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Research Article

Prevalence of Undernutrition and Associated Factors among Children, Aged 6 Months-59 Months from WASH Project and Non-WASH Project Implementing Kebeles of Tach Gayint Woreda North West, Ethiopia, 2019

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ABSTRACT

Background: Nutritional scantiness is a leading cause of wasting, stunting and being under weight in children all over the world. Stunting induces developmental delays, decreased cognitive function, an increased risk of chronic disease and a decrease in the national economy. This study deliberate to assess the prevalence and associated factors of under nutrition WASH project and non-WASH project implementation kebeles among children aged 6 months to 59 months in Tach Gayint district, North West Ethiopia.

Methods: A community based comparative cross sectional study was conducted amongst 1120 children aged 6 months-59 months randomly selected in Tach Gayint district from January 2019 to February 2019. The sample size was calculated using the double proportion formula. Data were entered into Epi Info version 7 and exported to SPSS version 20 for analysis. The association between dependents and independent variables was tested using multivariable logistic regression. The statistical association was declared with 95% confidence intervals at a p-value of less than 0.05.

Result: The prevalence of stunting, under weight and wasting was 49.4%, 17.0%, and 12.8% respectively. Diarrheal (AOR=8.01; 95% CI: 1.62-39.45), sex (AOR=1.80, 95% CI: 1.26-2.58) and unimproved water source (AOR=1.918, 95% CI: 1.389-2.64) were independent factors.

Conclusion: Under nutrition was a major public health issue among children aged 6 months to 59 months according to WHOs cut of points. Unimproved water sources, the sex of the child, and frequent diarrheal infection were associated factors for under nutrition. Therefore, strengthening the implementation of WASH activities to increase the coverage of improved water supply and prevention and control of diarrheal infection should be included in the prevention strategies of under nutrition.

Keywords: Under nutrition; Under weight; Wasting; Stunting; Wash project; Ethiopia

Abbreviations: ANRS: Amhara National Regional Statics; CSA: Central Statistics Agency; EDHS: Ethiopia Demographic and Health Survey; FH: Food for Hungry; HC: Health Centre; HEP: Health Extension Program; HEWs: Health Extension Workers; HHWT: Household Water Treatment; HP: Health Post; HSDP: Health Sector Development Programmed; MOH: Ministry of Health; SPSS: Statistical Package for Social Science; UNICEF: United Nation Children Education Fund; WHO: World Health Organization

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INTRODUCTION

Malnutrition is a metabolic disorder due to a lack of or excess provision of essential nutrients to the human being during the lifetime. Under nutrition is the consequence of an insufficient intake of energy, protein, and/or micronutrients, poor absorption or rapid loss of nutrients due to illness or increased energy expenditure. It encompasses low birth weight, stunting, wasting, under weight, and micronutrient deficiencies. Stunting is irreversible but preventable malnutrition disorder that develops due to inadequate nutrition or repeated infections or both. The provision of water, sanitation and hygiene facilities could save three million lives each year due to malnutrition death. Address safe and adequate quantity of water, hand washing facilities near latrines with detergents hand washing critical times to reduce malnutrition.

WASH interventions lead to a diarrhoea reduction, better absorption of food, and safe time and resources, which impact positively vulnerable people's livelihood.

This study aimed to assess the prevalence and associated factors of under nutrition amongst WASH project and non-WASH project implementing households [1].

Statement of the problem

Under nutrition caused by lack of water, sanitation, and poor hygiene practices are underlying causes and it contributes a lot to the immediate cause by causing WASH related diseases for children. Globally 815 million are stunted and 52 million are wasting under-five children are suffering chronically.

Diarrhea is a leading cause of death in children under-five which is largely caused by poor WASH that contributes significantly to under-nutrition.

Africa and South Asia are home to more than 80% of child deaths due to diarrhoea children under five years of age annually. In Africa, 226.7 million people are undernourished, with a prevalence of 20%, in the sub-in Saharan Africa, the greatest incidence of any region in the world. Eastern Africa accounts for 33.9% of the population estimated to be undernourished. However, the prevalence of undernourishment in sub-Saharan Africa has declined from 33.3% to 22.7% from 1990-1992 to 2016.

