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RESEARCH

Environmental health factors associated with diarrhoeal diseases among under-five children in the Sebeta town of Ethiopia

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The aim of this study was to assess and explore household environmental health factors associated with the occurrence of diarrhoea experienced by children under five years of age in Sebeta town of Ethiopia. A cross-sectional study, using stratified random sampling was used to conduct the research. A total of 477 households' mothers/caregivers had participated in the study. The study showed that the prevalence of childhood diarrhoea was 9.9%. A number of risk factors including demographic variables, water and hygienic practices, and knowledge of risk factors showed significant association with childhood diarrhoea on bivariate analysis. The multivariate analysis showed that four variables were protective factors for childhood diarrhoea, including the type of toilet facility (AOR: 0.37; 95% CI 0.16 – 0.87; $p = 0.023$), availability of specific hand-washing places (AOR: 0.40; 95% CI 0.18 – 0.90; $p = 0.026$), availability of hand-washing facilities (AOR: 0.20; 95% CI 0.06 – 0.70; $p = 0.012$) and mothers' knowledge on diarrhoea causation (AOR: 3.09; 95% CI 1.24 – 7.68; $p = 0.015$). The study, thus, recommends that effective measures to curtail prevalence of diarrhoea in urban contexts should be substantially increased by enhancing protective factors such as urban sanitation promotion programmes with emphasis on accelerating universal access to improved sanitation and hand-washing facilities, together with efforts in promoting proper hygiene behaviours.

Keywords: childhood, diarrhoea, environmental health factors, Ethiopia, Sebeta town, under-five children

Introduction

Diarrhoeal diseases are major public health problems, especially in children in developing countries.[1] Globally, diarrhoea remains the second most common cause of death among children under five years of age.[2] There are an estimated 1.7 billion cases of diarrhoea with an average of 2.9 episodes/child/year, and an estimated 1.87 million deaths among children under five years of age.[3]

More than 40% of the global burden of disease attributed to environmental factors falls on children below five years of age, who account for only about 10% of the world's population.[4] Lack of safe water, sanitation and hygiene may account for as much as 88% of the disease burden due to diarrhoea.[5] For example, and a well-known fact, most of the cases of diarrhoea worldwide are the result of faecal-oral contamination. Water supply, sanitation and hygiene are one of the top ten proven preventive interventions for morbidity and mortality of children under five years of age.[6]

The 2005 Ethiopian Demographic and Health Survey showed that the prevalence of under-five childhood diarrhoea in the two-week period was 18% in Ethiopia.[7] A 2011 Demographic and Health Survey also showed that 13% of children under the age of five had diarrhoea, in the two-week period before the survey.[8] According to data sources from the World Health Organization and United Nations Children's Fund Joint Monitoring Programme for Water Supply and Sanitation, only 44% of the general population in Ethiopia has access to safe drinking water supplies. A further 79% of the population do not have access to improved sanitation facilities.[9] There is ample evidence that access to adequate and safe water and sanitation can influence the current levels of child mortality and, therefore, these major determinants must be addressed in developing sustainable preventive interventions.[10]

To effectively prevent childhood diarrhoea, it is imperative that the important risk factors associated with diarrhoea in communities be identified through research. With these situations, this study aimed to assess and explore the association between household environmental health risk factors and the occurrence of diarrhoea among children under five years of age in an urban setting of Sebeta town in Ethiopia.

Methods

Study design and setting

A descriptive, cross-sectional design was used to conduct the study among households of Sebeta town from October to November 2013. The setting for this study, Sebeta town, is located in Oromiya region in Ethiopia. The town is 25 kilometres to the Southwest of Addis Ababa. Sebeta town is administratively divided into eight *kebeles* (local administrative unit below district),[11] with a population of more than a 100 000 people.[12]

Sampling methods

A two-stage stratified random sampling method was used to select the samples in which the population was first divided into relevant strata (subgroups). Firstly, the *kebeles* was considered as strata and all eight *kebeles* of the town were included in the study. Thereafter, all the lists of households with under-five children in each *kebele* (community) which were registered by the *kebele* health post were used as the sampling frame for the random selection of sampling units. A proportional size allocation method was employed to determine the number of

study subjects in each *kebele*. In the second stage of sampling, from each stratum (*kebele*), households with under-five children were selected using the simple random sampling technique by means of a table of random numbers.

