

# Current Status and Predictors of Diarrhoeal Diseases among Under-Five Children in a Rapidly Growing Urban Setting: The Case of City Administration of Bahir Dar, Northwest Ethiopia

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## Abstract

**Background:** Diarrhoeal disease in under-five children is a serious public health challenge especially in low income countries including Ethiopia. In Ethiopia, several interventions are going on to reduce morbidity, and mortality of children. The objective of the study was to assess the prevalence and associated factors of diarrhoeal diseases among under-five children in the City Administration of Bahir Dar. **Methods:** A community based cross-sectional study was conducted on a sample size of 667 mothers/caregivers having under-five children. Participants were selected through multistage sampling technique. Structured questionnaire and observation checklist were used to collect data. It was analyzed using SPSS version 16 for windows. Logistic regression was applied to measure possible associations. Strength of association, and statistical significance was measured using odds ratio and confidence interval at 95% confidence level. **Results:** A total of 667 mothers/caregivers with under-five children were included in the study. Two-week prevalence of diarrhoea was 21.6%. Households in rural part of the city (OR: 2.82, 95%CI: 1.66 - 4.81), monthly income  $\leq$  birr 500 (OR: 2.27, 95%CI: 1.44 - 3.57, failure to use separate container for storing drinking water (OR: 1.78, 95%CI: 1.17 - 2.70), presence of human excreta in the compound (OR: 1.88, 95% (1.15 - 3.06) were found to be predictors of childhood diarrhoea. **Conclusion:** Diarrhoeal diseases remain serious public health challenge in rural as well as urban set ups in Ethiopia with particular refer-

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**ence to Bahir Dar City, despite several interventions over decades. Therefore, interventions, and strategies applied so far to eliminate diseases of poverty including diarrhoeal diseases should be re-visited.**

## **Keywords**

**Diarrhoeal Diseases, Prevalence, Under-Five Children, Urban Setting**

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## **1. Introduction**

The health of under-five children is a major health challenge worldwide. To alleviate the problem, several interventions have been tried for the past two decades. Though there was substantial progress in reducing mortality rate, from 87 deaths per 1000 live births in 1990 to 51 in 2011, the pace has been slow or even reversing, particularly in many sub-Saharan African countries [1]. Of the estimated 10.6 million under-five deaths worldwide, about 42 percent occur in African region. This figure is seven times higher than the burden in the European region [2] [3]. Ethiopia ranked among the top five countries in the world in the absolute number of annual deaths in under-five children [4].

Diarrhoea has been a potential bottle-neck in reaching the Millennium Development Goal (MDG) target. Together with pneumonia, it is responsible for 29% of all child deaths [5] [6]. The burden of childhood diarrhoea in Ethiopia is well known. Several epidemiologic studies were conducted [7]-[12]. Findings of these studies indicated that diarrhoeal disease in children was one of the highest in the world, and it is mostly associated with personal and environmental hygiene.

Currently, several interventions are going on to reduce child morbidity, and mortality in Ethiopia. According to the report of Federal Ministry of Health, water supply and sanitation coverage has increased. Health extension package has been implemented and scaled up for both rural and urban areas in the country which aims to empower the community to prevent classical infectious and parasitic diseases [13]. By implication, these interventions are expected to decrease diseases of poverty such as diarrhoea, intestinal worm infestation, and trachoma.

Most of these studies conducted in Ethiopia focus on rural areas [7]-[12]. Therefore, data are needed to see the progress especially in urban areas. The current study aimed at determining the magnitude and associated factors of diarrheal disease in the city administration of Bahir Dar. The finding of this study would help decision makers know the current prevalence of childhood diarrhoea which could in turn serve as a mirror to reflect successes or failures of interventions applied so far. The lesson derived from the disparities of interventions vis-à-vis outcomes regarding health gains could pass meaningful messages for international readers too.

## **2. Methods**

### **2.1. Study Design and Area**

Community based cross sectional study was conducted in the city administration of Bahir Dar, the capital of Amhara National regional State. It is a rapidly growing city in the country where you can observe infrastructure distribution inequalities. The total population of the City Administration was estimated to be 267,350. Of which, 219,585 were living in urban and 47,765 were in rural part of the city. According to the current census, total number of under-five children in all sub cities of the city administration was 11,776. Of these, 7919 were living in urban and 3857 were in rural part of the city administration [14].

