

## **Household sanitation practice associated with nutritional status of pre-school children aged 24-59 months in Hawassa Zuria Woreda, South Ethiopia: A cross-sectional study.**

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### **Abstract**

**Introduction:** Childhood is period by when human being expected to shape prenatal nutritional deficiencies and foster good health. Children from developing countries including Ethiopia suffer both from sanitary gaps and under nutrition. Though literatures depict sanitary problem and nutritional deficits as problems to be focused on separately evidences examining association of the two issues are limited in Ethiopia. Therefore, this study was designed to investigate the relationship between household sanitation practice and anthropometric status of pre-school children aged 24-59 months old in Hawassa Zuria Woreda, Southern Ethiopia.

**Method:** A community based cross-sectional study design was employed. By using simple random sampling technique 597 child-mothers/caregiver pairs were selected and interviewed with semi-structured questionnaire. Anthropometric statuses were generated using WHO-Anthro. Data was analyzed using descriptive statistics and chi-square test.

**Results:** The prevalence of stunting, underweight and wasting were 245 (41%), 134 (22.4%) and 79 (13.2%), respectively. Household sanitation practices and stunting ( $X^2=4.21$  and  $P\text{-value}=0.04$ ), underweight ( $X^2=4.38$  and  $P\text{-value}=0.04$ ) and wasting ( $X^2=12.95$  and  $P\text{-value}<0.001$ ) were found statistically significantly associated.

**Conclusion:** Prevalence of underweight was lower than the national figure. Proportion of wasted and stunted pre-school children was higher than both the national and regional reports. Household sanitation practice and pre-school children's nutritional status (Stunting, Wasting and Underweight) were found associated. Per the finding, stakeholders and mothers/caregivers better design strategies to improve household sanitation practice. Further studies can be done focusing cause effect relationship and examining effect of strategies to improve household sanitation practices.

**Keywords:** Pre-school children, Nutritional status, Household sanitation practice.

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### **Introduction**

Nutritional status of children is important as it determines their health, physical growth, development, academic performance and progress in life [1,2]. Childhood malnutrition can affect potential for growth and the risk of morbidity in later years of life [3]. About half of all children deaths are associated with malnutrition, of which three quarters are linked to mild and moderate forms of malnutrition [4]. Pre-school children constitute

malnutrition vulnerable segment of any community [5]. Their nutritional status is a sensitive indicator of community's health and nutrition [6]. In developing countries where around 230 million under-five children are believed to be chronically undernourished more than half of under-five children deaths are associated with malnutrition [7,8]. In Sub-Saharan Africa, 41% of under-five children are malnourished and deaths from malnutrition are increasing on daily basis in the region. Chronically being highest in the world and second highest

in sub-Saharan African region under nutrition is a historic public health problem of Ethiopian children [9-11].

Reducing malnutrition among children under the age of five remains a huge challenge in developing countries. Other than food insecurity, several factors contribute to malnutrition including inappropriate care, unavailability of safe and sufficient water and poor sanitary condition [3]. Most of Ethiopian population does not have access to basic sanitation facilities [12]. In addition to this, majority of the households do not have sufficient understanding of hygienic practices regarding food, water and personal hygiene. As a result, over 75 % of the health problems in Ethiopia are due to communicable diseases attributed to unsafe and inadequate water supply, and unhygienic waste management, particularly human excreta [13]. Though documents are discussing significance of sanitation problem and under nutrition separately evidences focused on the association between the issues lack in Ethiopia. Therefore, this study was designed to investigate the relationship between household sanitation practice and anthropometric status of pre-school children aged 24-59 months old in Hawassa Zuria Woreda, South Ethiopia.