Sample size

The sample size for this study was determined using the statistical formula of $N = Z^2P(1\text{-}P)/d^2$ for estimation of single population proportion in prevalence study.[13] In the formula, where *n* was the required sample size, *P* was the proportion of diarrhoea (assumed prevalence of diarrhoea of 17%), *Z* was the standard score corresponding to 95% confidence level (and is thus equal to 1.96) and *d* was the margin of error (estimated at 5%). With a design effect of 2 for the multistage nature of stratified sampling and a non-response rate of 10%, accordingly, the sample size for the study was 477 households' mothers/caregivers with under-five children.

Inclusion and exclusion criteria

The inclusion sampling criteria for this study were:

(i) Household's mother/caregiver having a child who had not yet completed his or her 60th month. In cases, where there were more than one under-five child in the same household, the youngest child was selected; and,

(ii) Households that were registered as having under-five children by the *kebele* health post.

The exclusion sampling criteria for the research were:

(i) Institutions (such as offices, hotels, etc.) other than households; and,

(ii) Households that did not have child/children under five years of age and were not registered as having under-five children by the *kebele* health post.

Ethical considerations

The Health Studies Higher Degrees Committee of the department of Health studies at the University of South Africa (UNISA) granted the ethical clearance certificate to conduct the research. Institutional consent was also sought from the government institution in Ethiopia. Permission was obtained from the Oromiya Regional Health Bureau to conduct the study in Sebeta town of Ethiopia. Voluntary informed consent was obtained from all the study participants.

Data collection

Two types of structured data collection methods were used in the study. These were structured interview and structured observational methods. The data collection tool which was employed for household interview and observation methods is the structured interview schedule (questionnaire). A structured data collection tool was developed after carrying out a literature review and was mainly adapted from the publications of World Health Organization and United Nations Children's Fund,[14] Environmental Health Project,[15] Hygiene Improvement Project,[16] and United Nations Children's Fund.[17]

The type of question in the interview schedule was based on the two types of variables of the study, namely dependent (outcome) and independent (explanatory) variables. The occurrence of childhood diarrhoea in an under-five child within the last two weeks preceding the study interview was considered to be the dependent (outcome) variable. The outcome measure, diarrhoea in under-five children, was based on mothers' response (yes or no) to a question on whether a particular child under 60 months of age had experienced diarrhoea during the two weeks prior to the interview. This was measured by asking mothers with children under the age of 5 years to provide information about the history of diarrhoea for the two weeks prior to the interview. Diarrhoea is defined as three or more loose or liquid stools passed in a 24 hour period.[15] Environmental health factors were considered to be the independent variables. Thus, the questions of the structured data collection tool were focused on sociodemographic data, household environmental health conditions and childhood diarrhoea.

The data collection tool was initially developed in the English language and then translated to Afan Oromo, which is the local language of the study area. The structured data collection tool was pretested in the same study area where the main data collection was performed. The pretest was carried out in 10% (47 households) of the total sample size of the study.

The data collection from the randomly selected households of Sebeta town was conducted by a field data collection team, which consisted of the principal researcher and the field data collectors. The field data collectors were urban health extension workers of the *kebele* health posts in Sebeta town. The data collectors were trained for one day on data collection methods and the interview/observation methodology. Twenty-nine data collectors were grouped into eight teams as per the eight *kebeles* of Sebeta town to gather data from the households. The principal researcher was responsible for overall coordination of the whole data collection process and checking of the data quality during the field data collection period.

