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Assessment of Prevalence and Related Factors of Diarrheal Diseases among Under-Five Year's Children in Debrebirehan Referral Hospital, Debrebirehan Town, North Shoa Zone, Amhara Region, Ethiopia

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Abstract

Background: Diarrheal diseases are one of the top (major) leading causes of under-five morbidity, mortality and under nutrition in developing countries. In African countries including Ethiopia, each child on average suffers from five episodes of diarrhea per year while the two-week prevalence ranges from 10% to 40% in different parts of Ethiopia. Objective: To assess prevalence and associated factors for the occurrence of diarrhea diseases among the under-five year's children in Debrebirehan referral hospital. Method: A facility-based cross sectional study design was conducted among 483 children less than 5 years of age who came to Debrebirehan referral hospital from February 1, 2013 to June 30, 2013. Data were collected, entered analyzed by using SPSS statistical software version 16.0. A logistic regression model was used to associated factors for the occurrence of diarrhea diseases. Results: The prevalence of diarrhea among mothers and under-five children was 9.3% and 31.7%, respectively. Occupation of mothers (private workers) [(AOR: 2.004, 95% CI: (1.167 - 3.442)], occupation of fathers (farmers) [AOR: 1.427, 95% CI: (1.224 - 1.812)], maternal history of recent diarrhea [(AOR: 1.042, 95% CI: (1.015 - 1.219)], houses having one room [AOR: 1.297, 95% CI: (1.097 - 1.906) and houses having two rooms [AOR: 1.151, 95% CI: (1.032 - 1.716)], living with cattle in one house [AOR: 1.297, 95% CI: (1.097 - 1.906)], address (rural) [AOR: 2.527, 95% CI: (1.847 - 7.538)], feeding of gruel for children [AOR: 3.046, 95% CI: (1.408 - 6.587)], feeding of adult's food for children [(AOR: 3.703, 95% CI: (1.324 - 10.354)], method of dipping to take water from water containers [AOR: 1.371, 95% CI: (1.137 - 1.607) & water storage

container without cover [(AOR: 1.304, 95% CI: (1.110 - 1.836)] had significant association with diarrheal diseases. Conclusion and Recommendation: In this study, the prevalence of diarrheal diseases was very high and major problem among under-five children. The health institutions efforts should be strengthened to decrease factors which increase diarrheal diseases.

Keywords

Diarrhea, Morbidity, Mortality, Under-Five Year

1. Introduction

Background

Diarrheal disease remains a leading cause of mortality and morbidity in children of the developing world. In developing countries, the average annual incidence rate of diarrhea in under-fives is estimated to be 2.6 episodes. It is also estimated that there are 100 million episodes and 3.3 million deaths occurring each year among children of under-five years of age [1]. In Africa, a child experiences five episodes of diarrhea per year, and 800,000 children die each year from diarrhea and dehydration [2]. Diarrhea is also responsible for 25% to 75% of all childhood diseases and account for about 14% of outpatient visits, 16% hospital admissions [3]. In addition to the excess mortality and morbidity, diarrhea predisposes children to malnutrition, which makes children highly susceptible to other infections [4].

In Ethiopia, morbidity reports and community-based studies have shown that diarrheal disease is a major public health problem that causes morbidity and mortality in children [5] [6]. Morbidity-Mortality-and Treatment (MMT) surveys conducted in Ethiopia in 2000 at different time's revealed five diarrheal episodes per child/year; and the two-week incidence rate to be 16%. The diarrhea associated mortality rate is about 10/1000 under-five population [4] [7]. Studies conducted in central rural Ethiopia revealed that diarrhea is one of the common causes of under-five mortality, accounting for about 8.4% to 27% of all deaths [8] [9]. Recent estimates indicate that the two-week period prevalence of diarrhea in under-five children in Ethiopia is about 24 percent. [6]. Children's health is affected by environmental conditions as well as by their family's socio-economic status [10]. Studies done by WHO pointed out those poor environmental conditions were strongly associated with the risk of diarrheal disease [11]. Maternal practices related to hygiene, breastfeeding, sanitary food preparation and appropriate weaning practices are also potentially important determinants in the occurrence of diarrhea in children. On the other hand, the relationship between childhood diarrhea and parental socioeconomic, behavioral and household environmental factors wasn't consistent [12]-[14].