In Ethiopia, the prevalence of diarrhea ranges from 10% to 40% and each child on average suffers from five episodes of diarrhea per year. Poor sanitation accounts for 15% of total mortality among children under the age of five due diarrhoea in Ethiopia. According to EDHS 2016 report, the prevalence of stunted, wasted and under weight under-five children is 38.2%, 9.8%, and 28.4% respectively. In the Amhara region the magnitude of stunting, wasting and under weight in under five children were 46.3%, 9.8%, and 28.5% respectively.

Provision of sanitation facilities initiated in all households for Tach Gayint district with interventions of a health extension program and non-governmental organizations to increase access to safe drinking water and improved sanitation. WASH access was achieved by the campaign with fewer behavioral changes in the households and most of the effort of health extension workers mainly focuses on new construction with those who have less follow-up to the utilization of existing water, sanitation facilities and hygienic practices. However, non-governmental organizations mainly focus on both access and utilization of WASH practices. Therefore, this study was necessary to carry out the comparison of under nutrition among 6 months-59 months of children in the district [2].

Prevalence of under nutrition

Studies conducted in many countries showed that improved sanitation reduces growth deficit from 4% to 37% which lead to a reduction of weight deficit from 11% to 41% in the urban context and from 5% to 35% in rural context. A study conducted in Bangladesh, 22% reduced stunting prevalence on children when living in a healthy environment, compares to those living in contaminated environments. A study conducted among under-five children in Indonesia, the prevalence of stunting and severe stunting was 28.4% and 6.7%, respectively.

The prevalence of under nutrition among children in Tanzania classified as under weight was 46.0%, stunting was 41.9%, and wasting was 24.7%. About 33% were both under weight and stunted, and 12% had all three conditions. A study conducted in food-insecure areas of Ethiopia, WASH project implementation decreased the prevalence of stunting by 12.1%.

In Ethiopia, the study was conducted in Bahir Dar, and the prevalence of stunting, under weight and wasting were 42%, 22.1%, and 6.4%, respectively. In another study of Afar, the prevalence of acute malnutrition was 11.8%. In Blue Hora, the prevalence of stunting, under weight and wasting was 47.6%, 29.2% and 13.4% respectively. In Amhara region Dabat Woreda the prevalence of stunting and wasting among children aged 6 months-24 months were 58.1% and 17.0%, respectively.

Factors associated for under nutrition

Children who drink untreated water and use an unimproved latrine are stunted three times higher than children who drink safe water and use an improved latrine in the household [3].

Another studies conducted in Iran, poor water supply was identified as significant risk factor of childhood under nutrition. Children in the households that lacked all three types of facilities were found to have respectively 1.32, 1.24 and 1.43 times higher odds of suffering from diarrheal fever and cough. Whereas the study conducted in peru shows that 24 months old babies living in the worst WASH conditions have 54% more diarrhoea episodes than those living in the best WASH conditions, 24 months old babies living in the worst WASH conditions are 1 cm shorter than those living in the best WASH conditions.

A study conducted in Iran, children in households with more than four members were 1.35 times more likely to be under weight those less than four members. A study conducted in Indonesia, indicates that children who were not given age appropriate feeding were significantly more likely to be stunted than those who were fed appropriately (31.3% *vs.* 24.2%). The study shows that unimproved WASH conditions are an important contributor to ARIs and diarrheal morbidities among Nigerian children. Illness in the preceding two weeks, lack of latrine utilization, and lack of

hand washing practice were independent predictors for under weight. A study conducted in Tanzania that under-five children mother's education was associated with being under weight and stunting. Mothers with primary and secondary education were a low prevalence of stunting. In Ethiopia, Afar region the study conducted show that childhood acute malnutrition was associated with the presence of two and three children in each household, unprotected drinking water sources, absence of the latrine, hand washing without soap, childhood diarrheal disease, and child unvaccination. According to a study conducted in the Oromia region's bule hora district, male children were 2.5 times more likely to be under weight than females. Children whose mothers washed their hands with soap before food preparation and feeding were less likely to be malnourished. Hand washing with soap before food preparation and child feeding can prevent childhood acute malnutrition by 79%. A study conducted in Bahir Dar shows that children who had an illness in the preceding two weeks were 2.6 times more likely to develop stunting than children who were not ill.

