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PREVALENCE AND ASSOCIATED FACTORS OF WASTING AMONG CHILDREN BORN TO WOMEN IN THE AGE GROUP 15-19 (EXPOSED) AND THOSE IN THE AGE GROUP OF 20-49 (UNEXPOSED)IN DAMOT GALE WOREDA, SOUTHERN ETHIOPIA, 2023

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Abstract
Background: Undernutrition was casing more than half of under-five mortality where it is still preventable problem. There is no study that shows the association of maternal age with child undernutrition.
Objective: To compare the magnitude of wasting and associated factors among children born to women aged 15-19 years and those aged 20-49 years in Damot Gale woreda, southern Ethiopia, 2023.
Methods: comparative cross-sectional study was conducted from January 2021 to August 2023 Stratified random sampling technique was used to select 2121 mother-child pair of study participants. Data were entered into Epi Data V4.6 and the Z-scores of indices, WHZ, HAZ, WAZ were calculated using WHO Anthro. Then, data were exported to SPSS V23 for further analysis. Multivariable logistic regression analysis was done to identify the independent determinants of stunting, wasting and underweight separately and variables with a p-value of <0.05 and 95%CI of AOR was used to declare statistically significance.
Result: the overall prevalence of wasting among the study population was 12.7%. However, when we come to maternal age category, there was significant difference between mothers of age group 15- 19 years and 20-49 years old. The prevalence of wasting was 16.5% (95%CI: 14.6%, 18.0%) found to be high among the children 6-59 months born to mothers of age group 15-19 years than children born to mothers of age group 20-49 years old, (16.5%, 95%CI: 14.8%, 18.0%).
Conclusion: this study showed that the prevalence of wasting found moderate and there was significant difference between children born to mother's age category. Maternal education, history of illness in the last 14 days, child sex, BMI, ANC, dietary diversity score, monthly income, birth order, health facility distance in minutes were factors associated with undernutrition. Zonal, district as well as health facilities should intervene on nutrition related services.
Key words: Under nutrition, early marriage, Damot Gale Woreda

Background

Child malnutrition is defined as a pathological state resulting from either inadequate nutrition, including under nutrition (protein-energy malnutrition) due to insufficient intake of energy and other nutrients; or over nutrition (overweight and obesity) due to excessive consumption of

energy and other nutrients [1].Globally in 2016, 155 million under-five children were stunted, 52 million were wasted and 41 million were overweight or obese[2]. According to UNICEF statistics, the global rate of LBW is 17%, out of which 6% is observed in industrialized countries and 21% in developing. According to EDHS 2016, nearly 4 in 10 (38%) of children under five in Ethiopia are stunted, or too short for their age, 10% of children are wasted (too thin for height), 24% of children are underweight, or too thin for their age [3].

Globally, about 18 million adolescent girls between 15-19 years give birth each year. Babies born to adolescent mothers account for 11% of all births worldwide; 95% of these occur in developing countries [4]. In 2016, there were 20.3 births for every 1,000 adolescent female's ages 15-19, or 209,809 babies born to females in this age group[5]. In sub-Saharan Africa, in the year 2013, 101 births per 1,000 were occurred, some of the highest rates of adolescent fertility in the world[1]. Among

14.3 million adolescent girls who gave birth in 2008 worldwide, one of every three was from sub- Saharan Africa. More than 50% of adolescent girls give birth by the age of 19 in this region. Births to teens aged 15-19 account for 5.3% of all births in 2016. Nearly nine in ten (89%) of these births occurred outside of marriage [6].

According to the EDHS 2016, 13% of women in the age group 15-19 years began childbearing: 10% had a live birth, and 2% were pregnant with their first child at the time of interview. The proportion of women aged 15-19 years who began childbearing rose rapidly with age, from 2% among women aged 15 years to 28% among those aged 19 years [7].