Data analysis

Data were coded and entered into a computer using EPI Info 7.0 and analysed using SPSS version 20.0 statistical software. The summary results of the descriptive statistics were presented using tables and graphs. In analysing data, both bivariate and multivariate analyses were employed using SPSS software programme to identify the determinants of childhood diarrhoea. Bivariate analysis was conducted using chi-square test of independence or Fisher's exact test. Multivariate analyses were performed using the binary logistic regression to estimate the association between the dependent variable and independent variables. All the independent variables that were found significant with a *p* value less than 0.25 in the bivariate analysis were entered into the regression model, and a backward stepwise (likelihood ratio) method was used for the multivariate analysis. The results of the multivariate analysis were presented with an adjusted odds ratio (AOR) with 95% confidence intervals (CI) and *p* values. In all the analyses, the test was two-sided and a *p* value less than or equal 0.05 was considered statistically significant.

Results

Socio-economic and demographic data of the study households

All the household respondents, from a total of 477 households that were randomly selected for the study in Sebeta town of Ethiopia, participated in the interview, thus resulting in a response rate of 100%. The largest proportion (93.3%) of the interview respondents comprised mothers of the under-five children, whereas 6.7% were female caregivers who were at least

18 years of age. The majority of the respondents (92.9%) were from urban areas, while 7.1% were from rural areas (town peripheral areas within town boundary but with rural characteristics).

The results of the study show that the mean age of the mothers was 28.6 years. The majority of the mothers were between the age of 20 and 29 years (64.6%). The majority of the mothers (91%) were married. According to the results of the study, 26.4% mothers were illiterate (cannot read and write) and 73.6% were literate. The majority of household heads (86%) were literate and 14% were illiterate. The results of the study regarding the mothers' types of job show that 54.5% mothers were housewives and 16.8% were private traders. The mean for the number of under-five children in the households was 1.3, and 72.1% of mothers had one under-five child. The majority of households (81.1%) had more than three household members, and the mean household family size of the study population was 4.7. The majority of households (65.4%) had a family monthly income of less than or equal to 1 000 Ethiopian Birr (ETB). About three-fifths of the houses were privately owned (61.4%), and over half (55.1%) of the house floors were made of earthen floor. More than half (56.2%) of the households had three separate rooms or less, and the mean for the number of separate house rooms held by the study population was 3.3. Table 1 displays the households' socioeconomic and demographic characteristics.

Environmental health conditions

The percentage of the population with access to improved piped water was 96.6%. The mean per person per day for water consumption in the households was 2.4 litres. Five out of nine households (54.3%) had treated their drinking water at home. The majority of households (92.7%) had toilet facilities that members of the household routinely used, and less than one-third of households (29.4%) had used an antiquated toilet facility. Regarding children's stool disposal practices, the majority of the households (81.1%) used a proper disposal method (contained). Two-thirds of the households (67.9%) had used improper wastewater disposal methods. Nearly three-fifths of the households (58.1%) used a proper solid waste disposal method. The study indicates that over one-half of the households (55.1%) had specific places for handwashing and an overwhelming majority of the households (93.1%) had handwashing devices. About three-fifths of the households (61.2%) had water for washing their hands at the specific handwashing places, and over four-fifths of the respondents (84.5%) had good knowledge on at least three causes of diarrhoea. Table 2 presents the household environmental health characteristics.

Under-fives' demographic and health characteristics

The results of the study showed that the mean age of the under-five children was 25.6 months. About one-third of the children (32.1%) were in the age group of 36–59 months, and 29.8% ranged from 24–35 months of age. Three-fifths of the under-five children (59.5%) were males, while two-fifths of the under-five children (40.5%) were females.

The prevalence rate of diarrhoea among under-five children in the two weeks proceeding the interview day was 9.9% (Table 3). Furthermore, all of the children that had diarrhoea (47, 100%) were found to have suffered from the illness for a duration of less than 14 days (acute diarrhoea), with a mean of 3.3 days.