MATERIALS AND METHODS

Study area

The study was conducted in the Amhara region, South Gondar zone, in the Tach Gayint district. It is located 200 km away from Bahir Dar, Amhara regional state, and 872 km from Addis Ababa capital city of Ethiopia. The current total population of Tach Gayint district was 120, 898 populations of these 60449 (50.0%) are men and 60449 (50.0%) are women, out of these 15557 are less than 5 years of age population. It has 6 health centers, 23 health posts, and 20 Kebeles.

Study design and period

A community based comparative cross-sectional study design was conducted from January 15/2019 to February 15/2019.

Source population

All 6 months-59 months of children who live in the Tach Gayint district were the source population.

Study population

The study population was all 6 months-59 months of children in the kebeles that were randomly selected in the sample.

Eligibility criteria

Inclusion criteria: All mothers/caregivers who live at least 6 months and their children.

Exclusion criteria: Women with clinically confirmed mental disorders who cannot speak well and children who have deformities were excluded from the study.

Sample size determination and sampling technique

The sample size was calculated by using double population proportion formula with the following assumptions: Under nutrition prevalence of 28.5% was used from the findings of a previous study in the Amhara region among children aged 6 months-59 months in, North Ethiopia among non-WASH project implementer Kebeles. Assuming that 10% reduction in under nutrition due to WASH project implementation, then the prevalence of under nutrition was 18.5%, 95% confidence level; 5% margin of error, 10% non-response rate, and a design effect [4].

$$\text{Sample size was } n = \frac{\left(\frac{Z_{\alpha}}{2}\right)^2 \times p1 \times q1 - p2 - p2)}{(d1 - d2)^2} * 2 = \frac{(1.96)^2 \times (0.2850.715 - 0.185 * 0.815))}{(0.02)^2} * 2 \quad n = 1010,$$

The final sample size was 1120 participants

Sampling procedure

Four WASH projects and four Non-WASH project implementation Kebeles were selected randomly and 1120 children aged 6 months to 59 months were selected with a multistage stratified sampling procedure from registration at health posts and community based nutrition registration. The Kebeles were assigned according to the calculated sample size of 1120. Study subjects were found by simple random sampling of families with children aged 6 months-59 months in each designated Kebeles. When there was more than one child in a household, a lottery system was used to choose one child [5].

Dependent and independent variables

Dependent variables: Under nutrition (under weight, wasting, and stunting).

Independent variables

Socio-economic and demographic factors: Age of children, mother's age, gender of children, number of children, marital status, religion, residence, educational status, parents' occupations, family size, monthly income.

WASH related factors: Drinking water sources, latrine utilization personal hygiene, solid and liquid waste management, HHWT, practice, unclean utensils, uncooked food, a critical time of hand washing,

Maternal health service: Complementary feeding, delivery services, diarrhoeal morbidity ANC service [6].

Operational definitions

Under nutrition: Insufficient intake of energy and nutrients to meet an individual's needs to maintain good health.

Stunting: Wasting: Under weight: Refer to a low height for age, weight for height, and weight for age, respectively. The child was classified as stunted, wasted, and under weight if his/her z score was less than 2 SD; otherwise, he/she was considered as well-nourished (≥ 2 Z score), based on the international median of WHO reference value.

WASH project implementer: Kebeles those were supported by nongovernmental organizations in related WASH.

Non-WASH project implementer: Kebeles were not supported by non-governmental organizations in related wash.

Improved sanitation: Sanitation facilities are those that hygienically separate human excreta from human contact and include flush or pour-flush toilets to piped sewer systems, septic tanks or pits, ventilated improved pit latrines, pit latrines with slab, and composting toilets.

Unimproved sanitation: Sanitation facilities that are not separate human excreta from human contact to fulfill no public or shared latrines, pit latrines without a slab, bucket latrines, hanging latrines, and open defecation [7].

Data collection procedure

Data were collected by face to face interviews using questionnaires. Health extension workers measured heights and weights.