Teenage pregnancy is the biggest killer of young girls worldwide; 1, 000,000 teenage girls die or suffer serious injury, infection, or disease due to pregnancy or childbirth every year. Adolescent girls aged 15 to 19 years are twice as likely to die from complications in pregnancy as are women in their twenties. The youngest girls are particularly at risk; the mortality rate for those under 15 is four times higher than for those in their 20s[8]. Teenage pregnancy also has significant long-term social consequences for the adolescents, their children, their families, and their communities; it led adolescents to less educational attainment and high school dropout, poor health, and poverty. The children of teenage mothers are also more likely to have lower school achievement and drop out of high school, have more health problems, are incarcerated at some time during adolescence, give birth as a teenager, and face unemployment as a young adult [9].

Even though adolescent pregnancy occurs among all racial, cultural, and socioeconomic groups, some adolescents are more likely than others to become pregnant. Factors such as economic status, education, religion, place of residence, peer's and partners' behaviors, family and community attitudes, age, mass media, lack of reproductive health services and knowledge are contributing factors to the increase of unintended pregnancy among adolescents in Ethiopia [10].

The government of Ethiopia developed strategies to achieve four major objectives: increasing access to quality reproductive health services for adolescents, increase awareness and knowledge about reproductive health issues, strengthen multi-sectoral partnerships, and design and implement adolescent and youth reproductive health programs However, teenage pregnancy remains high in the country[11]. Up to date evidence on the magnitude of undernutrition and associated factors was needed in the study area as well as the country at

large. However, there was no previous study comparing the effect of maternal age, i.e. those between 15-19 years and 20-49 years old on child nutritional status. Therefore, this study will help to identify the magnitude of undernutrition among the children born to mothers of age group from 15-19 and 20-49 years and associated factors.

Materials and Methods

Study area, study design and study population

Total area size 255.54 square kilometer, which is about 6.07% of the total areal size of Wolayita zone. The district is located to the south-central direction along the major road from Addis Ababa to Arba Minch. Astronomically, the district is located between the coordinate of 6°32′24″N and 7°7′30″N latitude and 37°44′53″E and 37°56′24″E of longitude. Mount Damot is the highest peak in the district with an altitude of 2800 meters above sea level within inter-mediate agro climatic zone of WoinaDega and Kola Bidet is an administrative town of the Damot Gale district. Damot Gale Woreda is bordered on the southwest by Sodo-Zuria, on the northwest by Boloso Sore and DamotPulasa, on the north by the Hadiya Zone, on the east by DigunaFango, and on the southeast by DamotWeyde. It is 300 kilometers southwest of the capital, Addis Ababa and 70.7 km from regional city Hawassa. The Total population of the Woreda is 145,197(74,051 males and 71,146 females). The total number of children 6–59 months age residing in the rural areas of the district was 22,069. Malnutrition is one of the main health problems in South Regional State. It is predominantly seen among the rural population. The woreda has seven health centers, 27 health posts and no hospitals. (Ref_39)

The lively hood condition Wolayta zone is one of densely populated area with nature of very small land holdings; frequent rain fall insufficiency and failure to rain as well as pests frequently push part of the population over the hunger threshold and onto relief food aid. The main food crops are maize and beans intercropped, and sweet potatoes in two harvests, whilst enset is generally small in volume but important as a backstop in the lean months of February to May. With scarce grazing, livestock must be largely hand-fed with crop residues and fodder bought on the market. The biggest investment is in cattle. Cattle owners commonly contract poorer households to keep and fatten some of their stock, rewarded by a share in the sales. The severity of these seasonal food shortages and a failure of second season sweet potatoes is a key indicator of impendingcrisis. (Ref_40)

Community based comparative cross-sectional study was conducted from December 2018 to March 2019.All 6 months to 5 years of age children-mothers (15-49 years) pair who are residents of the Damot Gale Woreda in 2018/2019 were source population while All children 6 months to 5 years of age children-mothers (15-49 years) pair who are residents in selected Kebele of the Damot Gale Woreda during study period were study population.

Sample size determination and sampling technique

A double population proportion formula is used to calculate the sample size required for studying the prevalence of stunting, wasting and underweight consecutively with 95% level of confidence, and 80% power.

