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Magnitude and Factors Associated With Acute Malnutrition among 6-59 Months Old Age Children Dire Dawa and Erer Towns of Eastern Ethiopia, 2021

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Received Date: 16-09-2021, **Accepted Date:** 09-10-2021, **Published Date:** 16-10-2021

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Abstract

Background: Children are most vulnerable to malnutrition in developing countries because of low dietary intake, lack of appropriate care and inequitable distribution of food within the household. Both moderate and severe acute malnutrition have serious consequences including increased morbidity and mortality.

Methods: Community-based cross-sectional study design was used to assess 681 children. Validated questionnaires from previous study were used to collect the data. Data were entered in to Epi-data version 3.02 and were exported to SPSS version 21.0. To identify significant factors associated with acute malnutrition, binary regression analysis was performed and a p-value <0.05 at a 95% confidence interval was considered statistically significant.

Results: The overall prevalence of general acute malnutrition among 6-59 months old age children in Dire Dawa and Erer towns was 27.3%(95% CI: 23.8-30.4). However, there were proportion differences between two towns. The prevalence of General acute malnutrition (38.3%) at Erer town was significant than Dire Dawa town (22.9%) with ($p \leq 0.001$). Age of the child, family planning use as means of birth spacing in Dire Dawa and Low dietary diversity

Asfaw TD | Volume 2, Issue 3 (2021) | JCMR-2(3)-040 | Research Article

Citation: Asfaw TD, et al. Magnitude and Factors Associated With Acute Malnutrition among 6-59 Months Old Age Children Dire Dawa and Erer Towns of Eastern Ethiopia, 2021. Jour Clin Med Res. 2021;2(3) :1-23.

DOI: <http://dx.doi.org/10.46889/JCMR.2021.2303>

practice and household food insecurity in Erer were factors associated with general acute malnutrition.

Conclusion: There were population proportion differences between Dire Dawa and Erer towns. Both moderate acute malnutrition and severe acute malnutrition indicators are in alarming range. Different contributing factors were associated with nutritional status of 6-59 months old children in Dire Dawa and Erer towns. Promote nutritional counselling, family planning methods and waste management is important.

Keywords

Severe Acute Malnutrition; Body Mass Index; Moderate Acute Malnutrition; Population

Abbreviation and Acronyms

AOR: Adjusted Odds Ratio; BMI: Body Mass Index; CMHS: College of Medicine and Health Sciences; CI: Confidence Interval; COR: Cumulative Odd Ratio; DD: Dietary Diversity; DDS: Dietary Diversity Score; DRHB: Dire Dawa Regional Health Beauró; EDHS: Ethiopia Demographic Health Survey; GDP: Gross Development Product; HH: Household; HEW: Health Extension Worker; MAM: Moderate Acute Malnutrition; OR: Odd Ratio; RAD: Research Affairs Directorate; SAM: Severe Acute Malnutrition; SDG: Sustainable Development Goal; UNICEF: United Nation International Child Emergency Fund; US\$: United State Dollar

Introduction

Malnutrition can be defined as both under nutrition and excess nutritional intake. Most of the time diet and disease are related to life style, living environment conditions, access to basic needs for the existing population and health care [1].

Micronutrient deficiency and nutrition problems in early life are not only devastating; it's also very difficult to overcome this problem. The annual economic losses from low weight, poor growth and vitamin and mineral deficiencies account for 11% of the GDP in Asia and Africa. As nutrition is both basic and a maker for future sustainable development, the common effort against malnutrition in all forms requires working together with multiple stakeholders to bring visible changes to existing problems [2,3].

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Recent assessments of progress towards the World Health Organization (WHO) global nutrition targets 2025 indicate that current rates of progress may not be sufficient to meet the established goals, although there is considerable variability in progress across regions and towards targets. It is expected that, approximately 70% of the world's population will live in urban areas by the end of 2050. At the same time, nutritional problems continue to exert a heavy toll globally. In 2018, almost 200 million children under 5 suffered from malnutrition while at least 340 million suffered from hidden hunger [4,5].

Food transportation, production and storage systems will change in the future because of many factors such as population growth, globalization, pandemics, droughts, weather changes, political crises and locust invasion. The learning journey on changing food systems test several of these drivers and one very important driver of change is urbanization, particularly in developing countries will be considered [6].

More specifically, while part of the urban population faces food insecurity, other sub-populations are hypothesized to suffer from dietary excess and obesity as a consequence of more sedentary lifestyles and the transition towards diets high in sugar, fats and refined foods, but low in fiber. However, whether and how these patterns are linked to urbanization remains poorly understood. These changes occur at different rates in different regions and populations, but the most rapid changes occur in the developing world [7].

The Sustainable Development Goal (SDG) has set a plan, by 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children <5 years of age [8]. However, both moderate and severe acute malnutrition have serious consequences, contributing to increased morbidity and mortality, impaired intellectual development, sub-optimal adult work capacity and increased risk of disease in adulthood. Indeed, Moderate Acute Malnutrition (MAM) and Severe Acute Malnutrition (SAM) together account for approximately 11.5% of the total deaths of children with less than 5 preventable deaths each year [9].

In Ethiopia, results from the 2019 EMDHS show slow progress, 37% of children under 5 stunted and 12% are severely stunted. Overall, 7% of children in Ethiopia are wasted and 21% of all children are underweight and 6% are severely underweight [10].