## **Materials and Methods**

### ***Study Setting and Design***

Hawassa Zuria Woreda is one of the 21 Woredas in Sidama Zone, Southern Ethiopia. It is located 297 km south of Addis Ababa, the capital city of Ethiopia, and 22 km from Hawassa, the capital city of Southern Nations, Nationalities and Regional State (SNNPR). Sidama Zone is the largest Zone in SNNPR with area coverage of 305.2 km<sup>2</sup>. Total population of the woreda projected in 2013/2014 was 151, 016. According to the annual report of Hawassa Zuria Woreda Health Office, the estimated number of preschool children (aged 24-59 months) in the woreda was 16,016 in the year 2014. A community based cross sectional study design was conducted from April 21 to May 21, 2014.

### ***Sample Size and Sampling Procedure***

Single population proportion formula was used to calculate sample size. Prevalence of malnutrition was used to calculate the sample size. The prevalence of underweight, stunting and wasting were 28.3, 44.1 and 7.6%, respectively, reported by the 2011 EDHS for the region. The confidence level 95% ( $\alpha=0.05$ ) and margin of error ( $d=0.05$ ) were considered. The largest sample size was taken after sample size was calculated based on the three under nutrition indicators. A sample size of 597, calculated based on the prevalence of stunting, was found to be the largest and taken as a sample size for this study.

Out of 23 kebeles found in Hawassa Zuria Woreda four kebeles (lowest administrative units) were selected via simple random sampling. Households with pre-school children were identified with house to house census. Then the total sample size was proportionally allocated to each

of already selected four kebeles. Finally sample units were selected applying simple random sampling.

### ***Data Collection and Analysis***

Pre-tested interviewer administered structures questionnaire was used to collect data. Anthropometric measurements (weight and height) were taken for all children by the principal investigator with an assistant. Standard anthropometric measurement procedures were used as it recommended by world health organization (WHO, 1995). Entire data was checked for completeness, coded, entered in to SPSS version 20 for window and cleaned. Anthropometric data were exported from SPSS to WHO Anthro version 3.0.1 for window and standard Z-scores were generated for nutritional status. The nutritional status indicators, weight-for-Height (WHZ), Height-for-age (HAZ) and weight-for-age (WAZ) were compared with reference data from World Health Organization standards. Children below-2 standard deviations (-2SD) of the WHO median for WHZ, HAZ, and WAZ were considered wasted, stunted or underweight respectively. Descriptive statistics like frequencies, proportions/percentage, mean median and standard deviation were computed. Chi-square analysis was processed to determine association between household sanitation practice and nutritional status (stunting, underweight and wasting) of pre-school children. P-values less than 0.05 were considered as statistical significance level.

### ***Operational Definitions***

#### ***Good sanitation practice***

A household is considered to have good sanitation practices if latrine is situated in the yard within 20 m to the house, latrine is used by all members (age greater than 2 years old) of the family and no sign of open defecation, all the structures of the latrine are cleanable, with cover and not soiled with fecal material and functional hand washing facility (with water and soap/ash) is available near the latrine plus proper dumping of refuse, solid and liquid waste disposal.

#### ***Poor sanitation practice***

A household is considered as having poor sanitation practice if it does not satisfy any one or more of the requirements for 'good sanitation practices'.

#### ***Ethical Issue***

Ethical clearance and letter of permission were obtained from Hawassa University Institutional Review Board Office and Zonal Health Desk respectively. All the study participants were informed about the purpose of the study, their right to refuse and assured confidentiality. The informed consents were obtained from all participants prior to their participation in the study. Children who had severely malnourished were referred and linked to health posts for clinical management. Mothers and care takers were provided with bars of soap as a compensation for time spent.

**Result**

**Socio-Demographic and Economic Characteristics**

A total of 597 mothers (aged 18-46 years, mean (± SD) age 29.02 (± 5.47)) were interviewed about sanitation practices with a response rate of 100%. The majority of the study participants were Housewives, 546 (91.5%) in occupation, protestants, 549 (92%) in religion and can't read and write, 359 (60.1%) and Sidama in ethnicity, 568 (95.1%). Nearly two thirds (63.5%) of households had five or more household members with mean (± SD) family size of 5.3 (± 1.8). The majority, 591 (99%) of the pre-school children studied lived in male headed households (Table 1).