Bivariate analysis of factors associated with childhood diarrhoea

In the bivariate analysis, using the chi-squared and Fischer's exact tests, a number of risk factors appeared to be significantly associated with childhood diarrhoea. The identified risk factors were: area of residence (χ^2 (1, N = 477) = 7.71, p = 0.01), household head's education (χ^2 (1, N = 477) = 3.78, p = 0.05), household's level of water treatment (χ^2 (1, N = 477) = 5.38, p = 0.02), mother's/caregiver's washing practices with soap on washing a child's bottom after defecation (χ^2 (1, N = 477) = 4.02, p = 0.05), availability of specific places for handwashing (χ^2 (1, N = 477) = 5.98, p = 0.02), availability of handwashing devices (facility) (χ^2 (1, N = 477) = 16.69, p = 0.001), availability of water for handwashing at the specific handwashing places (χ^2 (1, N = 477) = 7.65, p = 0.006), the mother's/caregiver's knowledge on hand-washing with soap before feeding children (χ^2 (1, N = 477) = 3.69, p = 0.05) and the mother's/caregiver's knowledge on at least three causes of diarrhoea (χ^2 (1, N = 477) = 5.87, p = 0.02) (Table 4).

Multivariate analysis of factors associated with childhood diarrhoea

The bivariate analysis was conducted using chi-square and Fisher's exact tests to identify the risk factors of childhood diarrhoea; however, any possible confounding factors were not controlled at this level. Multivariate analysis was performed using the binary logistic regression by backward stepwise method with a likelihood ratio approach in order to identify the risk factors that are independently associated with diarrhoea while controlling for confounding variables. Only independent variables that were significantly associated with childhood diarrhoea at a p value less than 0.25 in the bivariate analysis using chi-square test and Fisher's exact test were included in the multivariable analysis. The Hosmer-Lemeshow test indicates chi-square value with a $p > 0.05$ (χ^2 = 3.338, 8 degrees of freedom, p = 0.91) which signifies that the overall model fit is good.

The regression model indicated that four variables were found to be independent protective factors for childhood diarrhoea in the expected direction. These protective factors were:

- The type of toilet facility used was significantly associated with diarrhoea (AOR: 0.37; 95% CI 0.16–0.87; p = 0.023).
- The availability of specific places for handwashing had a significant association with childhood diarrhoea (AOR: 0.40; 95% CI 0.18–0.90; p = 0.026).
- Childhood diarrhoea was significantly associated with the availability of handwashing devices (facility) (AOR: 0.20; 95% CI 0.06–0.70; p = 0.012).
- Mother's knowledge on the causes of diarrhoea was significantly associated with diarrhoea in children (AOR: 3.09; 95% CI 1.24–7.68; p = 0.015).

Table 5 provides a summary of the binary logistic regression results.

Discussion

This study examined household environmental health factors associated with the occurrence of childhood diarrhoea of Sebeta town in Ethiopia. The results indicated that the prevalence of diarrhoea was 9.9% in under-five children in the previous two weeks preceding the interview. This rate was less prevalent compared to study findings by the Ethiopian Demographic and Health Survey of 2011, in which national childhood diarrhoea

Table 1: Household socio-economic and demographic characteristics (*N* = 477)

Characteristic (*N* = 477)	Frequency	Percentage
Area of residence		
Urban	443	92.9
Rural	34	7.1
Mothers age		
20–29	308	64.6
30–39	159	33.3
40–49	10	2.1
Mothers education		
Illiterate	126	26.4
Literate	351	73.6
Household head education		
Illiterate	67	14.0
Literate	410	86.0
Main job of the mother		
Private trade (merchant)	80	16.8
Housewife	260	54.5
Others	137	28.8
Number of under-five children		
1	344	72.1
>1	133	27.9
Number of persons in households		
≤3	90	18.9
>3	387	81.1
Family monthly income in Ethiopian Birr*		
≤1,000	312	65.4
>1,000	165	34.6
Type of house ownership		
Private owned	293	61.4
Rented	184	38.6
Number of separate house rooms		
≤3	268	56.2
>3	209	43.8
Main material of the floor of the house		
Earthen floor	263	55.1
Non-earthen floor	214	44.9