There is a general agreement that the cause of child mortality and morbidity in developing countries is multifactorial. The child's survival depends on the interaction of socioeconomic, biological, behavioral and environmental factors [15] [16]. Hence, it is very important to see the relation and interaction of these factors to understand child survival. However, information on these factors is either scarce or inadequate [5]. Very limited information on the effects of socioeconomic, behavioral and environmental factors are incorporated in the few studies conducted on childhood diarrhea.

According to the information 2005 report from the North Showa zonal health office, diarrhea is the first leading disease from the top ten diseases in this zone. Therefore, this study will be very important to fill this gap.

2. Literature Review

2.1. Magnitude and Risk Factors of Diarrheal Morbidity

According to a follow-up study in Butajira, the incidence of diarrhea was about two episodes/person-year [19]. A community based study conducted in Keffa-Sheka Zone, southern Ethiopia, found a two-week childhood diarrhea prevalence of 15 percent [20]. Another study from Jimma town, southwest Ethiopia, showed a prevalence of 36.5 percent [21].

A study done on patterns of childhood morbidity in Tigray Region had shown 3.05 diarrheal episodes per

child per year [22]. Another study on determinant of household illness prevalence in Gondar showed that diarrhea was one of the three most frequently occurring symptoms, accounting for 11.4% of the overall illness prevalence [23]. A study done Jimma zone on diarrheal disease among under-five children found a two-week prevalence of 33.7 percent [24].

The factors that potentially determine the occurrence of diarrhea in children include malnutrition, poor personal hygiene, environmental problems, water availability and quality, unhygienic feeding practices, improper use of latrines, early discontinuation of breastfeeding, child's age, maternal education and household income [11] [17].

2.2. Diarrheal Morbidity and Socioeconomic Factors

Socioeconomic factors may affect, directly and indirectly, environmental, behavioral, nutritional, demographic risk factors with the exception of age and sex [27]. Therefore, differences in rates of diarrhea by socioeconomic status are mainly due to differences in childcare practices, such as preparation of weaning foods, boiling of drinking water, or personal hygiene practices [10] [12] [18].

Several studies on determinants of child health revealed that child survival in developing countries is highly associated with maternal education, more than with any other socioeconomic variables [25].

2.3. Diarrheal Morbidity and Environmental Factors

Children in urban areas where proper sanitation and water are available, and where modern treatment is more frequent will have a lower prevalence of diarrhea. Studies indicated that children living in urban areas were less likely to have diarrhea compared to those in rural areas [2] [19].

A study that assessed environmental determinants of childhood diarrhea, and another study from the Republic of Congo revealed that children coming from households that obtained water from protected sources were less likely to have diarrhea as compared to those who got their water supply from unprotected sources [12] [20]. A study that was done to determine the prevalence of childhood diarrhea in North Gondar Zone, northwest Ethiopia, indicated that use of unprotected water sources was significantly associated with diarrheal morbidity [28].

A study done in Jimma town indicated that in households without a latrine, and where feces are left deposited in the yard, or house, infant mortality was 2.76 times higher than in households where latrine was used [29]. A study from Zimbabwe revealed that the absence of refuse disposal pit latrine was associated with higher diarrhea morbidity [26].

A study done in Kefa Sheka zone observed an inverse relationship between number of rooms and diarrhea morbidity [20]. Another study from Jimma town also revealed that children living in houses with three or more rooms had less diarrhea [21].

2.4. Diarrheal Morbidity and Behavioral Factors

Behavioral factors play a primary role in the epidemiology of diarrheal diseases. Risk of exposure to diarrhea causing organisms may be affected by behavior patterns common to the population, such as, defecation habits and personal hygiene and by patterns of food preparation, storage and consumption [30].

Studies suggested that maternal practices related to hygiene, breastfeeding, food preparation, appropriate weaning practices, and healthcare are important determinants of diarrheal disease incidence [12]. It has been reported that partially breast fed or non-breastfed infants have about two to five times higher episodes of diarrhea experienced by exclusively breastfed infants [11] [16].