### **2.2. Target Population**

Target population for this study was mothers with under-five children residing in the city for at least six months prior to the survey.

### **2.3. Sample Size**

Sample size was determined by single population proportion formula. The assumptions were two-week period

prevalence of diarrhoea (15%), margin of error (4%), design effect (2), confidence level (95%) and anticipated non response rate (10%). The size of participants for this study was 673.

## 2.4. Sampling Procedure

A total of 673 households (505 from urban and 168 rural) where at least one under-five child were present based on family folder developed by health extension workers were selected using systematic random sampling method.

## 2.5. Data Collection Procedures

Face to face interview was done using a pretested structured questionnaire, and observation was made using observation checklist.

## 2.6. Data Quality Assurance

Data quality was assured by the following mechanisms. Questionnaire was adopted from previous studies in Ethiopia, and translated to local language and back to English to assure consistency of the questionnaire. Pre-test was done, and minor corrections were amended. Data collectors were selected who have educational attainment of grade 10 plus 3 years professional training, and have experience in data collection. Training had been given for data collectors and supervisors. Supervisors were BSc. Professionals. Each questionnaire was checked on daily basis for completeness.

## 2.7. Operational Definition

In this survey, if an under-five child was reported to have loss or watery stool at least three times per day, and at least once in the past two weeks prior to the study, the child was declared to have diarrhoea.

## 2.8. Data Analysis

The collected data were coded, entered, cleaned, and analysed using SPSS version 16 for windows. Bi-variate analysis was used to determine possible association between an independent and the outcome variable. Variables with statistical significance level of p-value of 0.3 or less were entered into the multivariable analysis model. Odds ratio with 95%CI was used to measure the strength of association, and statistical significance.

## 2.9. Ethical Considerations

Ethical clearance was obtained from Ethical Clearance Committee of Bahir Dar University and permission letter was also obtained from the Regional Health Bureau. Verbal consent was obtained from each caregiver of the child.

## 3. Results

### 3.1. Characteristics of Under-Five Children in the City Administration of Bahir Dar, Northwest Ethiopia

With 51.7% of the children were males. About 26% of children were within the age group of 12 - 23 months. In the current study, two weeks prevalence of diarrheal disease among under-five children was 21.6% (**Table 1**).

### 3.2. Socio-Economic & Demographic Characteristics of Mothers/Caregivers in Bahir Dar City Administration, Northwest Ethiopia

Six hundred sixty seven caregivers were included in the study. The study had a response rate of 99.1%. Majority (76%) were urban dwellers, and 71% of them were housewives. More than 54% of the caregivers were illiterate and about 44% earned a monthly income of Birr 500 or less (**Table 2**).

**Table 1.** Characteristics of under-five children, and two weeks prevalence of diarrhoea in the city administration of Bahir Dar.

Variables	Frequency	
	Number	Percent
Sex of children		
Male	345	51.7
Female	322	48.3
Age of children (month)		
0 - 5	47	7.0
6 - 11	93	13.9
12 - 23	172	25.8
24 - 35	137	20.5
36 - 47	125	18.7
48 - 59	93	13.9
Occurrence of diarrhoea in the past two weeks		
Yes	144	21.6
No	523	78.4

**Table 2.** Socio-economic & demographic characteristics of households which have under-five children, Bahir Dar City administration, June, 2012.

Variables	Frequency	
	Number	Percent
Residence		
Rural	163	24.4
Urban	504	75.6
No. under-5 children in a HH		
One	570	85.5
Two & above	97	14.5
Age of mothers/caregivers		
15 - 24 years	184	27.6
25 - 34 years	332	49.0
35 - 49 years	132	19.8
>49 years	19	2.8
Educational status of mothers/caregivers		
Unable to and write	360	53.9
Primary	137	20.5
Secondary and above	170	25.5
Occupation of mothers/caregivers		
House wife	473	70.9
Farmer	161	24.1
Government employee	33	4.9
Educational status of fathers (n = 599)		
Unable to read and write	189	28.3
Primary	213	31.9
Secondary and above	197	29.5
Monthly income		
Birr 500 or less	295	44.2
Birr 501 - 1500	291	43.6
Birr 1500+	81	12.1

### 3.3. Environmental Characteristics of Studied Households in Bahir Dar City Administration, Northwest Ethiopia

About eleven percent of households have animals which share the same house/room. Nearly 70% of households had latrine facility; however, only (16.2%) had hand washing facility.