The majority of households 582 (98.2%) owned agricultural/farm land of different sizes. Five hundred fifty (92.1%) of the households in the study area had a monthly income of less than 500 ETB. Most of the households, 585 (98%), used water from improved sources such as piped water for drinking. Five hundred ten (85.4%) of the households had no access to improved sanitation facilities, with more than a half 321 (52.3%) practicing open field defecation and 285 (47.7%) using latrines. At the time of survey, only 202 (70.9%) of available latrines were

functional. Five hundred ninety seven preschool children were included (aged 24-59 month) in the study. The children had mean (± SD) age of 40.99 (± 11.16) months. Of the 597 children sampled, 263 (44.1%) were boys and 334 (55.9%) were girls.

**Anthropometric Status of Preschool Children**

Out of the 597 children, 318 (53.3%) were undernourished and 279 (46.7%) had normal anthropometric status. Overall, the prevalence of stunting, underweight and wasting were 41% (41%), 22.4% (22.4%) and 13.2% (13.2%), respectively (Figure 1).

**Household Sanitation Practices**

Out of the 597 households studied, 285 (47.7%) had toilet facilities. While, 312 (52.3%) had no toilet during the survey. Out of 285 (47.7%) toilet facilities, 202 (70.9%) were functional and located within 20 m radius to the house and 117 (41.1%) of the households had hand washing facilities near the toilets (Figure 2) (Table 2).

Regarding the solid waste management, 265 (44.4%) households used refuse disposal pit, 262 (43.9%) dumped inside farmlands and the remaining 70 (11.7%) burned the refuse. Similarly, 327 (54.8%) of the respondents disposed

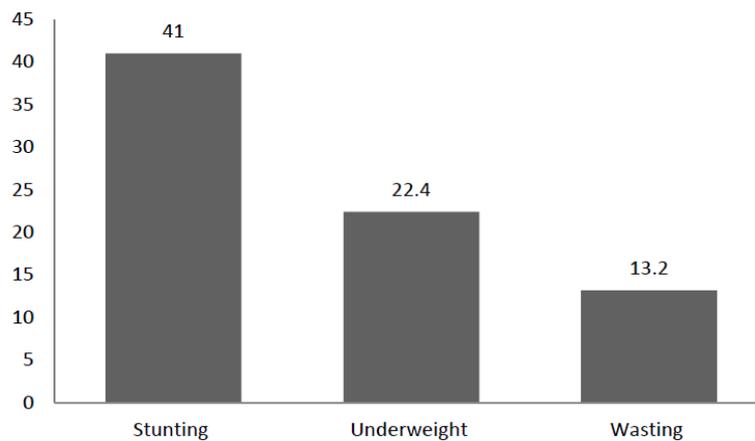


Figure 1. Prevalence of undernutrition among pre-school children in Hawassa Zuria Woreda, South Ethiopia,

**Households' Sanitation Practice**

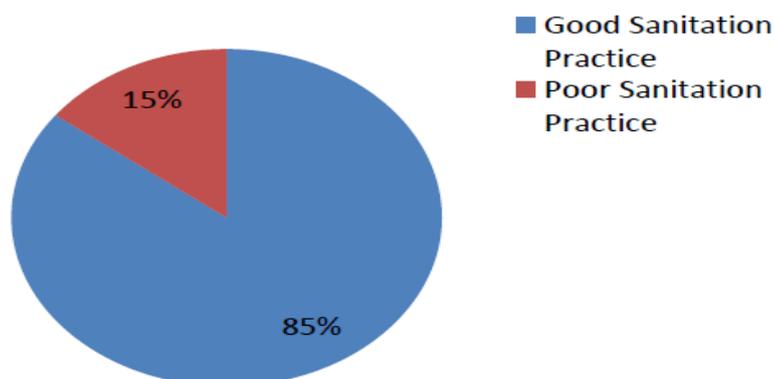


Figure 2. Percentage distribution of Households' sanitation practice in Hawassa Zuria Woreda, South Ethiopia, 2014