The efforts made to improve the collection and analysis of diet data must continue and the shocking gap in micronutrient data is a matter of urgency. However, data collection and analysis are not sufficient: all stakeholders need the capacity to use it to make evidence-based decisions [11]. Therefore, the findings showed that, the magnitude of the problem and the cause of the problem were different for different areas and this study aimed to assess the magnitude and factors associated with acute malnutrition among 6-59 months old age children Dire Dawa and Erer towns of eastern Ethiopia, 2021.

Materials and Methods

Study Area

Dire Dawa, which is located 515 km east of Addis Ababa, 55 km away from Harar and 313 km from Port Djibouti. Dire Dawa town administration the northern, east and west regions is bordered by the Shinile zone of the Ethiopia Somali regional state and in the south and south east by the eastern hararge zone of the Oromia national regional state. Based on the 2007(1999 E.C) national census, Dire Dawa town administration has 9 urban kebeles with a total urban population of 297,361 people. The Dire Dawa temperature is desert and most food groups are imported to the town from different parts of the country, mostly from the Oromia and Somalia regional states throughout the year. Major economic sources for the population were trade and private small business.

Erer town is located in Sitti, Somalia region and away 70 km from Dire Dawa. Erer is bordered to the north by Aydora, south Karamile, west Gota Bike and east by Wurso. Erere town has 4 kebeles and has one health center with 6 health posts: Aydora, Dimtu, Kenteras, Gode, Billa, Fetuli and Germam health posts. Erer town has 3843 household with 25367 total populations. The temperature of Erer town is Semi-arid. Abundant fruits and vegetables are produced around and in town. Most of the products are exported to local towns and some products are exported to Djibouti. Major economic sources for Erer town were agriculture. The study was conducted in towns of Dire Dawa and Erer.

Study Design

Community Based cross-sectional study design was implemented to assess the prevalence of general acute malnutrition and associated factors among 6-59 old age children.

Population

Source population

All 6-59 month old age children lived in Dire Dawa and Erer towns, eastern Ethiopia.

Study Population

All selected 6-59 month old age children living in selected households in each selected kebele.

Inclusion and Exclusion Criteria

Inclusion criteria

All selected 6-59 month old age children in each selected household were included in the study.

Exclusion Criteria

Children who were sick and unable to undertake Middle Arm Upper Circumference (MAUC) measurements during data collection days and those who lived for less than 6 months in the study areas.

Sample Size Determination and Sampling technique

Sample Size Determination 1st Objective

The sample size was determined using a single population proportion formula and proportions obtained from previous studies in Ethiopia.

According to different studies conducted in Ethiopia, the Prevalence of General Acute Malnutrition (GAM) was 11.8 % by considering a 95% Confidence Interval (CI) and 5% marginal error and calculated as follows [12]

The level of significance was 5% ($\alpha = 0.05$), $Z_{\alpha/2} = 1.96$ and the absolute precision or margin of error was 5% ($d = 0.05$).

$$n = \frac{(Z_{\alpha/2})^2 \times p(1-p)}{d^2}$$

Where n=sample size,

$$n = \frac{(1.96)^2 \times 0.118(1-0.118)}{(0.05)^2} = 200$$

By adding 10% of non-respondents rate: 20

The total sample size of this study is 220.

Sample Size for 2nd Objective

The sample Size was calculated for factors associated with general acute malnutrition that were significantly associated with outcome variables from previous studies with the following assumptions, two sided confidence level of 95%, power of 80% using Epi Info 7 Stat Calc. computer software program for the second objective (Table 1).

Asfaw TD | Volume 2, Issue 3 (2021) | JCMR-2(3)-040 | Research Article

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Factors associated with Nutritional Status	Outcome		Sample		References
	Exposed %	Non Exposed %	AOR		
Sex of the child	37.8	20.8	2.5	198	26
Paternal Education	35.5	25.3	6.9	540	26
Child age	35.1	24.3	1.33	478	25
Water Adequacy	30.7	20.6	0.81	630	25
Meal frequency	51.6	18.7	0.21	62	25
Availability of latrine	41.9	26	1.2	242	26
Diarrheal Disease in the last 2 weeks	52.3	21.4	3.9	72	26
Attend ANC	60.7	42.5	1.3	206	26

Table 1: Sample size determination for different factors associated with general acute malnutrition in Dire Dawa and Erere towns, Ethiopia, 2021.

By adding 10% contingency, the largest sample size was 693 and which was taken as the final sample size for this study.

Sampling Technique and Procedure

Simple random sampling was used to select each household from the selected kebele. In each selected household who live 6-59 month old children, the household head or child care giver was invited to respond to the questionnaires.

Simple random sampling techniques was implemented from the sampling frame as follow (Fig. 1)