Where,

$$n = \frac{(p_1q_{1+}p_2q_2)f(\propto,\beta)}{(P_1-p_2)^2}$$

P_1: prevalence of stunting, wasting and underweight among children whose mother age is between 15-19 years
P_2: prevalence of stunting, wasting and underweight among children whose mother age is between 20-49 years
α = level of
significance
β= power

The overall prevalence (P1) of stunting, underweight and wasting among children 6-59 months whose mothers aged 15 – 19 years was estimated to be 49.9%, 42.9% and 18.8%, respectively. And for those children whose mother is between 20-49 years of age the prevalence (P2) is estimated to be 44.5%,
37.7 and % 14.7% for the above indicators respectively. With 80% Power of a study and assumption of 95% confidence level, the sample size for stunting, underweight and wasting was, 1300, 1248 and 1084, respectively. Then, the sample sizes calculated for the factors were smaller than the sample size calculated for magnitude of wasting, stunting and underweight. So, the sample size calculated from magnitudes was considered for this study. Thus, the calculated total sample sizes calculated for prevalence of undernutrition was multiplied by design effect of 1.5; then, total sample size was 1950, 1872, and 1626 for stunting, underweight and wasting respectively. Hence, the largest of the three sample sizes was considered for this study. Including 10% for non-response rate, the total sample size calculated to be 1950 +195 (10%) equals to 2145. So, 2145 mother-child pair was assumed to be selected from both 15-19 years of age mothers and 20-49 years of age mothers.
A stratified two stage sampling technique was used to select the study subjects. The total kebeles (27 kebeles) in the Woreda were stratified into three by their geographical distance (kilometers) from the central Woreda town as near, medium and far distances. According, those kebeles within 5 km were considered to be at near distance, 5 -15 km were as medium distance and those >15 km were considered to be at far distance. This stratification was done under the assumption that distance from the central Woreda has impact on the variable of interest and nutritional status and awareness of mothers in nearby Kebeles is expected to have some level of homogeneity. Among the 27 Kebeles ten were selected by simple random sampling technique and study participants will be proportionally allocated to the selected kebeles. A respective sampling frame was created for each kebeles by registering women of child bearing age and one client in every Kth were included in the study using systematic sampling technique. Inclusion criteria was all children aged 6–59 months and their mothers (15-49 years of age) who resides in the selected Kebele of the Damot Gale Woreda, while Mother- child pairs who lived in Damot Gale Woreda for less than six months seriously ill mothers and unable to communicate due to impairment was exclusion criteria.

Data collection procedure

Quantitative data were collected from participants by using structured interviewer administered questionnaire. Main points included in the questionnaire were socioeconomic and demographic variables, illness and WASH related variables, feeding practice. Ten college completed trained females, two supervisors and principal investigator were participated in the data collection procedure.

Anthropometric measurements

Children weight were measured to the nearest 0.1 kg by the seca beam balance (German, Serial No. 5755086138219) with graduation of 0.1 kg and a measuring range of up to 25 kg. Weight was taken with light clothing and no shoes. Instrument calibration wasdone before weighing each child. Furthermore, the weighing scale waschecked daily against the standard weight for accuracy. Height wasmeasured using the seca vertical height scale (German, Serial No. 0123) standing upright in the middle of the board. The child's head, shoulders, buttock, knees, and heels touch the vertical board. The length of a child (aged 6–23 months) wasmeasured using a horizontal wooden length board in recumbent position, and read to the nearest 0.1 cm.

Data Quality Control

The questionnaire was first prepared in English language. To maintain consistency, the questionnaire was back translated from English to Wolaytegna(the native language of the study area) and was retranslated to English by professional translators. The questionnaire were pretested on 5% of sample outside the study area to check for the consistency in meaning and to explore further variables which might not been included during questionnaire preparation. College completed females were data collectors after getting training for two days on objectives of the study, definition of terms, identification and listing of HH and interview skill. Onsite supervision was under taken every day by supervisors and the principal investigator during data collection process. Data was checked for completeness and consistency immediately after data collectors filled it.