**Table 1.** Socio-demographic and economic characteristics of study population, Hawassa Zuria Woreda, Southern Ethiopia, 2014 (n=597)

Variables		Frequency	Percentage (%)
Maternal education	Can't Read and write	359	60.1
	Reading and Writing	8	1.3
	1-4 Grade	102	17.1
	5-8 Grade	107	17.9
	9-12 grade	20	3.4
	College	1	0.2
Marital status	Married	588	98.5
	Widowed	9	1.5
Head of household	Father	591	99.0
	Mother	6	1.0
Ethnicity of the respondent	Sidama	568	95.1
	Kembata	24	4.0
	Wolyita	5	0.8
Religion of the respondent	Protestant	549	92.0
	Muslim	32	5.4
	Catholic	16	2.7
Age of the caretaker in years	15-19	5	0.8
	20-24	103	17.3
	25-29	217	36.3
	30-34	144	24.1
	35-39	100	16.8
	40-44	20	3.4
	45-49	8	1.3
Household monthly income in ETB	<500	550	92.1
	501-1000	41	6.9
	>1000	6	1.0
Farmland ownership	Yes	582	97.5
	No	15	2.5
Decision on household earning is made by:	Both	239	40.0
	Father	343	57.5
	Mother	15	2.5

ETB: Ethiopian Birr

**Table 2.** Households' sanitation practice in Hawassa Zuria Woreda, Southern Ethiopia, 2014

Characteristic		N	Percentage (%)
Does household have toilet (n=597)	Yes	285	47.7
	No	312	52.3
Distance of toilet from living house(n=285)	<20 m	285	100
	>20 m	-	-
Toilet Condition (n=285)	Functional	202	70.9
	Not functional	83	29.2
Have a latrine covered (n=285)	Yes	18	6.30
	No	267	93.7
Hand washing facilities (n=285)	Yes	117	41.1
	No	168	58.9
Hand washing container contain water (n=117)	Yes	111	94.9
	No	6	5.10

**Table 3.** Association of pre-school children nutritional status and household sanitation practice in Hawassa Zuria Woreda, Southern Ethiopia, 2014 (n=597)

Anthropometric Status		Household Sanitation Practice		df	X <sup>2</sup>	P-value
		Good	Poor			
		N (%)	N (%)			
Wasting: Weight for Height	Normal	86 (16.6)	432 (83.4)	1	12.95	<0.001
	Wasted	1 (1.3)	78 (98.7)			
Stunting: Height for Age	Normal	60 (17)	292 (83)	1	4.21	0.04
	Stunted	27 (11)	218 (89)			
Underweight: Weight for Age	Normal	75 (16.2)	388 (83.8)	1	4.38	0.04
	Underweight	12 (9)	122 (91)			

liquid wastes into dug pits and 270 (45.2%) disposed inside the farmlands (Table 3).

#### **Relationship between Anthropometric Status of Preschool Children and Household Sanitation Practices**

Household sanitation practice was dichotomized to good and poor sanitary practice per the operational definition and chi-square analysis was done with nutritional status (Stunting, underweight and wasting) to determine existence of crude association. Weight for height ( $X^2=12.95$  and  $p\text{-value}<0.001$ ), Height for Age ( $X^2=4.21$ ,  $p\text{-value}=0.04$ ) and Weight for Age ( $X^2=4.38$  and  $p\text{-value}=0.04$ ) were associated with household sanitation practice.