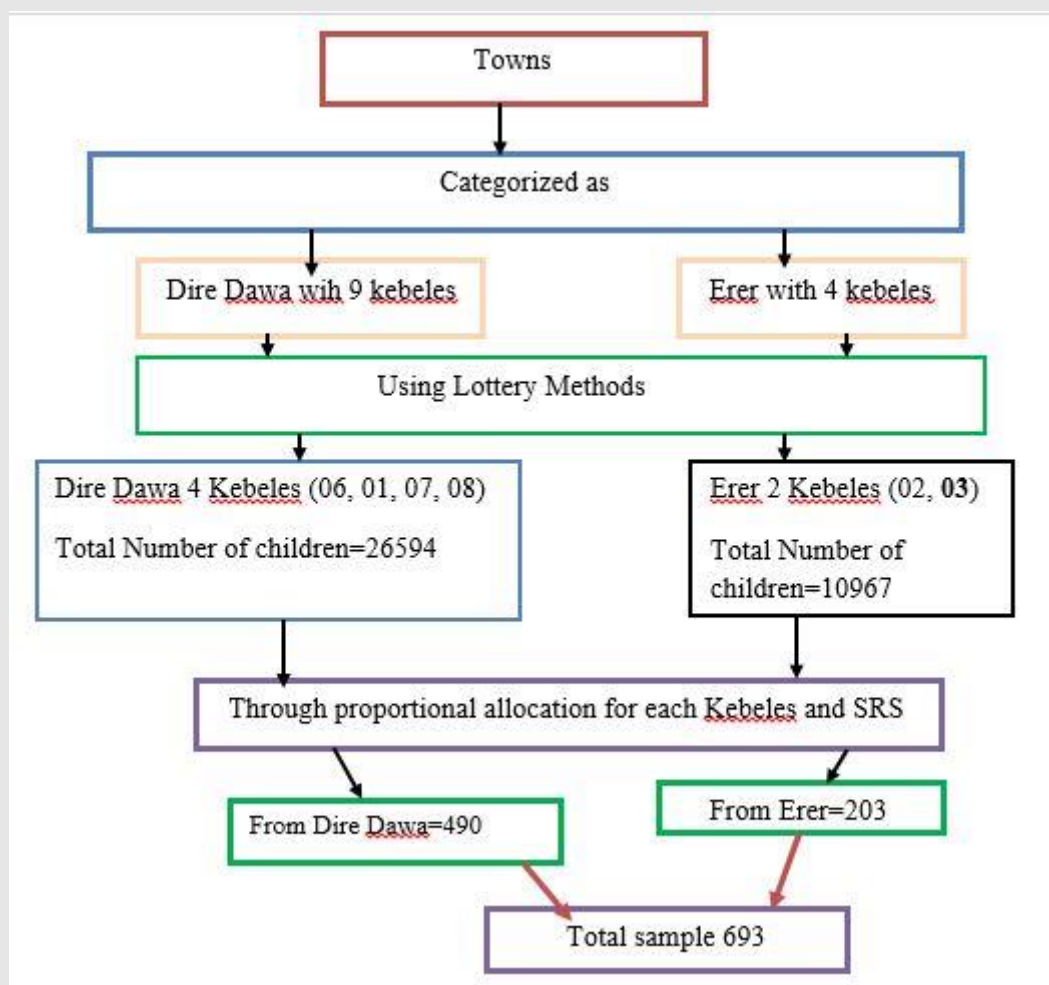


Figure 1: Schematic presentation of sampling technique to assess the prevalence of general acute malnutrition and associated factors among 6-59 months old age children in Dire Dawa and Erer towns of Eastern Ethiopia, 2021.

Operational Definitions

Food security is defined as a state in which “all people at all times have both physical and Economic access to sufficient food to meet their dietary needs for a productive and healthy life” [13].

Normal: Child MUAC (Measure Mid-Upper Arm Circumference) ≥ 12.5 cm or ≥ 125 mm [14].

Moderate Acute Malnutrition: Child MUAC (Measure Mid-Upper Arm Circumference) Mid- ≥ 11.5 cm - < 12.5 cm or ≥ 115 mm- < 125 mm [14].

Severe acute malnutrition: Child MUAC (Measure Mid-Upper Arm Circumference) <11.5 cm or 115 mm [12].

General acute malnutrition: Child MUAC (Measure Mid-Upper Arm Circumference) <12.5 cm or <125 mm [14].

Data Collection Procedure

The socio-demographic, maternal and child health, environmental hygiene and sanitation and general acute malnutrition data were collected using structured pretested Amharic, Afan Oromo and Afan Somali version questionnaires adapted from different literature [15]. Data were collected by health extension workers from other kebeles. Data were collected using standardized questionnaires. Ten data collectors, two coordinators and three supervisors participated in data collection activities and one day of training was given about the methods of Middle Arm Upper Circumference (MUAC) measurement, interviewing technique and filling questionnaires. The investigator monitored the data collectors to ensure the quality of the collected data.

Household food in security: Households with ‘Yes’ responses to at least one of 1-9 items listed in the Q1-9 based on household head interview was classified as food insecure. These items include ‘Worry about not having enough food,’; ‘Unable to eat preferred food,’; ‘Eat just a few kinds of food,’; ‘Eat food really do not want,’; ‘Eat smaller amounts in meal,’; ‘Eat fewer meals in a day,’; ‘No food of any kind in household,’; ‘Go to sleep hungry,’ and ‘Go a whole day and night without food’ [1-9].

Data Quality Control

Middle Arm Upper Circumference (MUAC) was measured on the upper left arm. To locate the correct point for measurement, the child elbow was flexed to 90 degrees, with the palm facing upwards; a measuring tape was used to find the mid-point the end of the shoulder (acromion) and the tip of the elbow (olecranon): which should be marked. The arm was then allowed to hang freely; the palm toward the thigh, measuring tape placed snugly around the arm at the mid-point of the mark. The tape should not be pulled to the thigh or loose. The final measurements were recorded to the nearest 0.1 cm. The Pre-test was performed on 5% (34 children) of Dire Dawa that did not select kebele for this study.

A data collection tool was checked for consistency and during data collection the discrepancies in the data were managed by the investigators. Data clearance, completeness, range and logic

checks were conducted regularly to ensure the quality of data before data entry. Data that were incomplete and inconsistent were excluded from the data and checked by the supervisors.