Before the analysis process, the data was checked for completeness and for any missing values during collection. Then it was coded and double entered in to EpiData V4.6 computer software to cross check for any errors during data entry and exported to SPSS version 24 for further analysis. Frequency tables were used to clean the data by checking missed values, outliers and inconsistencies. Any errors identified at this stage were corrected after revision of the original data using code number. The data collectors and supervisors were given a two-day intensive training ahead of time.

Data Processing and Analysis

Data was entered into the EpiData V4.6 software, and analysed using SPSS version 24 statistical package. Nutrition related data (sex, age, height, weight,) were entered into the WHO Anthro software. The Z-scores of indices, Weight-for-Height Z-score (WHZ), Height-for-Age Z score (HAZ) and Weight-for-Age Z score (WAZ) were calculated and compared using the World Health Organization (WHO) Multicentre Growth Reference Standard. A child with HAZ score <-2SD from the reference population was defined as stunted, a child with WHZ

<−2 SD from the reference population was classified as wasted, while a child with WAZ <−2SD from the reference population is defined as underweight.

Descriptive statistics, including frequencies and proportions, measures of central tendency and measure of dispersion were used to summarize the variables. Bivariable logistic regression analysis was done individually for all independent variables with stunting, wasting and underweight. Variables with a p-values of <0.25 in the bivariable analysis was entered into a multivariable logistic regression analysis to identify the independent determinants of stunting, wasting and underweight separately. Both the Crude Odds Ratio (COR) and the Adjusted Odds Ratio (AOR) with a corresponding 95 % Confidence Interval (CI) was computed to show the strength of the association. In the multivariable logistic regression analysis, variables with a p-value of <0.05 was considered as statistically significant. Model fitness was checked by using Hosmer-Lemeshow goodness of fit test and it was good.

Operational definitions

Underweight: Weight for age < –2 standard deviations (SD) of the WHO Child Growth Standards median

The weight for age index expresses the weight of a child in relation to his /her age. However, this index does not allow differentiation between two children of the same age and weight, one being tall and thin (wasted), the other shorter but not wasted. This index is mainly used during Maternal and Child Health clinic visits, since it is a good way of assessing the nutritional evolution of a child over time.

Stunting: Height for age < –2 SD of the WHO Child Growth Standards median

The height/age index expresses the height of a child in relation to his/ her age. It reveals stunting at a given age, but does not allow discrimination between 2 children of the same age and height, one being thin (wasted) the other one being heavier. This index reflects the past nutritional history of a child rather than his current nutritional status. It is mainly used to identify chronic malnutrition.

Wasting: Weight for height < –2 SD of the WHO Child Growth Standards median

The weight/height index expresses the weight of a child in relation to his height. It reveals whether a child is thin or not but does not discriminate between 2 children of the same height and weight, one being older than the other, and possibly stunted. It is the index used to measure acute malnutrition called "wasting", meaning current or acute malnutrition at the time of the survey.

Mid upper arm circumference

The mid-arm circumference is almost stable from 6 to 59 month and hence does not need to be related to the age. But it is less reliable to measure and so it is only used for the rapid screening of populations to get an idea of the situation and for entry to nutrition programs. It also serves to detect current nutritional status of children. In emergency situations where acute forms of malnutrition are the predominant pattern, the weight for height index (W/H) is the most appropriate index to quantify levels of current acute malnutrition in the population with an

assessment of edema. Furthermore, weight for height does not require the determination of age which is often difficult in these situations.

Body Mass Index (BMI)

- BMI < 17.0 indicates moderate and severe thinness.
- BMI < 18.5 indicates underweight.
- BMI 18.5–24.9 indicates normal weight.
- BMI ≥ 25.0 indicates overweight.
- BMI ≥ 30.0 indicates obesity

Improved Drinking-water sources

Improved drinking-water sources are defined in terms of the types of technology and levels of services that are likely to provide safe water. Improved water sources include household connections, public standpipes, boreholes, protected dug wells, protected springs and rainwater collection. Unimproved water sources are unprotected wells, unprotected springs, vendor-provided water, bottled water (unless water for other uses is available from an improved source) and tanker truck-provided water.