Quality control

To assure data quality, the research questionnaires were written in English, translated into the local language, and then back into English. Supervisor and health extension workers were recruited. They received two days of training. The principal investigator and supervisors evaluated the gathered data for completeness and relevance every day after data collection and provided feedback to data collectors for the next day. Each child's height was measured using either a vertical or horizontal measuring board, with the heels, buttocks, shoulders, and back of the head all contacting the board. The head was held erect freely. It was a one-to-ten scale [8].

Data processing and analysis

The collected data were checked for completeness and consistency before being coded, entered, cleaned, and edited in Epi-info version. After data entry into Epi-info version-7, it was exported to SPSS 20 for statistical analysis. Descriptive statistics were computed using standard statistical parameters such as percentages, which were used to present categorical data. A mean and standard deviation were used for normally distributed continuous data.

WHO plus Anthro and bi-variable logistic regression analysis were used to identify independent factors, and variables that P-value<0.2 were fitted to multivariable logistic regression analysis [9].

RESULTS

Socio-demographic characteristics

One thousand one hundred children aged 6 months-59 months with their caregivers were included in the study, making a response rate of 98.2%. Almost all 525 (98.1%) mothers/caregivers were married from the non-WASH project implementing group and 494 (89.8%) from the Wash project implementing Kebeles. Most of the participants were orthodox, which is 523 (94.7%), and 547 (99.5%) non-WASH project and WASH project implementers Kebeles respectively. All of the participants 547 (99.5%) from WASH project implementation and 500 (100) non-WASH implementing Kebeles were rural residents. Almost all of the respondents' mothers were farmers which are 538 (96.5%) and 542 (98.6%) from non-WASH and WASH projects implementing Kebeles of the participant respectively (Table 1) [10].

Table 1: Frequency distribution of sociodemographic characteristics of under nutrition among the age of 6 months-59 months, Tach Gayint Northwest Ethiopia 2019 (n=1100).

Variables		WASH			
		Non-WASH implementation		WASH implementation	
	Variables	Frequency	%	Frequency	%
Marital status	Single	14	2.5	52	9.5
	Married and others 536		97	498	90.5
Family size	<4	302	54.7	311	56.5
	>4	248	44.9	239	43.5
Educational status of mothers	Unable to read and write	429	77.7	290	52.7
	Able to read and write	99	17.9	225	40.9

	Primary and above secondary cycle	22	4	35	6.4
Sex of child	Male	302	54.9	275	50
	Female	248	45.1	275	50
Age of child in months	6 months-11 months	178	32.4	123	22.4
	12 months-24 months	171	31.1	172	31.3
	>24 months	201	36.5	255	46.4

Nutritional and maternal factors

Children's mothers used iron and folic acid supplementation during their last pregnancy, with 427 (77.6%) and 519 (94.4%) from the non-WASH project implementing and WASH project implementing groups of clients, respectively. Among the participants of mothers who were a birth interval of the last consecutive child were more than 48 months which is 214 (38.9%) and 275 (50%) of respondents were non-intervention and intervention group respectively. Among the total participants of the WASH project implementing group, the time of initiation of the additional meal at 6 months was 538 (97.8%) whereas in none WASH project-implementing a group of study participants the time of initiation of the additional meal was 389 (70.7%) with the age of between 10 months-12 months. About 536 (97.5%) of WASH project-implementing study participants and 550 (100%) of non-WASH project-implementing study participants received vitamin A supplements. Almost all children from both groups were immunized with their eligible (98.8%) (Table 2) [11].

Table 2: Frequency distribution of nutritional and maternal factors for children with the age of 6 months-59 months with Tach Gayint Northwest Ethiopia 2019 (n=1100).

Variables		Non-WASH project implementing		WASH project implementing	
	Categorised	Frequency	%	Frequency	%
ANC follow up	Yes	478	86.9	543	98.7
	No	72	13.1	7	1.3
Additional meals during pregnancy	Yes	281	51.1	528	96
	No	269	48.9	22	4
Iron supplementation during pregnancy	Yes	427	77.6	519	94.4
	No	123	22.4	31	5.6
The birth interval from the first child	Less than 24 months	14	2.5	57	10.4
	48+ months	214	38.9	275	50
	24 months-47 months	265	48.2	114	20.7
	First months	57	10.4	104	18.9
Initiation of breastfeeding	<30 minutes	144	26.2	269	48.9
	30 minutes-60 minutes	340	61.8	272	49.5