In study of the rural part of Ethiopia on breastfeeding and the occurrence of acute childhood diarrhea found out that the risk of developing diarrheal disease in partially breastfed infants was five-times higher than that of infants exclusively on breast milk [4]. The study showed that exclusive breastfeeding was an important predictor of the occurrence of diarrheal disease in infants less than six months of age. Study done in Gambia demonstrated heavy contamination of gruels used as complementary foods [3].

Availability of improved water sources or latrine alone will not reduce diarrhea morbidity, without a change in behavior that affects hygiene practice [12] [14]. A study revealed that the prevalence of diarrhea was significantly higher in children from households where water is obtained from storage container by dipping than in those where water is obtained by pouring [20] [31].

3. Objectives

3.1. General Objective

To assess the prevalence and associated factors for the occurrence of diarrhea diseases among under-five year's children.

3.2. Specific Objectives

- To determine the prevalence of diarrhea diseases.
- To assess factors that were associated with diarrheal diseases.

4. Methods and Materials

4.1. Study Area

Debrebirehan is the capital town of the North Shoa zone which is located at about 130 Km of North East of Addis Ababa. Debrebirehan hospital is found in Amhara national regional state, North Shoa zone.

4.2. Study Design and Period

Cross section study design was conducted to assess the prevalence rate and associated factors for the occurrence of diarrhea diseases among the under-five year's children. The study was conducted from February 1, 2013 to June 30, 2013.

4.3. Study Variables

4.3.1. Outcome (Dependent) Variable
Episode of diarrhea in a child.

4.3.2. Explanatory (Independent) Variable
1) **Socioeconomic status** includes family economic status, place of residence, household size, maternal age, education, ethnicity, number of children, occupation, marital status, religion, etc.

2) **Environmental sanitation** includes type of water source, distance to the water source, amount of daily water consumption availability of latrine, number of rooms, livestock in house, refuse disposal, etc.

3) **Behavioral factors** includes method of water drawing and storage, feeding practices, action for diarrhea, duration of breast-feeding, time of introducing supplementary feeding, etc.

4.4. Operational Definitions

1) *Diarrhea* is defined as having three or more loose or watery stools in a twenty-four hours period, as reported by the mother/caretaker of the child.

2) *Number of rooms* is defined as any partition of a house that is intended to separate the rooms for different purposes.

3) *Refuse*: includes such solid wastes as ash, cow dung, home-sweepings; but not human excreta.

4) A child who was receiving no food, solid or liquid, other than breast milk at the time of the survey was considered as *exclusively breast-fed*.

5) *Mixed feeding*: a child who was receiving food, solid or liquid, in addition to breast milk at the time of the survey.

6) *No breast-feeding*: a child who was not receiving breast milk at the time of the survey.

The child may eat food/liquid that was prepared for adults or prepared separately for him/her.

7) *Index child*: refers to a child that was included in the study from a household to have information on the demographic and health characteristics, and also to calculate the prevalence and incidence of diarrhea.

8) *Prevalence*: the number of diarrhea cases at the time of the interview divided by the total number of households included in the study.

4.5. Source and Study Population

The study population for the study was all under five children who came to the Debrebirehan referral hospital.
The source population was all under-5 year's children living in the zone.

4.6. Sample Size Determination

The prevalence of diarrhea for the areas covered by the Debrebirehan town was not known from previous studies. Other studies done in different parts of the Country but these were not latest. Hence, the national prevalence of diarrhea for under-five children was taken from the report of the Demographic and Health Survey 2011 (13%) to calculate the sample size. By using this assumption: p = 13% = 0.13, $Z\frac{\alpha}{2}$ = critical value at 95% confidence interval (1.96)

d = desired precision (3%)

$$n = \frac{Z^2 \frac{\alpha}{2} P(1-p)}{d^2}$$

$$n = \frac{1.96 \times 1.96 \times 0.13 \times 0.87}{0.03 \times 0.03} = 482.761$$

The calculated total sample size for this study will be 483.

4.7. Sampling Procedure

The sampling technique used in this study was a taking participant using every other client fashion. The data (questionnaire) were recorded or collected for under five children patients who come to the referral hospital using every other client fashion. The patients' mother or caretakers (the under five children's mother or caretakers) was interviewed in face-to-face by data collectors with Amharic language.

