded that under-nutrition among under-five children was one of the public health problems in the study area. Thus, interventions should be focused on 25–59 months age of children, multiple birth type, anemic children, and small size of child at birth, female children, underweight mothers and improving access to improved drinking water to get better health care, to enhance the child’s nutritional status, and reduce child mortality more rapidly.

Limitations Of The Study

A limitation was the use of a cross-sectional study design which could only generate a hypothesis regarding the role of independent variables on the nutritional status of children but not their cause and effect relationships.

Abbreviations

AOR
adjusted odds ratio; BMI:body mass index; COR:crude odds ratio; CSA:Central Statistical Agency; SPSS:Statistical Package for Social Science; DHS:Demographic and Health Surveys; EDHS:Ethiopian Demographic and Health Survey.

Declarations

Ethics approval and consent to participate

Ethics approval and consent to participate The EDHS 2016 has taken into account the standard ethical guidelines of the measure DHS program. The authors have obtained the data from measure DHS website (https://www.dhsprogram.com/data/dataset_admin/index.cfm) following their data obtaining procedure. The formal ethical clearance was obtained from the Demographic and Health Surveys (DHS) program.

Consent for Publication

Not applicable.

Availability of data and material

The data set used and analyzed during the current study is available from the corresponding author on reasonable request (in SPSS code).

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

DK conceived the idea, drafts the manuscript and interpreted the results. DK, YM, HA and EW performed statistical analysis and help in results interpretation and writing. DK, YM, HA and EW critically reviewed the manuscript.

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