Data Processing and Analysis

Data were coded and entered in to Epi-data version 3.02 and exported to SPSS Version 21 for analysis and exported to SPSS software. Missing values were checked by conducting a simple frequency analysis. Exploratory data analyses were performed to check for missing values, potential outliers and the normality distribution for the continuous variables. Covariates with a p-value less than 0.25 in the variable were candidates for a binary logistic regression analysis to control for potential confounders and to identify associated factors with general acute malnutrition. In binary logistic regression analysis adjusted odds ratios with 95% Confidence intervals were calculated and p-values <0.05 were considered as significant associated factors with the outcome variable. The fitness of the model was tested using the Hosmer-Lemeshow goodness of fit test and then the information about nutritional status and factors was presented using frequencies, summary measures, tables and figures.

Result

Households Socio-Economic and Demographic Characteristics

The majority of the children ages among the studied households were 12-23 months 193(28.3%) and 52.7% were male by sex. Among the household heads 495(72.7%) were married and 64.9% of the respondents were Muslim by religion in both towns. Regarding formal education, 229(33.6%) household mothers did not have formal education and 103(15.1%) household females had diploma and above. However, 178(26.1%) household Fathers had Diplomas and above with form education and 112(16.4%) had not attended formal education. In addition, 343(50.4%) household mothers were housewives and only 89(13%) were government employers. However, among the household heads, 282(41.4%) male were private employees and 201(29.5%) were governmental employers. Concerning family size and income, 59.5% households had less than four families, 261(38.3%) had more than three children in their house and the majority 169(24.8%) of the households had 5001-10,000 a Birr monthly average income. However, 131(67%) of respondents from Erer reported that, their monthly income was 3001-5000 Ethiopian birr (Table 2).

Variables	Dire Dawa Frequency	% n=485	Erer Frequency	% n=196	Dire Dawa and Erer Frequency	% n=681
Child Age in Month						
6-11	113	23.3	59	30.1	172	25.3
12-23	112	23	81	41.3	193	28.3
24-35	122	25.2	36	18.4	158	23.2
36-59	138	28.5	20	10.2	158	23.2
Child Sex						
Male	256	52.7	103	52.5	359	52.7
Female	229	47.3	93	47.5	322	47.3
Marital Status of Mother						
Married	379	78.1	116	59.2	495	72.7
Single	49	10.1	70	35.7	119	17.5
Divorced	38	7.9	9	4.6	47	6.9
Widowed	19	3.9	1		20	2.9
Religious						
Muslim	317	65.2	125	63.7	442	64.9
Orthodox	136	28	52	26.5	188	27.6
Protestant	26	5.4	12	6.7	38	5.6
Catholic	7	1.4	6	3	13	1.9
Educational Status of Mothers						
No formal education	119	24.5	110	56.1	229	33.6
Primary	194	40	45	23	239	35.1
Secondary	90	18.8	20	10.2	110	16.2
Diploma and above	82	16.7	21	10.7	103	15.1
Education Status of Father						
No formal education	67	13.8	45	23	112	16.4
Primary	164	33.8	52	26.5	216	31.7
Secondary	107	22	68	34.7	175	25.7
Diploma and above	147	30.2	31	15.8	178	26.1
Mother Occupation						
House wife	241	49.7	102	52	343	50.4
Daily Laborer	109	22.5	24	12.2	133	19.5

Private Employee	58	12	46	23.5	104	15.3
Government Employee	65	13.4	24	12.3	89	13
Commercial sexual worker	12	2.4			12	1.8
Father Occupation						
Daily Laborer	106	21.9	20	10.2	126	18.5
Private Employee	185	38.1	97	49.5	282	41.4
Government Employee	127	26.2	74	37.8	201	29.5
Drivers, Brokers*	67	13.8	5	2.6	72	10.6
Household Family Size						
<4 Families	296	61.1	109	55.6	405	59.5
>4 Families	189	38.9	87	44.4	276	40.5
Number of Children in the Household						
One children	147	30.3	21	10.7	168	24.7
Two children	166	34.2	86	43.9	252	37
More than three children	172	35.5	89	45.4	261	38.3
Household Monthly Income						
500-1000	34	7	1		35	5.1
1001-3000	166	34.2	45	23	211	31
3001-5000	117	24.1	131	67	248	36.4
5001-10,000	151	31.1	18	9.1	169	24.8
>10,000	17	3.6	1		18	2.6

Table 2: Households socio-economic and demographic characteristics of Dire Dawa and Erer towns, east Ethiopia, 2021.

Maternal and Child Health Care Utilization

Among a total of 681 household heads, 605(88.8%) reported that, they had received at least one ANC visit and 402(59%) had visited a health facility for PNC follow up. The majority of mothers 462(67.8%) delivered their children at health facilities. Health care deliveries in Dire Dawa and Erer towns were 70.5% and 64.3. Among totals, 136(20%) of mothers were delivered in hospital. However, 83(12.2%) of mothers in these two urban areas were delivered

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in the home. Of the total respondents 585(85.9%) feeding their children the first milk and 517(75.9%) mothers exclusively feed their breast milk. A total of 85.2% mothers from Erer town reported that, they exclusively feed their child until six months. However, only 488(71.7%) mothers started a timely complimentary feeding practice. Concerning early breast feeding initiation, 51.2% initiated their child to breast feed within an hour and 2.9% mothers initiated breast feeding after a day.