	>60 minutes	66	12	9	1.6
Complementary feeding practice	Yes	386	70.2	535	97.3
	No	164	29.8	15	2.7
De-worming	Yes	185	92.5	253	96.6
	No	15	7.5	9	3.4

Hygiene and sanitation factors

The total non-WASH project implementation group of participants had 408 (74%) unsafe child feces disposal systems. However, the 468 (85%) households disposed of safely child faces the WASH project implementation group. The study participants used latrines in 496 (90.2%) of the WASH project implementation group and 256 (46.5%) of the non-WASH implementation group. Availability of water nearby from the total latrine usage was 61 (24.4%) of the non-WASH project implementation group and 274 (49.8%) WASH implementing group (Table 3) [12].

Table 3: Frequency distribution of WASH facility among children 6 months-59 months with Tach Gayint Northwest Ethiopia 2019 (n=1100).

Indicators		Non-WASH implementing group		WASH implementing group	
	Variables	Frequency	%	Frequency	%
Safe child faces disposal	Yes	142	25.8	468	85.1
	No	408	74.2	82	14.9
Availability of latrine	Yes	256	46.5	496	90.2
	No	294	53.5	54	9.8
Water source nearby toilet	Yes	61	24.4	274	49.8
	No	189	75.6	227	41.3
Hand washing after defecation	Yes	43	81.1	239	43.5
	No	10	18.9	18	3.3
Hand washing before eating	Yes	505	91.5	362	65.8
	No	45	8.2	188	34.2
Hand washing before preparation of food	Yes	50	9.1	117	21.3
	No	500	90.6	433	78.7
Hand washing before child feeding	Yes	111	20.5	388	70.5
	No	439	79.5	162	29.5
Hand washing after child defecation	Yes	387	70.1	341	62
	No	165	29.9	209	38

Hand washing after waste cleansing	Yes	29	5.5	108	19.6
	No	521	94.5	442	80.4
Source of water	Improved	277	50.4	534	97.1
	Unimproved	273	49.6	16	2.9
Queening time	<30 min	58	10.5	14	2.5
	30 min-60 min	483	87.8	532	96.7
	60 min-90 min	9	1.6	4	0.7
HHWT	Yes	18	3.3	283	51.5
	No	532	96.7	267	48.5
WASH index in a week	One time	16	2.9	91	16.5
	2 times	76	13.8	40	7.3
	3 times	143	26	248	45.1
	>=4 times	315	57.3	171	31.1
Child sickness within the previous week	Yes	58	10.5	57	10.4
	No	492	89.5	505	89
Type of disease	Diarrheal	9	15.5	9	15.8
	Pneumonia	49	85.5	48	84.2
Episode of diarrheal per week	<2 time	27	65.9	21	53.9
	>=2 times	12	29.3	18	46.1

Prevalence of under nutrition

Stunting was found in 49.4% of the population, with 39.9% being severe and 9.5% being mild. WASH project implementation sites accounted for 47.8% of the total, while non-WASH implementation sites accounted for 45.6%. Males accounted for 50.1% of children with stunting, while females accounted for 48.8%. There were 47.7% males and 43.1%females among the participants at the non-WASH project-implementing site. Among the total study participants of children in the study area, WASH project implementing and non-WASH project implementing kebeles children with under weight, both chronic and acute under weight with WAZ scores below-2 standard deviation 17% were affected by under weight. WASH project implementation sites accounted for 10.2% of the total, whereas non-WASH project implementation sites accounted for 24% of the overall under weight youngsters, 6.1% were severely under weight and 10.9% were moderately under weight. 22.2% were male WASH project implementation participants and 11.3% were female. In the absence of WASH project implementation, 29.5% of participants were males and 17.3% were females.

From the total participant of the child in the comparative study on WASH project implementing and non-WASH project implementing kebeles, the prevalence of acute under nutrition or wasting was 12.8%. Among these 9.6%were WASH project implementing and 18.4% were non-WASH project implementing the site. From this, 7.8% of them were severe wasting with a WHZ score below 3 standard deviations and 5% of them were moderate acute under nutrition. From age category of males was 15.7% and females was 9.7%. From the non-WASH project implementing the site, 21.1% were males and 15.1% were females [13].