*1 US Dollar (USD) equals 20.7 Ethiopian Birr (ETB) on July 20, 2015.[18]

prevalence rate was recorded at 13% for the country, 11.3% for the Oromiya region, and 11% for the urban areas of the country.[9] The data for this study were collected during the month of November, which is a dry season in the study setting of Ethiopia. Conducting the study during a dry season might not reflect the diarrhoea prevalence rates during the rainy season. Other studies indicate that there is a relation between diarrhoeal illnesses and weather-related and climate-related events.[19] In some studies, diarrhoea prevalence was found to be higher in the rainy season than in the dry season.[20]

Slightly over half of the study households (54.3%) treated their drinking water at home, and the bivariate analysis of the study using chi-square test indicated that there was a statistical significance in the association between diarrhoea and household-based drinking water treatment. However, after controlling the influence of other variables in the multivariate analysis, childhood diarrhoea and household-based drinking water treatment had no significant association. Similarly, a study conducted in Kenya found that none of the water treatment methods used by households had any association with diarrhoea.[21] In contrast, a cross-sectional analytical study conducted in Tanzania showed that treating water with any method (AOR = 0.49, 95% CI 0.28–0.84) and treating water by boiling (AOR = 0.39, 95% CI 0.2–0.7) were associated with reduced risk of diarrhoea.[22]

The type of toilet facility used showed no significant association with diarrhoeal disease in children when examined in the bivariate analysis. In the multivariate analysis, the type of toilet facility used was a significant protective factor for childhood diarrhoea; and, showed a significant negative effect (AOR = 0.37; 95% CI 0.16–0.87; p = 0.023). This means that children of

Table 2: Environmental health conditions of the study households (*N* = 477)

Characteristic (*N* = 477)	Frequency	Percentage
Main source of drinking water		
Piped water	461	96.6
Non-piped water	16	3.3
Household-level water treatment		
Yes	259	54.3
No	218	45.7
Availability of a toilet facility that members of the household usually use		
Available	442	92.7
Not available	35	7.3
Type of toilet facility used		
Improved	337	70.6
Unimproved	140	29.4
Stool disposal methods		
Contained (proper disposal)	387	81.1
Uncontained (improper disposal)	90	18.8
Type of domestic wastewater disposal method		
Proper disposal of wastewater	153	32.1
Improper disposal of wastewater	324	67.9
Type of household solid waste disposal method		
Proper disposal	277	58.1
Improper disposal	200	41.9
Availability of specific place for handwashing		
Available	263	55.1
Not available	214	44.9
Availability of handwashing device (water tap or local water holding receptacle, pail with dipper, kettle, jug, basin or sink)		
Available	444	93.1
Not available	33	6.9
Availability of water for handwashing at the specific handwashing place		
Available	292	61.2
Not available	185	38.8
Mothers knowledge of at least three causes of diarrhoea		
Poor (mentioned none or 1–2)	74	15.5
Good (mentioned more than two or 3–12)	403	84.5

Table 3: Children's demographic and health characteristics (*N* = 477)

Characteristic (*N* = 477)	Frequency	Percentage
Age of child (months)		
0–6	35	7.3
7–11	45	9.4
12–23	102	21.4
24–35	142	29.8
36–59	153	32.1
Gender of child		
Male	284	59.5
Female	193	40.5
Diarrhoea in under-five child within the last two weeks preceding the interview		
Yes	47	9.9
No	430	90.1
Duration of diarrhoea		
<14 days (acute diarrhoea)	477	100
>14 days (persistent diarrhoea)	-	-

Table 4: Risk factors for diarrhoea in children under the age of five years ($N = 477$)