Improved sanitation facilities

Improved sanitation facilities are defined in terms of the types of technology and levels of services that are likely to be sanitary. Improved sanitation includes connection to a public sewers, connection to septic systems, pour-flush latrines, simple pit latrines and ventilated improved pit latrines. Service or bucket latrines (from which excreta are removed manually), public latrines and open latrines are not considered to be improved sanitation.

Ethics and consent to participate

Ethical approval was obtained from GAMBY college of Medical sciences, Research and post graduate program coordination office. Official letter of permission was obtained from Wolayta Zone health department and Damot Gale woreda health office. The participants were selected according to the sampling procedure and clear justification was given to those who were not included in the study as participant. All the necessary explanation about the purpose of the study and its procedures were explained to the respondents with the assurance of confidentiality. A written consent was obtained following an explanation of the purpose, risk and benefit of the study. The participants were provided with clear information and were asked if they were willing to participate or not. Only those who were willing to participate were interviewed. They were also informed that they could refuse to answer any question or they could stop the interview at any time. Study participants were informed that they would not get direct benefit or harm for participating in the study, but their participation may help to improve theirs and others health through these research finding. Confidentiality of respondents was maintained throughout the research process and participant's privacies were respected properly. If Children participating in the study were found to be undernourished, their mothers were advised to take them to health facility and were linked with the nearby health facility so that they could get appropriate care and treatment

Result

Socio-demographic characteristics

In this study out of 2145 individuals expected, 2121 mother-child pair was interviewed making a total response rate of 98.8%. About 28.2% and 27.3% of respondent's BMI status among age groups 15- 19 years and20-49 was underweight, respectively. The majority of respondent's educational status among mothers age 15-19 had no formal education whereas mothers 20-49 were primary education. In this study, mothers who have power on deciding over the use of money among 15-19 were 69.4 while it was 72% among mothers age group 20-49. Regarding health facility distance in minutes, more than half of both groups were from a distance of taking 1 hour and above. When we see, the marital status of respondents, about 90% from both groups were currently married (Table 2).

Table 1: Household andMaternal characteristics of the respondents among children of age 6-59 months born to married women of age 15-19 years and those 20-49 years in Damot Gale Woreda, Southern Ethiopia, 2019/2020

S.No		Age 15-19		Age 20-49		Total
	Variables	No	%	No	%	No (%)
1	Maternal Nutritional status (BMI)					
	Underweight	299	28.2	279	26.3	578(27.3)
	Normal	692	65.3	661	62.3	1353(63.8)
	Overweight	69	6.5	121	11.4	190(8.9)
2	Parity					
	1	58	5.5	97	9.1	155(7.3)
	2-3	181	17.1	267	25.2	448(21.1)
	4-5	394	37.2	516	48.6	910(42.9)
	6+	427	40.3	181	17.1	608(28.7)
3.	Marital status					
	Never married	22	2.1	9	0.8	31(1.5)
	Currently married	943	89.0	894	84.3	1837(86.6)
	Widowed	51	4.8	90	8.5	141(6.6)
	Divorced and Separated	44	4.2	68	6.4	112(5.3)
4.	Maternal Educational Status					
	No formal education	377	35.6	358	33.7	735(34.6)
	Primary	343	32.4	380	35.8	723(34.1)
	Secondary and above	340	32.1	323	30.4	663(31.3)
5.	Father Educational status					
	No formal education	259	24.4	222	20.9	481(22.7)
	Primary education	420	39.6	432	40.7	852(40.2)
	Secondary and above	381	35.9	407	38.4	788(37.2)
6.	Sex of HH head					
	Male	803	75.8	802	75.6	1605(75.7)
	Female	257	24.2	259	24.4	516(24.3)
7.	Monthly income					
	<500	177	17.5	267	26.5	444(20.9)
	500-1000	317	31.3	414	41.0	731(34.5)
	≥1000	518	51.2	326	32.3	844(39.8)
8.	Employment					
	Employed	92	8.7	100	9.4	192(9.1)
	Unemployed	968	91.3	961	90.6	1929(90.9
9.	Power in deciding over money					
	Yes	736	69.4	764	72.0	1500(70.7)
	No	324	30.6	297	28.0	621(29.3)
10.	Health Facility distance in min					