Factor associated with under nutrition

According to this study, mothers of children who were unable to read and write were nearly twice as likely to have under weight children as mothers who attended primary and secondary school. Fathers of children who could not read or write were seven times more likely to cause under weight. Those who were unable to read and write were six times more likely to be under weight than those who completed elementary and secondary school AOR=6.88; 795% CI: (1.26-37.61), as well as the sex result of the child having a weight difference with the same age status as males

and females. This may be in childhood age female was growing faster than those males and it is mainly a natural difference. Supplementing mothers during breastfeeding is one way to prevent childhood under weight. This prevents both being under weight and undernourished. The prevalence in this survey is comparable to other studies such as the EDHS. This may be associated with the mothers were not get adequate nutrition supplementation during their breastfeeding time and this caused the mother who got inadequate nutrition supplementation to be more likely to cause under weight than the mother who got adequate nutrition supplementation during her last breast milk AOR=0.002, 95% CI, (0.63-0.038). In this study, the woman/caregiver who get untreated water at household level were almost five times more likely to be under weight than the caregiver who uses treated water at household AOR=4.83, 95% CI (1.09-21.28) (Table 4) [14].

Table 4: Bivariate and multivariable logistic regression analysis between predictor variables and the prevalence of under weight children among the age of 6 months-59 months Tach Gayint Northwest Ethiopia 2019 (n=1100).

Variables	Categories	Under weight		COR	AOR
		Yes	No		
Educational status of mother	Unable to read and write	163 (14.8%)	556	1	
	Able to read and write	42 (3.8%)	282	1.96 (1.36,2.84)*	1.93 (0.193 (19236))
	First and secondary school	6 (0.5%)	51	1.857 (0.77,4.470)	-
Educational status of husband	Unable to read and write	151 (13.7%)	467	1	1
	Able to read and write	54	366	1.74 (.66,4.61)*	6.88 (1.26-37.61)**
	Primary and secondary cycle	5	44	52.75 (0.000,0.000)*	9.24 (0.57-149.75)**
Sex of child	Male	137	440	1.8 (1.38, 2.58)*	4.46 (0.97-20.50)
	Female	74	449	1	
Age	6 months-11 months	87	214	1	
	12 months-24 months	37	306	3.36 (2.20, 5.13)*	5.63 (0.97, 32.69)
	>24 months	87	369	1.72 (1.22, 2.42)	3.75 (0.77, 18.101)
Additional meal during pregnancy	Yes	127	682	0.46 (.33,.63)*	10.63 (0.59,190.67)
	No	84	207	1	1
Additional meals during breast	Yes	134	714	0.42 (0.31,0.59)*	0.002 (0.63,0.03)**
	No	77	175	1	
Child faecal disposal	Yes	75	535	0.36 (0.26,0.49)*	-
	No	136	354	1	
Availability of latrine with the yard	Yes	116	636	0.48 (0.35, 0.66)	-
	No	95	253	1	
Water source nearby latrine	Yes	39	296	1	
	No	79	337	1.78 (1.17,2.69)*	-

Wash hands after defecation	No	185	682	2.160 (1.392,3.35)*	-
	Yes	26	207	1	
Hand washing before preparation of food	No	21	146	0.562 (0.35, 0.91)	2.06 (0.21,20.08
	Yes	190	743	1	
Hand washing after waste cleaning	No	14	123	1	
	Yes	197	766	0.44 (0.25, 0.78)*	-
Water sources for drinking	Improved	141	670	0.65 (0.47, 0.91)*	-
	Unimproved	70	219	1	
Treat water at household	Yes	29	272	1	
	No	182	617	2.76 (1.82,4.20)*	4.83 (1.09,21.28**
Implementation kebeles	Implementation	68	482	1	
	non implementation	143	407	2.49 (1.81,3.42)*	-
Type of disease	Diarrheal	6	11	3.19 (1.01,10.04)*	1.04 (18.15,4.34**
	Pneumonia and others	15	88	1	1