4.8. Data Collection Instruments and Data Collection Procedure

A structured questionnaire was used to collect data. The questionnaire was adapted from the Ethiopian BSS questionnaire. Four qualified nurses was trained for two days and participated in the pre-test and data collection. The pre-test was conducted on 25 under five children in Debrebirehan referral hospital which were out of the sampled population. The principal investigator was closely followed and supervised data collection day to day. Incomplete and inconsistent data were identified and necessary corrections were made during the data collection time.

4.9. Data Processing and Analysis

Data entry, cleaning, editing and analysis were done using SPSS statistical software version 16.0. The frequency distribution of all variables was examined to check for data entry errors (e.g. unrecognized or missing codes, out of range values). For each variable, frequencies, odds ratios (OR), 95% CI and p-value at 5% will be computed to assess the process and degree of association between dependent and independent variables. To identify independent variables which had statistically significant association with the presence or absence of diarrhea diseases bivariate & univariate analysis were computed. The data were described and presented using narrative text and tables.

4.10. Data Quality Assurance

The questionnaire was structured and standardized. The data collectors were trained for two days. The instruments were pre-tested on 5% of the sample population/who was not the part of the study group. Based on the result of pre-testing a necessary revision was undertaken. Data collectors submitted the collected data to the supervisors on daily basis. The name of interviewer was recorded so as to enhance the responsibility to any in-

complete question. Data coding and data entry was checked at the beginning and at the midway stage of the work. Data cleaning was conducted at the end of data entry.

4.11. Ethical Consideration

Permission was obtained from the ethical clearance committee of Debrebirehan Health Science College and medical officer of the referral hospital. Informed verbal consent was obtained from the mothers/caretakers of the children. Mothers/caretakers were give their consent for participation in the study and all information that was obtain about the subjects as well as the mothers/caretakers was keep confidential.

5. Results

5.1. Socio-Economic Characteristic

From this study, the prevalence of diarrhea for under-five children in Debrebirehan referral hospital was found 31.7%. A total of 483 clients were included in this study. Out of these respondents, 479 (99.2%) were mothers and 4 (0.8%) were caretakers. More than 80% of the mothers were below the age of 36 years (**Table 1**). The majority of mothers were married 476 (98.6%), Christian by religion 469 (97.1). About 81% of the fathers were

Table 1. Socioeconomic characteristics of the respondents, Debrebirehan town, Debrebirehan zonal hospital June 2013 (n = 483).

Variables	Response category	Frequency	Percent
Relation of the respondent to the child	Mother	479	99.2
	Caretaker	4	0.8
Age of the mother	18 - 26	167	34.6
	27 - 35	227	47.0
	36 - 40	89	18.4
Marital status of mother	Married	476	98.6
	divorce	2	0.4
	single	5	1.0
Religion of parents	Christian	469	97.1
	Muslim	14	2.9
Ethnic group of parents	Amhara	408	84.5
	Oromo	61	12.6
	Tigray	12	2.5
	Others	2	0.4
Educational level of mother	Formal education	385	79.7
	Read only	27	5.6
	Totally no education	71	14.7
Occupation of the mother	House wife	259	53.6
	Government employee	110	22.8
	Private gainful work	114	23.6
Educational level of the father	Formal education	391	81.0
	Read only	36	7.5
	Totally no education	56	11.5
Occupation of the father	Government employee	179	37.1
	Merchant	189	39.1
	Farmer	115	23.8

literate. One hundred eighty nine (39.1%) fathers were merchants, 179 (37.1) were governments and 115 (23.8%) were farmers.

5.2. Environmental Characteristics

Floor of most houses (58.4%) were made from wood and others from mud and cement. From the total 483 respondents 63.5% of the total houses had three and more than three rooms. Only 17% of the total houses had one room. The majority of the respondents (96.3%) were not kept cattle in their houses where as 18 (3.7%) of respondents were lived with cattle in their houses. About 87.8% of the houses had either privately owned or shared latrine where as 12.2% of the houses had not latrine. About 260 (53.8%) of the respondents disposed their refuse by burning, 104 (21.5%) of the respondents disposed by burying the refuse in a pit and 72 (14.9%) of the respondents disposed in a garbage can. Only about 9.7% of the respondents disposed the refuse in open field (**Table 2**).

Three hundred eighty four (79.5%) respondents were used pipe/protected well as the main source of water

Table 2. Environmental characteristics of the respondents in Debrebirehan zonal hospital, June 2013 (n = 483).