	<30 min	82	7.7	94	8.9	176(8.3)
	30 min – 1 hour	365	34.4	387	36.5	752(35.5)
	≥ 1 hour	613	57.8	580	54.6	1193(56.2)
11.	Media access					
	Available	960	90.6	960	90.5	1920(90.5)
	Not available	100	9.4	101	9.5	201(9.5)

Factors affecting the undernutrition among the children aged 6 – 59 months

Bivariable and multivariable logistic regression result was presented with 95%CI of COR to identify candidate variables for multivariable logistic regression and AOR for factors associated with under- nutrition among children age group from 6-59 months born to mothers of age group 15-19 and 20-49 years, respectively. Then, variables with p-value < 0.25 at bivariable logistic regression and variables with p-value <0.05 at multivariable logistic regression analysis were presented together in different tables according to categories of dependent variables. Bivariable logistic regression result for wasting shows that parity, maternal educational status, father education status, maternal employment, child

birth order, history of illness in the last 14 days, diarrheal history in the last 14 days, fever in the last 14 days, type of sanitation facility, BMI of mother, monthly income of household, health facility distance in minutes and Dietary Diversity Score were important factors associated with wasting and candidate for multivariable logistic regression.

Multivariable binary logistic regression analysis for wasting shows that maternal educational status, history of illness in the last 14 days, BMI of the mother, monthly income of the household and dietary diversity score were important determinants of wasting among children of age 6-59 months born to mothers of age group 15-19 and 20-49 years. Children of age 6-59 months born to mothers who did not attend school were 2.57 times more likely to be wasted than children of mothers who had attended secondary and above education(AOR=2.57, 95%CI: 1.83, 3.62). children of age 6-59 months who had history of illness in the last 14 days were 1.41 times more likely to be wasted than children who did not have history of illness(AOR= 1.41, 95%CI: 1.04, 1.91). Children born to mothers whose BMI was <18.5(underweight) were 1.45 times more likely to be wasted than children born to mothers in the normal (18.5-14.9) range of BMI (AOR= 1.45, 95%CI: 1.08, 1.95). Children born to mothers whose monthly income <500 ETB and 500 -1000 ETB were 2.47 times and 1.42 times more likely to be wasted than children whose mothers earn monthly income of 1000 ETB and more(AOR= 2.47, 95%CI: 1.73, 3.53), and (AOR= 1.42, 95%CI: 1.03, 1.97). Children born to mothers whose home were at a distance of 30-60 minutes and >60 minutes were 2.73 times and 3.65 times more likely to be wasted than children whose home were at a distance of < 30 minutes to the health facility on foot, respectively (AOR= 2.73, 95%CI: 1.22, 6.14), and (AOR= 3.65, 95%CI: 1.64, 8.13). Children whose households had poor dietary diversity score were 1.57 times more likely to be wasted than children whose households had good dietary diversity score(AOR= 1.57, 95%CI: 1.17, 2.09)(Table 7).

Table 2: Multivariable logistic regression result on factors associated with wasting among children age of 6-59 months born to mothers of age group 15-19 years and 20-49 years old in Damot Gale Woreda, Southern Ethiopia, 2023(n=2121)