Only 378(55.5%) respondents reported that, they were feeding their child properly food groups that are available at their home and among them 59.4% were from Dire Dawa and the other 303(44.5%) were not feeding child the food that was available at home level according to the health professional counselling.

Regarding the immunization status of the child, this finding indicated that, 434(63.7%), 222(32.6%) and 25(3.7%) fully immunized, started but not completed and not immunized at all respectively. Among the respondents, 358(52.8%) used family planning methods as means of birth spacing and 323(47.4%) did not (Table 3).

Variables	Dire Dawa		Erer Town		Dire Dawa and Erer	
Anti-natal Care Follow Up for (Indexed Child)	Freq.	% n=485	Freq.	% n=196	Freq.	% n=681
Yes	426	88.8	179	91.3	605	88.8
No	59	12.2	17	9.7	76	11.2
Post Natal Follow up for (Indexed Child)						
Yes	392	80.8	10	5.1	402	59
No	93	19.2	186	94.9	279	41
Place of Delivery for (Indexed Child)						
Home	14	2.9	69	35.4	83	12.2
Health Center	342	70.5	126	64.3	468	67.8
Hospital	129	26.6	1		139	20
Gave First Milk/Prelacteal Feeding Practice						
Yes	418	86.2	167	85.2	585	89.9
No	67	13.8	29	14.8	96	14.1
Exclusive Feeding Practice for 6 Months						
Yes	350	72.2	167	85.2	517	75.9
No	135	27.8	29	14.8	164	24.1
Starting Appropriate Complimentary Feeding at 6 Months						
Yes	406	83.7	82	41.8	488	71.7
No	79	16.3	114	58.2	193	28.3

Appropriately Feeding Food Available at Home According to Health Professional Counselling						
Yes	288	59.4	90	46	378	55.5
No	197	40.6	106	54	303	44.5
Child Immunization Status						
Fully Immunized	303	62.3	131	66.8	434	63.7
Started, but not completed	159	32.7	63	32.1	222	32.6
Not immunized at all	23	5	2		25	3.7
Use Family Planning Methods for Birth Spacing Purpose						
Yes	330	68	28	14.3	358	52.6
No	155	32	168	85.7	323	47.4

Table 3: Maternal and child health care utilization among Dire Dawa and Erer towns households, East Ethiopia, 2021.

Household Hygiene and Sanitation Practice

Overall 394(57.9%) household respondents appreciated their solid waste disposal management system and majority 80% respondents were from Dire dawa town administration. However, 190(96.1%) of respondents from Erer reported that their kebeles did not have a waste management system. At the same time, among the total households 405(82.6%), 181(31.1%) households in Dire Dawa and Erer towns had solid waste management systems at household levels respectively. Among households, 466(68.4%) in both towns did not have any system to dispose of their liquid waste at the household level.

Regarding child health, 161(82.1%) the respondents from Erer town reported that their children had developed illness in the past two weeks and 35.9% children developed disease from Dire Dawa. Overall, 335(49.2%) children developed illness in the past two weeks. Concerning drinking water source, 352(72.6%) household water sources for drinking in Dire Dawa were pipe water. A total of 142(72.4%) households in Erer town's drinking water source were public tape. Over all, the majority 405(59.5%) households for both towns whose source of drinking water were pipe water.

These, 181(92.3%) households in Erer town and 421(86.8%) households in Dire Dawa had toilets at the household's level. Overall, 88.4% of household had private toilets and the other 11.8 % did not have toilet at household levels. In Dire dawa and Erer towns, 46(6.7%) the households used an open defecation system and 4.8% use a common latrine (Table 4).

Dire Dawa		Erer			Both Towns	
Variables	Frequency	% n=485	Frequency	% n=196	Total	% n=681
Presence of Solid Waste Management System in Kebele						
Yes	388	80	6	4.9	394	57.9
No	97	20	190	96.1	287	42.1
Presence of Solid Waste Management System in Households						
Yes	401	82.6	181	92.3	582	84.5
No	84	17.4	15	7.7	99	14.5
Presence of Liquid Waste Management System in Households						
Yes	202	41.6	13	2.7	215	31.6
No	283	58.4	183	93.3	466	68.4
Child Develop Illness in the Past 2 Weeks						
Yes	174	35.9	161	82.1	335	49.2
No	311	64.1	35	17.9	346	50.8
Source of Drinking Water						
Public Tap	48	9.9	142	72.4	190	27.9
Pipe water	352	72.6	53	27	405	59.5
Packed water	83	17.5	3	1.6	86	12.6
Presence of Latrine at Household Levels						
Yes	421	86.8	181	92.3	602	88.2
No	64	13.2	15	7.7	79	11.8
Households Without Toilet						
Shared toilet	30	6.1	3	1.5	33	4.8
Open defecation	35	7.2	11	5.6	46	6.7

Table 4: Household hygiene and sanitation practice among Dire Dawa and Erer towns, eastern Ethiopia, 2021.

Prevalence of General Acute Malnutrition of 6-59 Months Old Children in Dire Daw and Erer Towns Comparing NCHS Standard

The overall prevalence of general acute malnutrition among 6-59 months old age children in Dire Dawa and Erer towns was 27.3%(95% CI: 23.8-30.4). However, there were proportion differences between two towns. The prevalence of general acute malnutrition (38.3%) at Erer town was significant than Dire Dawa town (22.9%) ($p \leq 0.001$). A total of 113(16.6%)

developed Moderate Acute Malnutrition (MAM), 73(10.7%) developed Severe Acute Malnutrition (SAM) and 72.7% of the children normal in both towns. Findings from Erer town indicated that, 25% of children had developed Moderate acute malnutrition and 13, 3% of the children had developed severe acute malnutrition. Both indicators were in an alarming range compared to the international standard the National Centre for Health Statistics (NCHS) (Table 5).