Variables	Response category	Frequency	Percent
Types of floor material of the living house	Mud	191	39.5
	Cement	10	2.1
	Wood	282	58.4
Types of roof material of the living house	Thatched	90	18.6
	Corrugated iron sheet	393	81.4
Do animals live with family in one house	Yes	18	3.7
	No	465	96.3
Number of rooms	1	82	17.0
	2	94	19.5
	3	104	21.5
	4	183	37.9
	5	20	4.1
Is latrine available	Yes	424	87.8
	No	59	12.2
How do you dispose refuse?	Pit	104	21.5
	Burning	260	53.8
	Open field	47	9.7
	Garbage can	72	14.9
Source of water for drink	Pipe/protected well	384	79.5
	Unprotected well/spring	99	205
Types of collection container	Pot	79	16.4
	Plastic	55	11.4
	Jerry can bucket	349	72.2
Way of transporting water to home	In a covered container	460	95.2
	In uncovered container	23	4.8
Capacity of the container	10 - 20 liters	264	54.7
	21 - 30 liters	143	29.6
	31 - 40 liters	3	0.6
	41 - 60 liters	73	15.1

whereas and 99 (20.5%) used unprotected well/spring as the main source of water. About 349 (72.2%) respondents used Jerry can bucket to collect water and 79 (16.4%) respondents used pot to collect water. About Four hundred sixty (95.2%) respondents used a covered container, 23 (4.8%) respondents used uncovered container to fetch water (**Table 2**).

5.3. Behavioral and Child Demographic and Health Characteristic

Of the total 483 mothers/caretakers, 74 (15.3%) mothers breastfed their children exclusively. Four hundred nine (84.7%) mothers/caretakers fed their child other types of food in addition to the breast milk. About half (50.9%) mothers/caretakers fed their child cow's milk in addition to the breast milk, followed by powder milk, 132 (27.3%). Out of the total 483 mothers/caretakers who started supplementary feeding for their children 92 (19%) started before the child reached 6 months, and 327 (67.7%) after the age of 6 months. About 180 (37.3%) mothers fed their children using their hands, 169 (35%) mothers fed their children using bottle and 134 (27.7%) mothers fed their children using cup and spoon (**Table 3**).

5.4. Demographic and Health Characteristics of the Index Children

Only 45 (9.3%) children's mothers had diarrhea during the interview. Out of the 153 mothers/caretakers whose children got diarrhea at the time of the survey, about 132 (86.3%) mothers claimed that they took their child to the nearby health post or other health institution to seek medical help. Of the total children, nearly half of children (48.7%) age were from 7 - 14 months and 36% children age was above 24 months.

Out of 483 children, 258 (53.4%) children were males. One hundred and eighty-five (38.3%), 178 (36.9%), 72 (14.9%) 48 (9.9%) children were born first, second, third and fourth (beyond) respectively (**Table 4**). Of the total 483 children whose age was 9 months and above at the time of the survey, 344 (71.2) children were immunized for measles. Majority of children (96.1%) had diarrhea lasting less than 14 days. Out of 153 children who had diarrhea during the interview, 128 (83%) children had watery diarrhea, and only 26(17%) children had bloody and mucosal diarrhea. Out of the total 483 mothers/care takers, 368 (76.2%) mothers/caretakers were lived in urban (**Table 4**).

5.5. Association b/n Socio-Economic Factors and Diarrheal Diseases

In the Bivariate analysis and Multivariate (both) logistic regressions analysis, mothers' and fathers' occupation

Table 3. Behavioral aspects (maternal child health care and health practice) in Debrebirehan zonal hospital, June 2013 (n = 483).

Variables	Response category	Frequency	Percent
Child take other food	Yes	409	84.7
	Only breast milk	74	15.3
Prepare child food separately	Yes	396	82.0
	No	87	18.0
Type of food child receive	Cow's milk	246	50.9
	Powder milk	132	27.3
	Gruel	68	14.1
	Adult's food	37	7.7
Used material for child feeding	Hand	180	37.3
	Cup and spoon	134	27.7
	Bottle	169	35.0
Water storage container has cover	Yes	431	89.2
	No	52	10.8
Take water from drinking storage container by	Pouring	395	81.8
	Dipping	88	18.2

Table 4. Demographic and health characteristics of the index children, in Debrebirehan zonal hospital, June 2013 (n = 483).