Characteristic ($N = 477$)	Diarrhoea in under-five children		χ^2	p value
	Yes No. (%)	No No. (%)		
Area of residence				
Urban	39 (8.8)	404 (91.2)	7.71	0.01*,**
Rural	8 (23.5)	26 (76.5)		
Household head education				
Illiterate	11 (16.4)	56 (83.6)	3.78	0.05*
Literate	36 (8.8)	374 (91.2)		
Household-level water treatment				
Yes	18 (6.9)	241 (93.1)	5.38	0.02*
No	29 (13.3)	189 (86.7)		
Mother's/caregiver's washing practices with soap during the previous 24 h on washing a child's bottom after defecation				
Yes	12 (6.1)	184 (93.9)	4.02	0.05*
No	30 (11.6)	228 (88.4)		
Availability of specific places for handwashing				
Available	18 (6.8)	245 (93.2)	5.98	0.02*
Not available	29 (13.6)	185 (86.4)		
Availability of handwashing devices				
Available	37 (8.3)	407 (91.7)	16.69	0.001*, **
Not available	10 (30.3)	23 (69.7)		
Availability of water for handwashing at the specific handwashing places				
Available	20 (6.8)	272 (93.2)	7.65	0.006*
Not available	27 (14.6)	158 (85.4)		
Mother's/caregiver's knowledge on handwashing with soap before feeding children				
No	30 (12.4)	211 (87.6)	3.69	0.05*
Yes	17 (7.2)	219 (92.8)		
Mothers' knowledge of at least three causes of diarrhoea				
Poor (mentioned none or 1 to 2)	13 (17.6)	61 (82.4)	5.87	0.02*
Good (mentioned more than two)	34 (8.4)	369 (91.6)		

*Statistically significant with p value ≤ 0.05.
**Fisher's exact test.

Table 5: Multivariate analysis of factors associated with diarrhoea among under-five year children

Characteristics	Crude OR (95% CI)	Coefficient	Adjusted OR (95% CI)	P value
Time to obtain drinking water (round trip)(≤30 min/>30 min)	1.95 (0.71–5.79)	1.270	3.56 (0.79–15.98)	0.097
Type of toilet facility used (Improved/Unimproved)	0.64 (0.33–1.25)	–0.997	0.37 (0.16–0.87)	0.023*
Type of toilet ownership (Private toilet/Shared toilet)	3.65 (0.83–22.44)	1.452	4.27 (0.90–20.25)	0.067
Mothers' practices on hand-washing with soap before feeding children (No/Yes)	1.87 (0.88–3.98)	0.800	2.23 (0.98–5.05)	0.056
Availability of specific places for handwashing (Available/Not available)	0.47 (0.24–0.91)	–0.910	0.40 (0.18–0.90)	0.026*
Availability of handwashing devices (facility) (Available/Not available)	0.21 (0.09–0.51)	–1.597	0.20 (0.06–0.70)	0.012*
Mothers' knowledge on at least three causes of diarrhoea (Poor/Good)	2.31 (1.09–4.86)	1.127	3.09 (1.24–7.68)	0.015*

*Statistically significant with p value ≤ 0.05.

households with improved toilet facilities had a lower prevalence of diarrhoeal disease than those children whose households used unimproved toilets. The latter is indicative of the importance of the availability of improved toilet facilities and its impact in reducing childhood diarrhoea.

Furthermore, the bivariate analysis showed that, except washing a child's bottom after defecating which was statistically significant with childhood diarrhoea ($p = 0.05$), all variables of mothers' washing practices with soap, including washing hands and her body, washing the children's hands, washing clothes and washing the children's body did not show any significant association with childhood diarrhoea. After controlling for other

variables in the multivariate analysis, the results showed that washing a child's bottom after defecating was not significantly associated with diarrhoea occurrence. Even though washing hands with soap did not show a significant relationship with diarrhoea in this study, the importance of using soap to rid the hands of microbiological contamination, and its association with reducing the risk of diarrhoea, have been demonstrated consistently in the past in several studies.[23]