General Acute Malnutrition of Children	GAM Prevalence (%) National Centre for Health Statistics (NCHS) value							
	Dire Dawa		Erer		Over All			
	Freq.	%	Freq.	%	Freq.	%	Acceptable	Alarming
General Acute Malnutrition (MAUC<12.5cm)	111	22.9	75	38.3	186	27.30%	<10%	>15%
Severe Acute Malnutrition (MUAC<11.5cm)	47	9.7	26	13.3	73	10.70%	<5%	>=5%
Moderate Acute Malnutrition (MUAC<12.5>11.5CM)	64	12.9	49	25	113	16.60%	<15%	>15%
Normal (MUAC>12.5cm)	374	77.1	121	61.7	495	72.70%	>75%	

Table 5: Prevalence of general acute malnutrition of the children among 6-59 months old in Dire Dawa and Erer towns, eastern Ethiopia, 2021.

The Final Multiple Binary Logistic Regression for Outcome Variable

Binary logistic regression analysis was performed independently for Dire Dawa and Erer towns since there was population proportion difference; Children 12-23 month(AOR=0.476, 95% CI: 0.247-0.916), children 24-35 month(AOR=0.319, 95% CI: 0.160-0.638), children 36-59 month(AOR=0.172,95%CI:0.079-0.372),using family planning as means of birth spacing(AOR=1.686, 95% CI: 1.003-2.833), absence of waste disposal system at kebele level(AOR=2.456, 95% CI: 1.364-4.424), household food insecurity(AOR=3.599, 95% CI: 2.048-6.326) were factors associated with general acute malnutrition in Dire Dawa towns.

This indicated that, Children age 12-23 month had 0.476 times less likely to develop General acute malnutrition compared to children 6-11 months old and children 36-59 months old were 0.172 times less likely to develop general acute malnutrition compared to 6-11 month old age children. A Child mothers who did not used family planning as means of birth spacing had

1.686 times more likely to develop general acute malnutrition compared to that a child whose mothers used family planning methods for birth spacing . Food insecure households were 3.599 times more likely to develop general acute malnutrition than children who lived in food secured households (Table 6).

Nutritional Status of 6-59 Months Old Children								
Towns	Variables	Normal N=374 Frequency (%)	GAM (General Acute Malnutrition) N=111 Frequency (%)	AOR	P- value	95% Confidence Interval		
						Lower	Upper	
Dire Dawa	Child Age in Month							
	6-11	66(17.7%)	47(42.3%)	1				
	12-23	85(22.7%)	27(24.3%)	0.476	0.026*	0.247	0.916	
	24-35	100(26.7%)	22(19.8%)	0.319	0.001*	0.16	0.638	
	36-59	123(32.9%)	15(13.6%)	0.172	0.000*	0.079	0.372	
	Using Family Planning Methods for Birth Spacing							
	Yes	269(71.9%)	61(54.9%)	1				
	No	105(28.1%)	50(45.1%)	1.686	0.049*	1.003	2.833	
	Timely Complimentary Feeding at 6 Months							
	Yes	322(86%)	84(76%)	1				
	No	52(14%)	27(24%)	0.516	0.69	0.253	1.052	
	Presence of Waste Disposal System at Kebele Level							
	Yes	314(84%)	74(66.7%)	1				
	No	60(16%)	37(33.3%)	2.456	0.003*	1.364	4.424	
	Household Food Security Status							
	Food secured	286(76.5%)	48(43.2%)	1				
	Food in secured	88(23.5%)	63(56.8%)	3.599	0.000*	2.048	6.326	
*Indicates factors associated with general acute malnutrition								

Table 6: Binary logistic regression analysis of general acute malnutrition of 6-59 month old children in Dire dawa, eastern Ethiopia, 2021.

The independent binary logistic regression analysis indicated that, No waste disposal system at household level (AOR=9.27, 95% CI: 1.405-61.192), low dietary diversity practice (AOR=2.66, 95% CI: 1.033-6.835) and household food insecurity (AOR=8.25, 95% CI: 2.820-24.109) were the factors associated with general acute malnutrition in Erer town. This indicated that, household with low dietary diversity practice 2.66 times more likely to develop general

acute malnutrition than household with high dietary diversity and food in secured households were 8.25 times more likely to develop general acute malnutrition than food secured households (Table 7).

Nutritional Status of 6-59 Months Old Children								
Variables		Normal		GAM (General Acute Malnutrition)			95% Confidence Interval	
		N=121 Frequency (%)		N=75 Frequency (%)	AOR	P-Value	Lower	Upper
Town	Presence of Waste Disposal System at Household Level							
	Yes	118(97.5%)		63(88%)	1			
	No	3(2.5%)		12(12%)	9.27	0.021*	1.405	61.192
Erer	Household Dietary Diversity Practice							
	High Dietary Diversity Practice		104(85.9%)	38(50.6%)	1			
	Low Dietary Diversity Practice		17(14.1%)	37(49.4%)	2.66	0.043*	1.033	6.835
	Household Food Security Status							
	Food Secured Household		78(64.5%)	9(12%)	1			
	Food Insecured Household		43(35.5%)	66(88%)	8.25	0.000*	2.82	24.109
*Indicates factors associated with general acute malnutrition								

Table 7: Binary logistic regression analysis of general acute malnutrition of 6-59 month old children in Erer town, eastern Ethiopia, 2021.