AOR significance 95% CI **

COR significance 95% CI *

Stunting

This result was associated with nutritional supplementation during pregnancy, child age, care giver/mother handwashing behaviour, availability of latrine in the yard, and supply of drinking water as significant factors for the high degree of stunting in this research. Mothers who utilize water at the household level with an unimproved water source were nearly twice as likely to stunt as those who used improved water sources for those households (AOR=1.91, 95% CI, 1.40-2.64. The child's age was the most significant factor for stunting in this non-WASH project implementing kebeles. This may be due to the child becoming unable to obtain nutrition supplements and the mother's breast alone is insufficient for the child to survive. Stunting was seven times more frequent in children aged 12 months-24 months than in children aged 6 months-11 months (AOR=6.71, 95% CI, (3.05-14.77). Also, as the child's age increases, the height-to-age percentage decreases, since children younger than 24 months are more prone to stunt than children aged 12 months-24 months. This shows six times more likely to stunt (AOR=6.44, 95% CI, (3.11-13.31)) (Table 5).

Table 5: Bivariate and multivariable logistic regression analysis between predictor variables and the prevalence of stunting children among the age of 6 months-59 months Tach Gayint Northwest Ethiopia 2019 (n=1100).

Indicators	Variables	Stunting		COR	AOR	P- Value
		Yes	No			
Sex of child	Male	254	323	1		
	female	237	286	7.24 (.570,.921)*	-	0.008
Age of child	6 months-11 months	174	127	2.03 (1.48,2.78)	6.72 (3.05,14.77)**	0
	12 months-24 months	138	205	2.12 (1.57,2.85)*	6.44 (3.11,13.31)**	0
	>24 months	179	277	1	1	

Iron foliate supplement	Yes	434	512	1		
	No	57	97	1.44 (1.01,2.05)*	-	0.041
Availability of latrine	Yes	315	437	0.70 (0.55,0.91)*	0.59 (0.43,0.82)*	0.047
	No	176	172			
WASH facility near by the latrine	Yes	111	182	0.68 (0.52,0.90)*	0.65 (0.46,0.92)**	0.007
	No	380	427	1		
Hand washing before meal	No	144	216	0.75 (0.58,0.97)*		0.031
	Yes	347	393	1		
Before preparation of food	No	40	127	0.33 (0.23,0.48)*	0.48 (0.31,0.75)**	0
	Yes	451	482			
After was cleaning	Yes	460	503	0.32 (0.21,0.48)*	0.54 (0.33,0.89)**	0
	No	31	106	1		
Water sources	Improved	379	432	1		
	Unimproved	112	177	1.38 (1.54,1.82)*	0.92 (1.38,2.64)**	0
Water treatment at HH	Yes	149	152	047 (0.76-0.99)*		0.047
	No	342	457	1.31 (1.00,171)*	1.92 (1.39,2.65)**	0

AOR significance 95% CI **

COR significance 95% CI *

Wasting

The age of the child, the mother's hand washing practice, WASH program implementation, water source, and the type of disease were factors of a high prevalence of wasting. Diarrhoea was more likely to cause wasting than the rest of chronic infections like scabies. A child ill with diarrhoea was 8 times more likely to become wasting than non-infected children (AOR=8.01, 95% CI, 1.63-39.45). The male child was almost two times as wasted than the female child (AOR=1.80, 95% CI: 1.26,2.58), 12-24 months children were almost two times wasted than 6 months-11 months children (AOR=1.8795% CI: 1.18,2.97 (Table 6).

Table 6: Bivariate and multivariable logistic regression analysis between predictor variables and the prevalence of wasting children among the age of 6 months-59 months Tach Gayint Northwest Ethiopia 2019 (n=1100).