Studies have shown that the existence of a designated place for handwashing is a good approximation of actual handwashing practice, and closely related to diarrhoeal disease prevalence.[24] In the current study, the bivariate analysis revealed a significant association between the availability of specific places for handwashing and diarrhoea in under-five children. The significant association was retained even after controlling for all the other variables in the multivariate analysis. Children from households with a specific place for hand-washing were 0.40 times less likely to have diarrhoea compared to those from households that did not have specific places for handwashing (AOR = 0.40; 95% CI 0.18–0.90; $p = 0.026$). Studies in developing countries have found that a handwashing facility where soap and water are colocated in one place for handwashing at key times, are important determinants of good handwashing practice with soap habits.[25]

For the hygiene of a household to improve, the primary caretaker must have easy access to a place to wash his or her hands, which has water and soap within easy reach. Access means that the members of the household can wash their hands when needed. One of the elements in the proper handwashing place is to have a handwashing device allowing for unassisted handwashing (e.g. tap, pail, water container, clay pot, handwashing sink, or tippy tap).[15] The results of this study in the bivariate analysis showed a significant difference in childhood diarrhoeal disease among households that had handwashing devices compared with those that did not have such devices. Even after controlling for other variables, the difference in the risk of diarrhoea remained significant. Thus, children from households that had handwashing facilities were 0.20 times less likely to have diarrhoea as compared to those that did not have handwashing facilities (AOR = 0.20; 95% CI 0.06–0.70; $p = 0.012$).

In addition, the results for the bivariate analysis showed that mothers' knowledge of at least three causes of diarrhoeal diseases was a significant protective factor for childhood diarrhoea. Furthermore, the significant association was maintained even after controlling for the effects of other variables in the multivariate analysis. The results showed that children whose households had poor knowledge on at least three causes of diarrhoea were 3.09 times more likely to develop diarrhoea than those that had a good knowledge (AOR = 3.09; 95% CI 1.24–7.68; $p = 0.015$).

Similarly, a cross-sectional survey conducted as a baseline survey to provide data for monitoring the impact and effectiveness of a water supply and sanitation intervention showed that responses to four of the survey questions reflecting the knowledge of disease causation and prevention were associated on their own with significant differences in diarrhoea prevalence among the index children.[24] Children whose caretakers thought that washing the children's hands, supervising what they eat, washing fruits and vegetables, and washing kitchen utensils are important preventive actions had a lower prevalence of diarrhoea. All such practices were protective against diarrhoea, reducing risk by about 40% when compared with children of mothers who thought that these practices were unimportant in diarrhoea prevention.

Limitations – The study units (households) that were included in the study were from the municipal communities of Sebeta town in Oromiya Regional State. Other towns in Ethiopia were not included in this study. Research results, therefore, were limited to this particular town and may not be generalised to other towns in the country. Furthermore, as the study was not a trend or follow-up type of research, it did not consider seasonal differences in the occurrences of diarrhoea.

Conclusions

The findings identified important environmental determinants that contribute to the occurrence of diarrhoea in under-five children of Sebeta town in Ethiopia. Both facilities (technologies) and behavioural aspects of environmental health act more notably as determinants of childhood diarrhoeal disease. The findings conclude that childhood diarrhoea has a number of environmental determinants, particularly environmental health risk factors associated with lack of improved sanitation and handwashing facilities and poor knowledge on diarrhoea causation. This clearly indicates the importance of environmental health as a determinant of child health. The importance of providing priority to protective factors for childhood diarrhoea such as the promotion of the availability and use of improved sanitation technologies and good hygiene practices, particularly focusing on the availability and use of handwashing designated places and hygienic hand-washing facilities; and, ensuring mothers'/caregivers' knowledge about the causes of diarrhoea is fundamental. This implies that hygiene promotion programmes should give priority to protective factors such as the safe disposal of excreta, the adequate washing of hands and increasing mothers'/caregivers' knowledge on the causes of diarrhoea to encourage appropriate hygiene practices. These actions need to be addressed in the planning and implementation of urban environmental health, sanitation and hygiene promotion programmes for the prevention of childhood diarrhoea. There is a need for effective measures to curtail the prevalence of diarrhoea among children by enhancing universal access to improved sanitation, household hygiene technologies for handwashing and promoting proper hygiene behaviours through hygiene promotion.

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