Discussion

This finding revealed that, among the household heads 72.7% were married, 33.6% of mothers did not have formal education and 50.4% of household mothers were housewives. Compared to the finding from Afar region that 87% mothers were illiterate, 94.6% of the mothers were housewives by occupation [15]. The difference may be, the eastern part of Ethiopia has more access for education. Dire Dawa is the nearest town to Djibouti port, it is the trade center and most of the women's are participated in trade sectors. That why housewives were less in number, compared to the other studies.

This finding indicated that, 59% mothers who had ANC visit, 75.9% of mothers were exclusively breast feeding their child and 71.7% of the mothers were started a timely complimentary feeding practice, 63.7% children were fully immunized and 3.7% the children were not immunized. Among the respondents, 52.8% were used the family planning methods as means of birth spacing and 47.4% did not used. A total of 59% household mothers visited PNC follow up and 87.8% mothers delivered in health facilities. This finding have similarity with the other study done in Hawasa, 73.7% exclusively breast fed and 2.2% of the children were not immunized [13]. In Bule hora, 2.1% of the children did not receive any form of vaccine and 54.3% were fully vaccinated, 49.8% of them had ever used family planning method MEDHS 2019 report indicate, urban family planning were 49.7% and children received all vaccination were 57% [10,17]. But had great difference with the finding, in afar region, 57% complementary food for the children and 80.7% of the children had ever been vaccinated [15]. Finding from MEDHS, 2019, the national urban ANC and PNC visit were 85%, 48% respectively. Similarly, urban delivered at health facilities were 70% and <6 months age children exclusively breast feed were 59% [10]. The possible reason for the variation may be because of service accessibility, health seeking behavior of the community and cultural barriers. In this study area, health accessibility was almost 100%, but the finding indicated that, still health utilization behavior of the community is not satisfactory. Because of religion and cultural barriers, most of the women are not using family planning and they had poor ANC visit history. It show that COVID-19 also had owns impact on health service utilization communities since movement restriction and economic collapse had a contribution on health seeking behaviors.

Result from this study showed that, overall 84.5% households did have solid waste management systems. Overall, 88.4% household had private toilets and the other 11.8 % did not have toilets at household level. In Dire dawa and Erer towns, 6.7% households used an open defecation system and 4.8% used a common latrine. Household head reported that, a total of 49% Children developed illness in the past 2 weeks. Compared to the national EDHS, 2016 report, 16% urban had VIP Latrines, 35% common latrines, 7% urban household had no latrines [18]. In Nigeria, 86.4% households had private toilets, 14.5% common toilets, 79.1% household did not have waste management system and 51.1% Households had pipe water [19]. A waste management system in this study is better compared to finding from Nigeria and improved latrines coverage in this study is better compared to the national average as well as compared to study conducted in Nigeria. But household without toilet facilities were similar with the national average in this study. Remarkably, child illness had dramatically increased during COVID-19 home stay period. But the exact case of illness is not investigated by this finding. It is expected that, during home stay like stress and playing in unhygienic environment may be the causes of illness.

In this study, the sources of drinking water for each household were 59.5% pipe water, 27.9% public tap and 12.6% packed water. National urban household source of drinking water EDHS

2016 indicated, households with water pipe were 77% and public taps 13%. The national average household level water pipe was better than this study, but public taps coverage better than the national average [19]. This finding cleared that the relation between nutrition and Water, Hygiene and Sanitation (WASH). The finding indicated that, water, hygiene and sanitation coverage especially in Erer town was lower than the national standards and child illness was more than expected.

The overall the prevalence of general acute malnutrition in children among 6-59 months old in this finding was 27.3%. A total of 16.6%, 10.7% children in Dire Dawa and Erer towns had moderate acute malnutrition and severe acute malnutrition respectively. However, there were great differences between two towns population. The prevalence of general acute malnutrition in Dire Dawa was 22.9% and in Erer 38.3%. This findings were higher than study from Afar, the prevalence of acute malnutrition was 11.8% (95% CI = 9.3, 14.8%) [15]. In Sudan, Moderate acute malnutrition was 16%, in Burkina Faso severe acute malnutrition was 5% and in Mali Severe acute malnutrition was 5.7% and moderate acute malnutrition was 5.1% [24].

The finding was comparable with the finding from Somalia urban study which was above Critical levels. The general acute malnutrition prevalence ($\geq 15\%$) were also recorded in two out of six urban areas surveyed during 2015 which was 18.4% in Bari and 15.7% in Nugal [20]. However, the finding indicated lower moderate acute malnutrition rate and higher severe acute malnutrition rate compared to the following countries, in South Sudan MAM= 23% SAM=10%, India, MAM=20% and SAM=6 % [21-24].

The finding indicated that, the prevalence of general acute malnutrition was nearly two times higher than the expected levels. This is an indication that during COVID-19 pandemic the children nutritional status in urban area rapidly deteriorated. That is why the finding indicates above the cut off points. Besides COVID- 19 pandemic, most of the regions in Ethiopia, locust invasion destroyed the crops and conflicts were happened in some part of the country. These may be additional aggravated factors the nutritional problem in the urban areas.