Variables	Categorical variables	Wasting		COR	AOR	P- value
		Yes	No			
Sex of child	Male	100	477	1.70 (1.20,2.41)*	1.80 (1.26,2.58)**	0
	Female	57	463	1	1	
Age of child	6 months-11 months	60	244	1	1	
	12 months-24 months	37	303	1.91 (1.22,2.99)*	1.87 (1.18,2.97)**	0.004
	>24 months	63	393			

Pregnancy additional meal	Yes	102	706	0.61 (0.43,0.88)*		0.008
	No	55	234	-	-	-
During breasting two additional meals	Yes	106	741	0.56 (0.38,0.80)*		0.002
	No	51	199	1		
Water source nearby latrine	Yes	42	293	0.45 (0.32,0.64)*		0
	No	63	352			
Water sources	Improved	93	717	0.36 (0.22,0.58)*		0
	Unimproved	64	223			
Type of disease	Diarrhoea	5	12	3.58 (1.05,12.28)*	8.01 (1.63,39.45)**	0.04
	Pneumonia	12	91	1	1	
Implementation	Implementation	51	498	0.43 (0.30,0.61)*		0
	Non implementation	106	442	1		

AOR significance 95% CI **

COR significance 95% CI *

DISCUSSION

Under nutrition among children under the age of five in Ethiopia public health problem that affects education health and the domestic growth of the economy. This study tried to assess the prevalence and associated factors of under nutrition among children aged 6 months-59 months in the Tach Gayint district. The prevalence of stunting among 6 months-59 months old children was 47.8% and 45.6% from those who implemented the WASH project and those who did not. This finding is almost similar to Nigeria, Afar (11.8%, and Blue Hora 47.6%. However, it is lower than Dabat (58.1% Haramaya (52.2%, and India. This is due to the fact Safety net food and WASH program was implemented in Dabat districts. Mothers with less than 18.5 BMI contributing under nutrition in Haramaya.

Under weight was found to be 10.2% of those WASH implemented Kebeles and 24% of those who did not. This study found a lower than Blue hora (29.2%). This difference may be WASH project implementing and socio demographic difference of the study area. The prevalence of wasting was 9.6% and 18.4% in both WASH project and non-WASH project implementing kebeles, respectively. This research was greater than Bahir dar (6.4%). Children diseased with frequent diarrhoea were three times more likely to become under weight than healthy children. This factor also similar to Haramaya district, Eastern Ethiopia This study found that diarrhoea throughout childhood relates to malnutrition by reducing weight and height gain over time. The study assured that diarrhoea linked to poor environmental hygiene and sanitation, resulting in under weight in the study area. Recurrent weight loss linked to multiple episodes of diarrhoea can lead to weight lost [15].

The odds of having under weight child among mothers/care-givers who did not store and treat water drinking at home were five times higher than those who used safe household water storage and treatment. This result was consistent Afar and Iran. This could be because safe and quality drinking water at household is a basic factor in achieving a healthy weight increase that includes enough nutritional intake and avoidance of waterborne infection in the growing children. When compared to women who took iron foliate, those who did not were more likely to have stunted children. This finding similar with Pakistan the odds of stunting were more in children if mothers did not take iron supplements during pregnancy. This could be because the woman would not receive nutrition education from health care experts about optimal supplementary feeding during pregnancy that they can apply to the growing baby during antenatal care follow-up [16].

CONCLUSION

This study assures under weight, wasting and stunting were high among children aged 6 months-59 months in Tach Gayint district with both non-WASH project implementer and WASH project implementer kebeles according to WHO cut point. Under nutrition is a major public health problem in the study area. Gender, age, unimproved source of water, diarrheal disease, lack of iron folate during pregnancy, and poor hand washing practices at critical times are major contributing factor. Integrating WASH program and nutrition intervention to reduce malnutrition in the districts supplementation of iron folate mandatory during antenatal follow health. Quasi-experimental study design will be conducted.

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AUTHORS' CONTRIBUTIONS

WT conceived and developed the study, prepare the research proposal, designed the questionnaire and write report. SE AS, ET were involved in data analysis, writing and editing the manuscript. The author (s) read and approved the final manuscript.

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AVAILABILITY OF DATA AND MATERIALS

The data could be accessed based on a reasonable request to the corresponding author.

COMPETING INTEREST

No competing interest.

ETHICS APPROVAL AND CONSENT

All methods were performed in accordance with the declaration Helsinki ethical standards. Ethical approval was obtained from wollo university ethical review committee. Permission letter was obtained from the South Gondar zonal health department and the Tach Gaint district health office. Informed verbal consent was safeguarded from study participants. There was no, potential risks and benefits of the study.

CONSENT FOR PUBLICATION

Not Applicable.

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