S.No	Variable	Wasted	Normal	COR(95%CI)	AOR(95%CI)
		No	No		
1	Parity				
	1	21	134	1	
	2-3	59	389	.97(.57,1.65)	
	4-5	90	820	.70(.42,1.65)	
	6+	99	509	1.24(.75,2.06)	
2	Maternal education status				
	No formal education	138	597	2.46(1.77,3.41)	**2.57(1.83,3.62)***
	Primary education	74	649	1.21(.84,1.74)	1.23(.84,1.79)
	Secondary and above Education	57	606	1	1
3	Father educational status				
	No formal education	76	401	1.31(.95,1.81)	
	Primary education	92	756	.84(.62,1.14)	
	Secondary and above Education	99	685	1	
4	Employment status of mother				
	Unemployed	237	1690	.70(.47,1.05)	
	Employed	32	160	1	
5	Birth order of the child				
	1	24	133	1	
	2-3	57	372	0.85(.51,1.42)	
	4-5	98	897	.61(.37,.98)	
	6+	87	439	1.10(.67,1.79)	
6	History of illness in the last 14 days				
	Yes	60	325	1.47(1.10,1.96)	**1.41(1.04,1.91)***
	No	206	1516	1	1
7	History diarrhea in the last 14 days				
	Yes	76	394	1.36(.99,1.86)	
	No	190	1449	1	
8	History of fever in the last 14 days				
	Yes	77	449	1.26(.95,1.68)	
	No	189	1394	1	
9	Sanitation facility				
	Improved	77	467	1	
	Unimproved	192	1385	.84(.63,1.12)	
10	BMI of mother				
	<18.5(Under nourished)	95	483	1.59(1.20,2.09)	**1.45(1.08,1.95)***
	18.5-24.99(Normal)	149	1204	1	1
	≥25(Overweight)	25	165	1.22(.78,1.93)	1.07(.66,1.73)
11	Monthly Income				
	<500 ETB	86	426	1.77(1.28,2.44)	**2.47(1.73,3.53)***
	500-1000 ETB	99	689	1.26(.92,1.71)	**1.42(1.03,1.97)***
	>1000 ETB	84	735	1	1
12	Health facility distance in minutes				
	<30 minutes	7	169	1	1
	30-60 minutes	96	656	3.53(1.61,7.75)	**2.73(1.22,6.14)***
	>60 minutes	166	1027	3.90(1.80,8.46)	**3.65(1.64,8.13)***
13	Dietary Diversity Score				
	Poor	94	449	1.68(1.28,2.20)	**1.57(1.17,2.09)***
	Good	175	1403	1	1

Discussion

This study explored the magnitude and associated factors of wasting among children of age from 6- 59 months born to mothers of age group 15-19 years and 20-49 years. The overall wasting prevalence in the study was 12.7%. There was significant difference for wasting among children born to mother's age group of 15-19 years and 20-49 years were 16.5% in 15-19 years old while it was 8.9% among mothers of age group 20-49 years old. Since we don't have other studies comparing the prevalence of wasting in children among mothers age category, we only compared the undernutrition of children born to mothers' age group of 15-19 years.

The factors associated with wasting among children of age 6-59 months born to mothers of age group 15-19 years and 20-49 years old were; maternal education, history of illness in the last 14 days, BMI of the mother, monthly income, health facility distance in minutes and dietary diversity score for wasting, maternal educational status were factors affecting nutritional status of the children in the study area.

Educational status of the mother was found to be associated with wasting of children of age from 6- 59 months. Accordingly, children of mothers with no formal education were 2.57 times likely to be wasted than children with mothers who attended secondary and above education. This was consistent with the study from Bure town of west Gojjam and Hula district of southern Ethiopia[15]. This indicates that mothers with no education may not money to buy basic requirements as well as awareness to consume the available food in a proper way so that their children were more likely to be wasted. On the other hand, study from pastoral community of Dollo ado district, Haramaya district, Bule hora district, Belesse district and Tula Sub city of Hawassa town were inconsistent and education was not significant factor [16-19].

History of illness in the last 14 days was associated with wasting of children of age 6-59 months. Accordingly, children who had illness in the last 14 days were 1.4 times more likely to be wasted than their counterparts. This was consistent with the study from Haramaya district[19]. This may be due to the fact that the children may loss appetite during illness that may led to weight loss.