In this study, the independent binary logistic regressions analysis in Dire Dawa town showed association with children 12-23 month(AOR=0.476, 95% CI: 0.247-0.916), children 24-35 month(AOR=0.319, 95% CI: 0.160-0.638), children 36-59 month(AOR=0.172,95%CI:0.079-0.372) are associated with General acute malnutrition. Our finding agreed with the finding in different part of the countries age group associated with nutritional status of the children east Gojjam [22], with the national study conducted in 2019 [10]. It is clear that at early age children are vulnerable to develop any form of malnutrition as well as the problems had high probability for complication.

In this study, those children who live in food insecure household had 3.599 times more likely to develop General acute malnutrition than food secured household insecurity (AOR=3.599, 95% CI: 2.048-6.326). This finding is similar with previous results North West Ethiopia [23].

This may be household food insecurity related with dietary intake of children. It is known that dietary intake of children is the immediate factor for general acute malnutrition. Besides this, food insecure households had an opportunity to eat diversified food which is very important to prevent nutritional problems at individual levels.

The independent binary logistic regression analysis in Erer town showed association with low dietary diversity practice (AOR=2.66, 95% CI: 1.033-6.835) and household food insecurity (AOR=8.25, 95% CI: 2.820-24.109). This finding was similar with the finding with in different part of our country [22,26,27]. However, food insecurity was a common factor associated with general acute malnutrition for both towns.

In this study, using family planning as means of birth spacing (AOR=1.686, 95% CI: 1.003-2.833), absence of waste disposal system at kebele level (AOR=2.456, 95% CI: 1.364-4.424) and no waste disposal system at household level (AOR=9.27, 95% CI: 1.405-61.192) had shown significant association with general acute malnutrition. This is the unique and new indication. It is true that unhygienic environment and poor waste management practice are risk factors for diarrheal disease. Diarrheal diseases are the main factor for child malnutrition. Birth spacing also directly related with maternal and child care. According to UNICEF conceptual framework (1998) it is considered as underline cause for child malnutrition.

Conclusion

The finding showed that, there were population proportion differences between Dire Dawa and Erer towns. The overall prevalence of general acute malnutrition among 6-59 months old age children in Dire Dawa and Erer towns was 27.3% (95% CI: 23.8-30.4). The prevalence of General acute malnutrition (38.3%) at Erer town was significant than Dire Dawa town (22.9%) ($p \leq 0.001$). Both moderate acute malnutrition and severe acute malnutrition indicators are in alarming range compared to the international standard of NCHS Values. Different contributing factors were associated with nutritional status of 6-59 months old children in Dire Dawa and Erer towns. Appropriate child feeding, benefit of using family planning methods and household dietary diversity practice should be communicated for the wider communities through appropriate communication channels.

Declaration

Ethics Approval and Consent to Participate

This research thesis was screened for scientific and ethical integrity by the relevant authorities from the ethical review committee of Dire Dawa University. Official letters were written to each

Asfaw TD | Volume 2, Issue 3 (2021) | JCMR-2(3)-040 | Research Article

Citation: Asfaw TD, et al. Magnitude and Factors Associated With Acute Malnutrition among 6-59 Months Old Age Children Dire Dawa and Erer Towns of Eastern Ethiopia, 2021. *Jour Clin Med Res.* 2021;2(3) :1-23.

DOI: <http://dx.doi.org/10.46889/JCMR.2021.2303>

town's administrator and formal permission and consent were obtained from different levels of administration officials. During data collection, the World Health Organization (WHO) guidelines on ethical issues related to violence research to ensure the safety of the respondents and data quality were properly followed. This was implemented as follows: For the purpose of data collection, the study framed and introduced to the community and respondents. Privacy was promoted and the respondents were informed of confidentiality.

Consent for Publication

Consent for publication is not necessary, because this manuscript did not contain any personal detail like photo, image and video, Quotes data. This study is conducted at household levels and all respondents were above 20 years.

Availability of Data and Material

All dataset used to interpret, replicate and build upon the findings of this report article currently availed in the hand of corresponding author and can be asked any time for reasonable request by publisher.

Competing Interests

Authors declared that, there is no competing interest regarding to this manuscript.

Funding

Dire Dawa University is funder for this research article.

Author's Contribution

TD developed and organized the materials and designs the study, performs analysis and interpret the data. DF and AA, assist the design development and contents evaluation activities. TD also prepared and presented this work throughout the whole validation procedure starting from proposal to finalization of this thesis at all levels of Dire Dawa University. Finally, TD also writes up and drafted the manuscript and all the authors read and approved the final manuscript.

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DOI: <http://dx.doi.org/10.46889/JCMR.2021.2303>

Acknowledgement

First of all we would like to give thanks Dire Dawa University for giving us fund for this research thesis from which we learnt a great lesson of field work, software application for analysis systems.

This is also a right time to us to express our great thanks to our brothers Mr Demis Yalew and Mr. Dawit coordinating the data collection. Our thanks go to Sr Nesima and all data collectors for their invaluable guidance and support throughout this thesis work.

We also give thanks for Dire dawa regional health beauro Public Health Emergency Management department staff and Erere town health office workers for their positive corporation during data collection process and helping during ethical clearance processing. This is a right time to me to give great thanks for Mr. Melese Markose and Mr. Samuel Dessu for their unreserved assistance during data analysis and interpretation. Finally, it is our pleasure to Thanks College of medicine and health science and college secretary Sister Serkalem Kasu and printing room workers especially Mss. Buzayehu for smile face and for supporting us stationary and printing materials throughout this thesis project.

Conflict of Interests

The authors declare no conflicts of interest.

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