

RESEARCH NOTE

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# Magnitude of wasting and underweight among children 6–59 months of age in Sodo Zuria District, South Ethiopia: a community based cross-sectional study

Efrata Girma Tufa<sup>1</sup>, Samson Kastro Dake<sup>1</sup>, Eyasu Tamiru Bekru<sup>2</sup>, Habtamu Azene Tekle<sup>3</sup>, Tesfahun Molla Bobe<sup>3</sup>, Banchalem Nega Angore<sup>4</sup> and Fithamlak Bisetegen Solomon<sup>5\*</sup>

## Abstract

**Objectives:** The study aimed to determine the prevalence of wasting and underweight, and identify associated factors in Sodo Zuria district in South Ethiopia.

**Results:** The prevalence of wasting and underweight were 11.1% and 14.0%, respectively. Wasting was significantly associated with male gender, diarrheal morbidity 2 weeks prior to the study and early initiation of complementary feeding. Predictors of underweight were diarrheal morbidity 2 weeks prior to the study and paternal illiteracy. The prevalence of wasting and underweight among under-five children is common in the study area. Diarrheal morbidity was associated with both wasting and underweight. Interventions targeting prevention of diarrheal morbidity through hygienic practices and creating awareness on infant feeding practices need to be implemented in the study area.

**Keywords:** Children, 6–59 months, Undernutrition, Wasting and underweight

## Introduction

Globally, at least one in three people experience malnutrition in some form [1] and the prevalence of child undernutrition is high in low- and middle-income countries [2]. Despite the decreasing trend in the prevalence, undernutrition continued to be a public health problem in developing countries [3]. The number of people without access to adequate calories in the world has increased since 2015 [4].

The number of undernourished people globally rose from 777 million in 2015 to 815 million in 2016 [5]. Globally, fifty-one million children were wasted and 16 million were underweight in 2017. Africa and Asia bear the greatest share of all forms of malnutrition and in Eastern Africa the prevalence of wasting is 6% [6]. In

Ethiopia, according to the Ethiopian Demographic and Health Survey (EDHS) of 2016, the prevalence of wasting and underweight were 10% and 24%, respectively [7]. The prevalence of wasting changed little (from 12 to 10%) in 16 years period nationally. However, the prevalence of underweight consistently decreased from 41 to 24% [7, 8]. Wasting and underweight prevalence of Southern Ethiopia were 6 and 21.1%, respectively [7].

About one-third of deaths among children below 5 years of age were attributed to undernutrition and it can lead children to be at greater risk of death and severe illness due to common childhood infections [9]. Undernutrition in children leads to physical and mental impairment [10–14].

The global progress to reduce malnutrition is not rapid enough to meet internationally agreed targets, including Sustainable Development Goal (SDG) target to end all forms of malnutrition by 2030. Improving nutrition will be a catalyst for achieving other SDGs. Despite few

\*Correspondence: fitha2007@yahoo.com; fitha2007@gmail.com

<sup>5</sup> Department of Medical Laboratory, School of Medicine, College of Health Science and Medicine, Wolaita Sodo University, Sodo, Ethiopia  
Full list of author information is available at the end of the article



studies were done at national and regional levels, the prevalence and risk factors at sub-regional or community level have been insufficiently emphasized. So this study tries to assess the burden of wasting and underweight among children aged 6–59 month at Sodo Zuria district, South Ethiopia.

## Main text

### Methods

#### Study setting

A community based cross sectional study was conducted among children aged 6–59 months paired with mothers/caretakers. Data was collected from May to June 2017. The study area is located at 380 km south of Addis Ababa. Sodo Zuria district is administratively structured into 30 kebeles (lowest administrative units) and has a census projected total population of 394, 772; 24,647 were children in the age range of 6–59 months.

#### Population and sampling

All randomly selected children 6–59 months of age paired with their mothers/caregivers were the study population. Sample size was calculated with an expected prevalence of 36.6% [7], 95% confidence level, 5% margin of error and 5% non response rate. The total sample size calculated for this study was 375. Out of 30 kebeles, 4 kebeles were selected randomly. The total sample size was allocated to each kebele proportionally. Households were selected using systematic random sampling and for households with more than one child in the age range of 6–59 months, one child was selected randomly.