BMI of the mothers was associated with wasting of children age 6-59 months. Accordingly, children whose mothers BMI <18.5 were 1.45 times more likely than the children whose mothers were in the normal (BMI=18.5-24.9) range. This was consistent with the study conducted in Hula district of southern Ethiopia[15]. This may be due to the fact that underweight mothers may not provide adequate nutrient to their breastfeeding children.

Monthly income of the household was also associated with wasting among children 6-59 months. Accordingly, children whose household had monthly income less than 500ETB and 500-1000ETB were 2.47 times and 1.42 times more likely to be wasted than the children whose households earn monthly income of more than 1000ETB. This has been shown consistently in studies from Hawassa City, Hula district and Bure town[15, 20, 21]. This may be due to mothers with less income were less likely to buy nutritious foods that may lead to undernutrition among children. However, household monthly income did not have significant association with the wasting among the children in the study from Lalibela town administration.

Dietary diversity score was also associated with wasting of children. So, children whose households had poor dietary diversity score were 1.57 times more likely to be wasted than

children whose households had good dietary diversity score. This indicates that diversity of food for children was important as it helps to maintain nutrition status of children.

Conclusion

There is difference in prevalence of wasting among children age 6-59 months born to mother's age between 15-19 years and 20-49 years old. The magnitude of wasting among children of age group 6- 59 months born to mothers of age group 15-19 years old was higher than mothers of age group 20-49 years. Maternal educational status and dietary diversity score were factors significantly associated with wasting. Maternal educational status, history of illness in the last 14 days, BMI of the mother, monthly income, health facility distance in minutes and dietary diversity score were factors associated with wasting. Consider intervention on early marriage to reduce undernutrition and other effects of early marriage.Zonal health department should give due emphasis to early married women to improve their nutrition practice and effective counseling on family planning utilization.Consider strengthening of supportive supervision on nutrition related services to the Woreda health office and health facilities and provide feedback. Consider improving infrastructure for services related to health and providing basic education for mothers regarding health-related services through building training centers.Mother of under-five children at a distance taking more than 30 minutes to the health facility should be given due consideration during monthly screening of children for nutrition.Consider providing continuous support for mothers of children with no formal education and only attended primary school. The district should monitor continuously on ANC utilization of pregnant mothers. They should take their children to the health center or health post for early identification and management of children with wasting through screening. The researchers are needed to do further research on the effect of age on child undernutrition.

Supporting Information

S1 File. English version questionnaire used to collect data at southern Ethiopia, 2019.
S2 File. SPSS final data for southern Ethiopia.

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Abbreviations

AM, Acute Malnutrition; ANC, Antenatal Care; ARI, Acute Respiratory Tract Infection; BMI, Body Mass Index; CI, Confidence Interval; EDHS, Ethiopian Demographic and Health Survey; HAZ, Height for Age Z-Score; HH, House Hold; HTP, Harmful Traditional Practice;RB(Dr), LBW, Low Birth Weight; RB(Dr),Dr Rajendra Baxi; MDG, Millennium Development Goal; MR, Misgana Wolderufael; MOH, Minister of Health; MUAC, Middle Upper Arm Circumference; OR, Odds Ratio; PEM, Protein Energy Malnutrition; SD, Standard Deviation; SDG, Sustainable Development Goal; SNNPR, South Nation Nationality and People Region; SPSS, Statistical Product and Service Solutions; SSA, Sub Saharan Africa; TTBA, Trained

Traditional Birth Attendant; UNICEF, United Nations Children's Fund; WHZ, Wight for Height Z-Score; WAZ, Wight for Age Z-Score; WHO, World Health Organization.

Author contributions: MR conceived and designed the study, developed the data collection instruments, performed the statistical analysis, wrote first version of the manuscript, designed implementation, analysis and report writing. RB (Dr) critically revised and approved the final manuscript for publication.

Availability of data and materials: For those who are interested; the datasets of this study could be accessed from the corresponding author on reasonable request.

Consent to publish

Not applicable. But we didn't take image, voice and videoat all. By considering the benefit of the study the findings aresubmitted for publication.

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