Variables	Response category	Frequency	Percent
Age of index child	0 - 6	74	15.3
	7 - 24	235	48.7
	>24	174	36
Sex of the index child	Male	258	53.4
	Female	225	46.6
Birth order of the child	First	185	38.3
	Second	178	36.9
	Third	72	14.9
	Fourth and above	48	9.9
Mother has hx of diarrhea	Yes	45	9.3
	No	438	90.7
Did you breastfed your child	Yes	477	98.8
	No	6	1.2
Current breastfeeding status	Exclusive breastfeeding	72	14.9
	Partial breastfeeding	282	58.4
	Not breastfeeding	129	26.7
Time for starting supplementary food	<6	92	19.0
	>6	327	67.7
	Not start	64	13.3
Child receive measles vaccination	Yes	344	71.2
	No	139	28.8
Do your child have diarrhea today	Yes	153	31.7
	No	330	68.3
For how long the diarrhea last	Less than 14 days	148	96.1
	Greater than 14 days	6	3.9
The types of diarrhea that child had	Watery	128	83
	Blood and mucus	26	17
Action taken for diarrhea treatment	Take child to health institution	132	27.3
	Take child to traditional healers	14	2.9
	Increased feeding	7	1.4
Address	Urban	368	76.2
	Rural	115	23.8

were significantly associated with diarrheal morbidity. Children whose mothers were private workers were about two times more likely to had diarrhea compared to children whose mothers were housewives [AOR: 2.004, 95% CI: (1.167 - 3.442)]. Children whose fathers were farmers were more likely to have diarrhea compared to children whose were government employee [AOR: 1.427, 95% CI: (1.224 - 1.812)] (**Table 5**).

5.1.1. Association b/n Environmental Factors and Diarrheal Diseases
In both logistic regressions analysis, children who lived in houses which had one [AOR: 1.297, 95% CI: (1.097 - 1.906) and two rooms [AOR: 1.151, 95% CI: (1.032 - 1.716)] had significant association with childhood diarrheal diseases. Living with cattle in one house had significant association with childhood diarrheal diseases [AOR: 1.297, 95% CI: (1.097 - 1.906)]. Children who live in the rural areas were about two times more likely to

Table 5. Selected socio-economic factors in relation to childhood diarrheal diseases, June 2013 (n = 483).

Variables	Diarrhea			Adjusted OR (95% CI)
	Yes (%)	No (%)	OR (95% CI)	
Educational level of mother				
-Formal education	107 (27.8%)	278 (72.2%)	1	1
-Read and write	14 (53.8%)	12 (46.2%)	1.33 (1.148 - 1.736)*	0.576 (0.214 - 1.546)
-Totally no education	32 (44.4%)	40 (55.6%)	1.481 (1.287 - 1.806)*	0.751 (0.357 - 1.582)
Occupation of mother				
-House wife	100 (38.6%)	159 (61.4%)	1	1
-Government employee	29 (26.4%)	81 (73.6%)	1.757 (0.074 - 2.874)	1.072 (0.552 - 2.084)
-Private gainful work	24 (21.1%)	90 (78.9%)	2.358 (1.409 - 3.948)*	2.004 (1.167 - 3.442)*
Education level of father				
-Formal education	110 (28.1%)	281 (71.9%)	1	1
-Read and write	17 (47.2%)	19 (52.8%)	1.438 (1.219 - 1.873)*	1.219 (0.349 - 4.253)
-Totally no education	26 (46.4%)	30 (53.6%)	1.452 (1.256 - 1.798)*	1.548 (0.421 - 5.695)
Occupation of father				
-Government employee	44 (24.6%)	135 (75.4%)	1	1
-Merchant	57 (30.2%)	132 (69.8%)	0.755 (0.476 - 1.196)	0.667 (0.368 - 1.211)
-Farmer	52 (45.2%)	63 (54.8%)	1.395 (1.239 - 1.651)*	1.427 (1.224 - 1.812)*

Note: $p < 0.05$, * = Significant.

have diarrheal diseases than the children who live in the urban areas [AOR: 2.527, 95% CI: (1.847 - 7.538)] (**Table 6**).