#### Data collection

Structured questionnaire was used and mothers/caregivers were interviewed face to face. Five bachelor degree graduates with prior experience on data collection and fluent speakers of the local language were recruited and intensively trained on the data collection questionnaire, selecting study participants, anthropometric measurements and ethics. They were also standardized on taking anthropometric measurements. The questionnaire was pretested on 5% of the sample size in a community other than the study area and revised. The length of a child (aged 6–23 months) was measured with a horizontal wooden length board in recumbent position. The height of a child (aged 24–59 months) was measured with a vertical wooden height board while the child standing upright in the board. The length and height measurements were read to the nearest 0.1 cm. Weight was measured using seca digital weight scale and read to the nearest 0.1 kg. All measurements were taken twice and the mean was used for analysis. Supervisors checked the

completeness and consistency of the questionnaire and errors were corrected on spot in the field.

#### Operational definitions

*Wasting* was computed when the weight-for-height z-score (WHZ) is below  $-2$  SD in the national center for Health Statistics (NCHS) growth curve.

*Severe wasting* was computed when the weight-for-height z-score (WHZ) is below  $-3$  SD in the NCHS growth curve.

*Underweight* was computed when the weight for age z-score (WAZ) is below  $-2$  SD in the NCHS growth curve.

*Severe underweight* was computed when the weight for age z-score (WAZ) is below  $-3$  SD in NCHS growth curve.

#### Data analysis

Data were entered into Epi Info software version 3.5.1 and exported to SPSS version 20 for analysis. WAZ data were analyzed using WHO Anthro software and compared using NCHS reference standard. Descriptive statistics was done for all variables. Bivariate analysis was performed to determine crude association and variables with  $p < 0.25$  in bivariate analysis were considered candidate for multivariate analysis. Multivariate logistic regression analysis was conducted to control confounders and identify predictor variables. Statistical significance was considered at  $p < 0.05$ .

## Results

### Sociodemographic characteristics

Out of 375 children, 342 participated in the actual study which gives a response rate of 91.2%. From all study participant mothers/caregivers, majority 299 (87.43%) were married, Wolaita in ethnic group 336 (98.25%) and protestant religion followers 246 (71.93%). One hundred sixty-four (47.95%) of the children were male and 104 (30.41%) were 6–23 months of age (Additional file 1: Table S1).

### Obstetric, maternal and child morbidity related characteristics

Majority 272 (79.53%) of the children were born in the health facility and 229 (66.96%) were born at 9 months of gestational age. Three-fourth 257 (75.15%) of the children had a normal birth weight and 69 (20.17%) were born in  $< 24$  months gap with the previous birth. (Additional file 2: Table S2).

### **Child caring practice and environmental health characteristics**

Two-third 228 (66.67%) of the children were started on breastfeeding within 1 h after birth, 334 (97.66%) were given colostrums and 301 (88.01%) did not get pre lacteal foods or liquids. Of the children 195 (57.02%) started complementary food at 6 months of age, and 250 (73.10%) never ate meat in their life. (Additional file 3: Table S3).

### **Prevalence of wasting and underweight**

Prevalence of wasting was 38 (11.1%), and severe wasting was 15 (4.4%). The highest prevalence of wasting (3.2%) was seen among children aged 48–59 months. The prevalence of underweight among study participants was 49 (14%) of which severe underweight accounts for 11 (3%). The highest prevalence of underweight (3.8%) was seen among children aged 48–59 months.

### **Predictors of wasting and underweight**

As indicated in Table 1, The likelihood of being wasted was 60% higher for children who started breastfeeding between 1 and 24 h of birth than their counterparts (AOR = 1.6, 95% CI 1.2–2.3). Children who had diarrhea in the past 2 weeks were 2.8 times (AOR = 2.8, 95% CI 3.2–7.4) higher odds of being wasted than children had no diarrhea. Children who had diarrhea 2 weeks prior to this study were 2.8 times (AOR = 3.9, 95% CI 1.8–4.4) more likely to be underweight than children without diarrheal disease. Risk of underweight among children whose fathers were illiterate was 5.4 times (AOR = 6.7, 95% CI 2.5–9.1) more likely than children whose fathers were literate. Female children were 3.2 times (AOR = 2.5, 95% CI 1.5–4.1) more likely to be underweight than males (Table 1).