Majority of households (83%) obtained drinking water from pipe and protected schemes while the remaining. About 60% of households had water source at home. Majority of households (68%) consumed  $\geq 15$  liters per day (Table 3).

### 3.4. Behavioural Characteristics of Households Which Have Under-Five Children, Bahir Dar City Administration, Northwest Ethiopia

About ninety seven percent of households claimed to use latrine facility. However, human excreta were observed in the compound and around the latrine in nearly 27.6% and 22.4% of households. In about 30% of the households, dry west disposal was collected and disposed at disposal pit while 76.8% of households disposed their liquid waste in open field. Majority (91.6%) of the caregivers claimed not to wash their hands after or before every critical times of hand washing such as before eating, and food preparation or after cleaning a child or visiting toilette (Table 4).

### 3.5. Factors Associated the Occurrence of Diarrheal Disease among Under-Five Children in the City Administration of Bahir Dar, Northwest Ethiopia

Multivariate logistic regression revealed that rural residence (OR: 2.82, 95%CI: 1.66 - 4.81), monthly income of birr 500 or less (OR: 2.27, 95%CI: 1.44 - 3.57), birr 501 - 1500 (OR: 3.39, 95%CI: 1.58 - 7.27), failure to use separate container for storing drinking water (OR: 1.78, 95%CI: 1.17 - 2.70) and human excreta in the compound (OR: 1.88, 95%CI: 1.15 - 3.06) were found to have statistically significant association with occurrence diarrhoeal disease among under-five children (Table 5).

## 4. Discussions

The major objective of the present study was to assess prevalence and correlates of diarrheal disease among under-five children in an urban set up. It revealed that the two weeks prevalence of diarrhoea was 21.6%. This finding was in line with the findings in Adami Tulu [7], North Gondar district [8] and Mecha district [9] where the prevalence rate was 22.7%, 20.7%, and 18%, respectively. Previous reports from Southwest Ethiopia (Nekemte, 2008) [10] and (Mana district, 2000) [11] where the prevalence was 28.9% and 33.7%, respectively were even worse than findings of the current study. The present study reconfirms that diarrhoeal diseases in under five children remains rampant in rural as well as in urban set ups.

The fact that the prevalence in the current study is similar to reports from Adame Tulu (1996) [7] and North Gondar Zone (2001) [8] clearly demonstrated that changes are very minimal over decades, and Ethiopia has a long way to go to eliminate this disease of poverty.

The most important predictors of diarrhoea in under-five children were personal and environmental hygiene as well as socioeconomic factors. Children from rural households were 2.82 times (95%CI: 1.66, 4.81) more likely to experience diarrhoea than those in urban households. This result was in line with the finding in Keffa Sheka Zone [12]. This might be associated with differences in access to water, sanitation and hygiene. The access for the above services in urban setting was better than that in rural settings. Hence this difference might be responsible for the low prevalence of diarrheal disease among under-five children in urban setting compared with the prevalence in those who were rural [15].

Children from households whose monthly income was below 1500 Ethiopian birr were at a higher risk to develop diarrhoea than in those who earn above 1500 Ethiopian birr. This was also in agreement with the findings in Keffa Sheka and Eritrea [12] [16].

In addition, children in households where human excreta was observed in the compound were 1.89 times (95%CI: 1.159, 3.07) more likely to develop diarrheal diseases than in those where no human excreta was observed. This finding was in line with the study undertaken in Nekemte [10]. This is logical that improper disposal of human excreta increases the chance for pathogenic microorganisms including the causes of diarrheal diseases to infect humans especially children [17].