5.1.2. Association b/n Behavioral Factors and Diarrheal Diseases

Children who fed gruel and adult's food were about three and four times more likely to have diarrhea than those who fed cow's milk [AOR: 3.046, 95% CI: (1.408 - 6.587) and (AOR: 3.703, 95% CI: (1.324 - 10.354) respectively].

Method of drawing/pouring water from storage container, and covering water storage container had significant association with diarrheal diseases [AOR: 1.371, 95% CI: (1.137 - 1.607) and (AOR: 1.304, 95% CI: (1.110 - 1.836), respectively]. In this study, maternal diarrheal diseases was significantly associated with childhood diarrheal diseases [AOR: 1.042, 95% CI: (1.015 - 1.219)] (**Table 7**).

6. Discussion

The findings of this study revealed that the prevalence of diarrhea in under-fives was 31.7 percent. This figure was quite high compared with 15% in Keffa-Sheka Zone [20], 13% in the report of the Demographic and Health Survey 2011 [30], 18.6% in the Republic of Congo and 11.4% in Gondar [23] but lower than findings in Jimma town (36.5%) [21] and in Jimmazone (33.7%) [24].

According to this study, occupation of mother and father was associated significantly with diarrheal diseases. This is also supported with other studies done on occupation of parent [2] [13] [21].

In this study, children who lived in houses with one and two rooms had significant association with diarrheal diseases. Similarly, a study done in Kefa-Sheka zone observed an inverse relationship b/n number of rooms and diarrheal morbidity [20]. Another study from Jimma town also revealed that children living in houses with three or more rooms had less diarrheal diseases [21]. Living with cattle in the same house had shown significant association with childhood diarrheal diseases. Similarly, study done by WHO revealed that the presence of animals in a house also can be used as a measure of exposure to diarrhea-causing organisms [11].

In the present study, children who live in the rural areas were about two times more likely to have diarrheal

Table 6. Selected environmental in relation to childhood diarrheal diseases, June 2013 (n = 483).

Variables	Diarrhea			Adjusted OR (95% CI)
	Yes	No	Crude OR (95% CI)	
Animals living with family in same house				
-Yes	13 (72.2%)	5 (27.8%)	1.166 (1.058 - 1.474)*	1.297 (1.097 - 1.906)*
-No	140 (30.1%)	325 (69.9%)	1	1
No of room in house				
-1	34 (41.5%)	48 (58.5%)	1.157 (1.034 - 1.721)*	1.239 (1.047 - 1.211)*
-2	42 (44.7%)	52 (55.3%)	1.138 (1.030 - 1.627)*	1.151 (1.032 - 1.716)*
-3	30 (28.8%)	74 (71.2%)	0.274 (0.060 - 1.255)	0.253 (0.054 - 1.195)
-4	45 (24.6%)	138 (75.4%)	0.341 (0.076 - 1.526)	0.354 (0.077 - 1.626)
-5	2 (10.0%)	18 (90.0%)	1	1
Latrine available				
-Yes	121 (28.5%)	303 (71.5%)	1	1
-No	32 (54.2%)	27 (45.8%)	0.337 (0.194 - 0.586)*	1.923 (0.286 - 12.932)
Source of water for drink				
-Pipe	105 (27.3%)	279 (72.7%)	1	1
-Protected well/spring	5 (45.5%)	6 (54.5%)	0.452 (0.135 - 1.511)	1.144 (0.252 - 5.181)
-Unprotected well/spring	43 (48.9%)	45 (51.1%)	1.394 (1.245 - 1.633)*	0.693 (0.280 - 1.717)
Address				
Urban	101 (27.4%)	267 (72.6%)	1	1
Rural	52 (45.2%)	63 (54.8%)	1.458 (1.297 - 1.706)*	2.527 (1.847 - 7.538)*

Note: p < 0.05, * = Significant.

Table 7. Selected demographic and behavioral aspects in relation to childhood diarrheal diseases, June 2013 (n = 483).