#### **Discussion**

This study assessed the relationship between anthropometric statuses of pre-school children with household sanitation practice in Hawassa Zuria Woreda, Southern Ethiopia. It is the first study to examine such relationship between pre-school children anthropometric status and households' sanitation practices of respondents in the study area. The nutritional assessment using anthropometric indices revealed that 41%, 22.4% and 13.2% of studied children age 24-59 months were stunted, underweight and wasted, respectively. In Afghanistan the finding showed that prevalence of stunting, underweight and wasting were 52%, 25% and 14% respectively, [14]. The finding reported from Sudan showed that the prevalence of stunting, underweight and wasting were about 51%, 35% and 19%, respectively [15]. While in Tigray the prevalence of stunting, underweight and wasting were about 42.7%, 38.3% and 13.4%, respectively [16]. The study found that, the prevalence of stunting, underweight and wasting was lower as compared to studies conducted in Afghanistan, Sudan and Tigray. Moreover, the prevalence of stunting, underweight and wasting in the present study was lower compared with a community based cross-sectional study conducted in Hawassa, SNNPR showed that prevalence of stunting, underweight and wasting were 53.1%, 43.6%

and 28.2%, respectively [17]. Additionally, a community based cross-sectional study conducted in rural kebeles of Hidabu Abote District, North Shewa, Oromia Regional State showed that the prevalence of stunting, underweight and wasting were 47.6%, 30.9% and 16.8%, respectively [18]. This might be difference due to study period and study area.

Furthermore, this study's finding showed that the prevalence of stunting was higher as compared with cross-sectional study conducted in Gumbrit, which reported a prevalence of 34% stunting, in Nigeria, with 39.2% prevalence of stunting [19,20] and in Gambia, with 31.2% prevalence of stunting [21]. The observed high prevalence of stunting may indicate that poor nutrition and high morbidity due to infectious disease [22].

Generally, prevalence of malnutrition was lower in the current study area as compared to the EDHS (2014) [23], report of underweight. However, stunting (41%) and wasting (13.2%) of the preschool children in the study area were higher than that of the national (40% of stunting and 9% of wasting) but lower than regional (44% of stunting). There was very high prevalence of wasting in the study area alarming to increased risk of morbidity and death among children and it signifies acute nutritional problem due to illness related to poor environmental sanitation condition and/or recent food shortage. High chronic malnutrition also signifies children's failure to grow; impact on both physical and mental capacity of the affected children.

In agreement to studies done in India, Philippines and Ethiopia [24-26] result of the present study revealed significant association between household sanitation practice and anthropometric status of the pre-school children: stunting ( $X^2=4.21$ ,  $p=0.04$ ), underweight ( $X^2=4.38$ ,  $p=0.04$ ) and wasting ( $X^2=12.95$ ,  $p<0.001$ ). According to Zeitlin *et al.* [27], poor hygiene and sanitation are major contributors to diseases that lead to malnutrition. Everyone needs to properly utilize toilet and wash hands with soap, before and after meals, and

after using the toilet. If it is not done, chances of contacting diseases and the prevalence of malnutrition increase. In addition, according to Rao *et al.* [28], improper disposal of waste is one of the greatest threats to members of the community. In addition inadequate sanitation practice is a major cause of diseases worldwide according to WHO (2006) and improving sanitation is known to have a significant beneficial impact on health both in household and across community [5]. Ahmed *et al.* [29] also stated that to promote good health, personal hygiene, and proper food handling, household and environmental sanitation, and safe drinking water are essential. Proper hand washing before, after meals and after using toilet is important as it reported by Talukder *et al.* [30].

## Conclusion

The study was aimed at assessing association between household sanitation practice and preschool children nutritional status. Looking the issues together potentially helps in directing ways to improve nutritional status. Prevalence of underweight was lower than the national figure. Proportion of wasted and stunted pre-school children was higher than both the national and regional reports. Household sanitation practice and pre-school children's nutritional status (Stunting, Wasting and Underweight) were found associated. Sanitary practice is among one of the drivers of communities' health condition including nutritional status. It usually contributes to increments of undesired health outcomes especially magnitude of communicable diseases and undernourishment among children. Per the finding, stakeholders and mothers/caregivers better design strategies to improve household sanitation practice. Further studies can be done focusing cause effect relationship and examining effect of strategies to improve household sanitation practices.

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