### **Discussion**

In this study, the prevalence of wasting was 11.1%, which is comparable with studies reported in Nigeria (9.5%) [15], Vietnam (10.2%) [16], South Asia (11%) [17], Ethiopia (8.9%) [18] and the 2016 EDHS report (10%) [7]. Higher prevalence levels were reported in Sudan [19] and Ethiopia [20]. However, it is higher than other studies reported in Bete Israel and Mongolia [21, 22]. The prevalence of underweight in this study was 14.0%. This is comparable with a study done in Bete Israel, Ethiopia (16.6%) [21]. But it is lower than studies reported elsewhere and in the country [7, 16, 17, 20, 23–26]. However, this is higher than a report in Mongolia (4.7%) [22].

In this study, the odd of being wasted was 3 times higher for boys as compared to girls. Many studies conducted in Ethiopia and other parts of the Globe have

reported similar findings [10, 19, 25, 27, 28]. It is unlikely that gender preference and differential feeding be the reason since it is females who usually receive less food in Ethiopian culture. There might be a genetic basis for boy's vulnerability since it is reported in many studies.

In this study, children who started complementary feeding before the age of 6 months had higher odds of being wasted when compared with children who started at the age of 6 months. This is in line with other study findings which revealed that children who exclusively breast fed for <6 months were more likely to be wasted as compared with those exclusively breast fed for  $\geq 6$  months.

In the current study, parental formal educational status was a predictor of underweight. Compared with children of educated fathers, children born from uneducated fathers had higher odds of being underweight. Other studies reported similar finding [16, 29]. The possible explanation might be that education might influence father's attitude towards child's nutrition and educated fathers tend to invest in children's feeding [16, 25, 29–31].

Presence of diarrheal morbidity 2 weeks prior to data collection was an independent predictor for both wasting and underweight. Similar finding was reported in Ethiopia and elsewhere [17, 25, 27]. The possible reason might be that diarrhea leads to loss of appetite leading to decreased food intake, malabsorption and finally malnutrition. On the other hand, malnutrition leads diarrhea. Since the current study is cross-sectional, it is difficult to conclude the direction of association.

### **Conclusion and recommendation**

A high proportion of wasting and underweight was found among children 6–59 months in Sodo Zuria district. Wasting was associated with male sex, diarrheal morbidity 2 weeks prior to the study and initiation of complementary feeding before 6 months, whereas underweight was found to be significantly associated with being a child of an uneducated father and diarrheal morbidity 2 weeks prior to the study. Efforts should be commenced towards prevention of diarrheal morbidity through hygiene practice and awareness creation on infant feeding practices and specifically on initiation of complementary feeding.

### **Limitation of the study**

Since it was a cross-sectional design, it was difficult to examine any potential temporal relationships. Certain level of recall bias was expected with regard to events happened in the past; such as history of illness and breastfeeding patterns immediately after birth and then after. We have no data for some biomedical indicators like arm circumference.

**Table 1 Factors associated with wasting and underweight among children aged 6–59 months at Sodo Zuria district, Wolaita Zone, South Ethiopia, June 2017 (n = 342)**