Variables	Diarrhea			Adjusted OR (95% CI)
	Yes	No	Crude OR (95% CI)	
Type of food child receive				
Cow's milk	93 (37.8%)	153 (62.2%)	1	1
Powder milk	40 (30.3%)	92 (69.7%)	1.398 (0.890 - 2.197)	1.230 (0.746 - 2.026)
Gruel	12 (17.6%)	56 (82.4%)	2.837 (1.445 - 5.569)*	3.046 (1.408 - 6.587)*
Adult's food	8 (21.6%)	29 (78.4%)	2.203 (1.967 - 5.023)*	3.703 (1.324 - 10.354)*
Water storage container has cover				
Yes	123 (28.5%)	308 (71.5%)	1	1
No	30 (57.7%)	22 (42.3%)	1.293 (1.163 - 1.528)*	1.304 (1.110 - 1.836)*
Take water from drinking storage container				
Pouring	107 (27.1%)	288 (72.9%)	1	1
Dipping	46 (52.3%)	42 (47.7%)	1.339 (1.211 - 1.545)*	1.371 (1.137 - 1.607)*
Mother has hx of diarrhea				
Yes	40 (88.9%)	5 (11.1%)	1.043 (1.017 - 1.113)*	1.042 (1.015 - 1.219)*
No	113 (25.8%)	325 (74.2%)	1	1

Note: p < 0.05, * = Significant.

diseases than the children who live in the urban areas. Similarly, researches done in Eritrea and rural Ethiopia indicated that children living in urban areas were less likely to have diarrhea compared to those in rural areas [2] [19]. Children in urban areas where proper sanitation and water are available, and where modern treatment is more frequent will have a lower prevalence of diarrhea. This may be attributed to the difference between urban and rural areas in literacy status, type of water source and latrine availability.

On the other hand, type of food received by child had shown significant association with the occurrence of diarrheal diseases. The children who fed gruel had three times more likely diarrheal diseases than children who were cow's milk fed in both analyses. The children who fed adult's food had four times more likely diarrheal diseases than children who were cow's milk fed in both analyses. It has been reported that partially breastfed or non-breastfed infants have about two to five times higher episodes of diarrhea experienced than exclusively breastfed infants [11] [16].

Studies revealed that obtaining water from storage containers by dipping was a risk factor for diarrhea [14] [20]. Similar to these findings, the present study showed that children who live in households where water was dipped out were more likely to have diarrhea compared to those who live in households where water was poured out. Those children who lived in households where uncovered water storage container was more like to have diarrhea than their counterparts. Similarly, other study showed that water stored in an uncovered container was associated with the occurrence of diarrheal diseases [14].

In the aspect, maternal diarrhea disease status was found to be significant predictors of diarrheal disease in children. Similar finding was observed in Congo where maternal diarrheal morbidity was associated with a two-fold increase in the odds for diarrheal disease in children [12]. This is so because mothers are food handlers of the family, and also they are usual childcare providers. Moreover, the care of the child may be compromised if the mother herself is sick.

7. Limitations and Strengths of the Study

7.1. Limitations

As being cross-sectional in the design, this study shared the drawbacks of similar cross sectional studies. In cross-sectional studies, it was difficult to entertain the seasonal differences in the occurrence of diarrheal diseases. The information on the prevalence of diarrhea might not reflect the actual situation that may be observed in the various seasons of the year, as the information on diarrhea was collected in a dry season. The other limitation was related to the definition of the term "diarrhea". There may be difference among mothers in perceiving their child's health. There was not enough financial support for studying this research during this time.

7.2. Strengths

The present study assessed the households' socioeconomic, environmental and behavioral characteristics that are considered to have effects on child health particular in diarrheal diseases. Considering multiple contributing factors that affect child health may help use the limited resources more effectively, by identifying the most important risk factors. The multiple factors considered in this study were analyzed using a stepwise logistic regression technique. This technique helps control for mediating and confounding factors, and also to identify the most important risk factors for proper intervention.

8. Conclusion

The overall results is this study suggest that living in rural areas, living with livestock in one house, occupation of parents, type of food child receive, child food handling practices, water handling practices and diarrheal history of mother were risk factors for the occurrence of diarrhea in under-five children.

9. Recommendations

Depend on this study finding, the authors recommend that IEC & BCC should plan to encourage the awareness of mothers on associated factors of diarrheal diseases, improve the environmental condition, giving direction for health extension worker to teach the community about diarrheal diseases. Further study should be done to identify the possible factors that were responsible for the high prevalence of diarrhea for proper interventions.

Acknowledgements

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