**Table 3.** Environmental characteristics of households, Bahir Dar City administration.

Variables	Frequency	Percent
Existence of animals in the same house/room with the household		
Yes	70	10.5
No	597	89.5
Floor of the house		
Soil	592	88.8
Ceramic	75	11.2
No. of rooms in the living house		
One	286	42.9
Two	381	57.1
Availability of latrine in the house (n = 463)		
Yes	463	69.4
No	204	30.6
Ownership of latrine (n = 463)		
Private	236	51.0
Communal	227	49.0
Type of latrine (n = 463)		
Traditional	398	86.0
Modern	65	14.0
Availability of hand washing facility in the latrine (n = 463)		
Yes	75	16.2
No	388	83.8
Availability of traditional hand dug well in the compound		
Yes	75	11.2
No	592	88.8
Location of the well from the latrine		
In the lower side from the latrine	26	34.7
Same level side by side with the latrine	33	44.0
Upper side of the latrine	16	21.3
Distance between the well and latrine		
Below 15 m	19	25.3
From 15 - 30 m	23	30.7
Above 30 m	33	44.0
Source of drinking water		
Pipe & other protected schemes	555	83.2
Unprotected sources	112	16.8
Distance between the water source and house		
In the compound	421	63.1
Purchasing from neighbour	76	11.4
Less than 20 minutes	85	12.7
≥20 minutes	85	12.7
Per capita water consumption		
≥15 liters	453	67.9
<15 liters	214	32.1

**Table 4.** Behavioural characteristics of caretakers with under-five children in the city administration of Bahir Dar, June, 2012.

Variables	Frequency	
	Number	Percent
Latrine use practice (n = 463)		
Always	450	97.2
Sometimes	13	2.8
Human excreta around the latrine (n = 463)		
Yes	103	22.4
No	360	77.6
Human excreta in the compound (n = 667)		
Yes	184	27.6
No	483	72.4
Material used for washing hands in all critical times (n = 667)		
Soap	89	13.4
Ash	10	1.4
Water only	568	85.2
Dry waste disposal method/s (n = 667)		
Bury/burn	200	30.0
Open field	467	70.0
Liquid waste disposal method/s (n = 667)		
Sinking	155	23.2
Open field	522	76.8
Hand washing at every critical times (n = 667)		
No	611	91.6
Yes	56	8.4

**Table 5.** Predictors of diarrheal diseases among under-five children in city administration of Bahir Dar, June, 2012.

Variables	Diarrheal disease		Crude OR (95% CI)	Adjusted OR (95% CI)
	Yes	No		
Residential area				
Rural	56	107	2.47 (1.66 - 3.68)*	2.82 (1.66 - 4.81)*
Urban	88	416	1.00	1.00
Household monthly income				
Birr 500 or less	82	213	1.81 (1.22 - 2.69)*	2.27 (1.44 - 3.57)*
Birr 501 - 1500	51	240	2.45 (1.23 - 4.85)*	3.39 (1.58 - 7.27)*
Birr 1500+	11	70	1.00	1.00
Separate container for storing drinking water				
Yes	84	365	1.00	1.00
No	60	158	1.65 (1.13 - 2.41)*	1.78 (1.17 - 2.70)*
Human excreta in the compound				
Yes	63	121	2.58 (1.75 - 3.81)*	1.88 (1.15 - 3.06)*
No	81	402	1.00	1.00

A lot has been said about success of Ethiopian Health System especially following implementation of Health Extension Package [18] [19]. Nearly 40,000 health workers are deployed across the nation to give health education by going house to house. The final goal of this mammoth national undertaking in Ethiopia is to empower households to prevent classical poverty diseases. However, the prevalence of classical poverty diseases such as diarrhoea [7]-[12], intestinal parasites [20] trachoma [21] remains rampant. According to these studies, prevalence of childhood diarrhoea ranged from about 18% to over 30% while intestinal parasites and trachoma had a 70%, and nearly 25%, respectively.

This disparity between investment in health and comparatively low outcome in health gain require through investigation for it will be the basis for future planning.

The most important limitation of this study is that it is not supported with identification of aetiologies of diarrhoeal diseases in the study area in addition to the limitation of the study design-cross sectional. Moreover, the strength of this study design could have been enhanced had it been supported with qualitative data to answer the why questions.

## 5. Conclusion

Despite several interventions over decades, diarrhoeal diseases remain serious public health challenge in rural as well as urban set ups in Ethiopia with particular reference to Bahir Dar City. Therefore, interventions and strategies applied so far to eliminate diseases of poverty including diarrhoeal diseases should be re-visited.

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## Conflict of Interest

There is no any conflict of interest.

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