Explanatory variables	Under weight		COR (95% CI)	AOR (95% CI)
	Yes	No		
Child sex				
Male	9	124	1.0	1.0
Female	40	169	1.8 (1.3–2.7)*	1.6 (0.7–1.3)
Paternal formal education				
Yes	29	82	1.0	1.0
No	33	111	2.8 (2.3–3.9)*	5.4 (2.5–9.1)*
Ownership of livestock				
Yes	41	193	1.0	1.0
No	8	100	1.4 (1.1–1.9)	
Place of delivery				
Health facility	39	233	1.0	1.0
Home	10	60	0.6 (0.4–0.9)*	
Availability of latrine				
Yes	41	208	1.0	1.0
No	8	85	1.6 (2.1–4.5)	1.7 (0.5–1.6)
Fed pre-lactation feeding				
No	39	262	1.0	1.0
Yes	10	31	2.9 (2.3–6.1)	0.6 (0.9–2.6)
Diarrheal morbidity in the last 2 weeks				
No	29	224	1.0	1.0
Yes	20	175	2.3 (2.1–3.8)*	2.8 (1.8–4.4)*
Explanatory variables	Wasting		COR (95% CI)	AOR (95% CI)
	Yes	No		
Child sex				
Male	17	143	143	3.2 (1.9–5.3)*
Female	21	161	161	1.0
Age at complementary feeding started (in months)				
≥ 6	33	225	225	1.0
< 6	5	4	4	2.2 (1.8–3.9)*
Immunization				
Yes	34	293	293	1.0
No	4	11	11	1.7 (0.8–3.8)
Ever use of family planning				
Yes	18	152	152	1.0
No	20	152	152	1.7 (0.6–2.1)
Initiation of breast feeding				
Within 1 h of delivery	24	204	204	1.0
After 1 h of delivery	14	100	100	1.6 (0.7–5.3)
Pre-lactation feeding				
No	35	266	266	1.0
Yes	3	38	38	1.5 (0.9–2.4)
Availability of latrine				
Yes	20	239	239	1.0
No	18	75	75	1.5 (0.8–2.2)
Diarrheal morbidity in the last 2 weeks				
No	17	236	236	1.0
Yes	21	68	68	2.8 (2.2–7.4)*

\*statistically significant at p&lt;0.05

## Additional files

**Additional file 1: Table S1.** Socio-demographic characteristics of study participants in Sodo Zuria district, South Ethiopia, June 2017.

**Additional file 2: Table S2.** Obstetric, child morbidity and other maternal characteristics of study participants in Sodo Zuria district, South Ethiopia, June 2017.

**Additional file 3: Table S3.** Child caring practice and environmental health characteristics of study participants in Sodo Zuria district, South Ethiopia, June 2017.

## Abbreviations

AIDS: acquired immune deficiency syndrome; AOR: adjusted odds ratio; CI: confidence interval; COR: crude odds ratio; EDHS: Ethiopian Demographic and Health Survey; HIV: human immunodeficiency virus; NCHS: National Center for Health Statistics; SD: standard deviation; SDG: Sustainable Development Goals; SPSS: Statistical Package for Social Sciences; WAZ: weight-for-age z-score; WHO: World Health Organization; WHZ: weight-for-height z-score.

## Authors' contributions

EG, SK, FS: Conceived the study; FS, HA, TM, SK, ET, BN, and TM: Participated in the design of the study and performed the statistical analysis, FS, SK, EG: Interpreted the data; FS: Obtained ethical clearance and permission for study; FS, EG, ET, HA: Supervised data collectors; SK, EG, FS, HA, TM, BN: Drafting the article or revisiting it critically for important intellectual content. All authors read and approved the final manuscript.

## Author details

<sup>1</sup> Department of Reproductive Health and Nutrition, School of Public Health, College of Health Science and Medicine, Wolaita Sodo University, Sodo, Ethiopia. <sup>2</sup> Department of Nursing, College of Health Science and Medicine, Wolaita Sodo University, Sodo, Ethiopia. <sup>3</sup> School of Medicine, College of Health Science and Medicine, Wolaita Sodo University, Sodo, Ethiopia. <sup>4</sup> Department of Midwifery, College of Health Science and Medicine, Wolaita Sodo University, Sodo, Ethiopia. <sup>5</sup> Department of Medical Laboratory, School of Medicine, College of Health Science and Medicine, Wolaita Sodo University, Sodo, Ethiopia.

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## Competing interests

The authors declare that they have no competing interests.

## Availability of data and materials

The data that support the findings of this study are available. Anyone interested can get upon reasonable online request by writing to fitha2007@yahoo.com.

## Consent for publication

Not applicable.

## Ethics approval and consent to participate

The study proposal got ethical approval (159/2017) from Wolaita Sodo University ethical review committee. Written consent was obtained from mothers/caregivers on behalf of the children.

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