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Environmental Factors Associated with Diarrhoea Among Under-five Children Attending at Muhimbili National Hospital, Tanzania

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Abstract

Generally, diarrhoea is still a second major reason of death and illness in children below the age of five years. It holds breathes of around half a million under five children every year and causes million more to be admitted. Every year diarrhoea kills around 525000 children under five years. Globally there are nearly 1.7 billion cases of childhood diarrhoea disease every year. Unfortunately, environmental factors associated with diarrhoea among under five children in Tanzania have not yet well addressed. Therefore, this study aimed to determine environmental factors associated with diarrhoea among under-five children attending at Muhimbili National Hospital (MNH), in Tanzania. A quantitative cross-sectional study design of 100 simple randomly selected participants was applied. Questionnaires were used to collect data from mothers/ carers with a child of under-five children suffering from diarrhoea admitted at MNH. Data were analysed using SPSS. Environmental risk factors associated with diarrhoea were determined with a p value of ≤ 0.05. Unsuitable infrastructure for grey water disposal, improper hand washing before feeding the baby and hand washing without using clean water and soap had strongly association with diarrhoea in under-five children attending at MNH with P-value of 0.001, 0.001, and 0.01 respectively. Identified risk factors for diarrhoea among under-five children call for the importance of providing health education to the caregivers on the causes, prevention, and treatment on the problem.

Background: *Generally, diarrhoea is still a second major cause of death and illness in children below the age of five years. It holds breathes of around half a million under five children every year and causes million more to be admitted. Every year diarrhoea kills around 525000 children under five years. Globally there are nearly 1.7 billion cases of childhood diarrhoea disease every year. It is always a symptom of an infection in the intestinal tract caused by parasite, viruses, and bacteria [1].*

The illness and deaths associated with diarrhoea diseases among under five children are extremely large and continue to exist among children living in poor countries, including in Sub Saharan countries, which create a great effects to health of the society [2]. The study conducted by Bado, Susuman identified that there is a link between diarrhoea disease among under five children and poor standard of living, poor general hygiene and inability to have safe water for drinking [2].

The effects that may result from diarrhoea include electrolytes and fluid imbalance, disturbance in acid and base regulation. Children suffering from severe diarrhoea they are at risk of getting electrolyte imbalance like hypokalaemia and dehydration which is the most cause of death if it is not treated immediately [3]. The common ways of preventing diarrhoea disease are by applying the ways target in interfering of faecal oral transmissions pathways, commonly refers

as five "F" (fluids, fields, flies, finger, and food). These ways include using clean and safe water, sanitation, hygiene and good preparation of food [4].
In Tanzania, by the year 2017 diarrhoea was the third principal cause of under-five morbidities which accounted over 27% [5]. Although there is decreasing in mortality caused by diarrhoea in under-five children, but still there is a persistent morbidity caused by diarrhoea. Therefore, study aimed on determining the environmental factors associated with diarrhoea among under-five children attending at MNH in Tanzania.

Keywords: Environmental Factors, Diarrhoea, Muhimbili National Hospital, Under-five Children, Tanzania

Abbreviations

- **EMD -** Emergency Department
- **MNH –** Muhimbili National Hospital

Literature Review

Diarrhoea is the major health problem and is the second principal reason of death and illness among children below the age of five worldwide. Typically, diarrhoea is the sign of an infection in the gastrointestinal which may be caused by different pathogens like viruses, bacteria, and parasite. Diarrhoea disease is transmitted through contaminated food, dirty drinking water, or from individual to individual with poor hygiene. Mortality resulting from diarrhoea mainly occur in children living in poor countries including sub–Saharan Africa [6].

Each year, 2.5 billion cases of diarrhoea in under-five children are likely to end up with death. More than half of these cases occur in Africa and South Asia. About 80% of the deaths are still in Africa, especially in Sub Saharan Africa. Child morbidity and mortality due to diarrhoea is the consequences of factors such as unsafe drinking water, poor feeding practice, inadequate knowledge on breast feeding, unhygienic condition and poor economic status [7].

The study done in Senegal showed that the diarrhoea diseases continue to be a significant reason of illness and deaths among under five children. In the country, diarrhoea accounts for 15% of all deaths in children under the age of five years and is the third leading cause of childhood deaths. In addition, was indicated that diarrhoea is a primary reason for the care givers to seek for frequently medical care for children of under five years of age [8].

The study done in Tanzania among admitted children by the year 2017 showed that diarrhoea is the third major cause of morbidity which accounts over 27% [5]. The following are the factors identified as contributing to diarrhoea among under five children.

Knowledge on Breast Feeding

Knowledge on breast feeding is among of the factors contributing to diarrhoea among under-five children. Various studies have showed that preparation for breast feeding the baby had a straight link with childhood diarrhoea. Some of these preparations include prompt beginning of breast feeding, care of breasts, mixing of food, period to start supportive feeding, proper preparation of supportive foods and children immunization. Colostrum which is the first milk contain large amount of nutrients and has the advantage of reducing infection diseases like diarrhoea [9]. For the children who begin the complementary feeding, diarrhoea is the big challenge. Cleanness during preparation of these complementary food increases the risk of diarrhoea to under five children [9].

Unsafe Drinking Water

Globally unsafe drinking water is a major health problem which may contribute to diarrhoea among under five children. Unsafe water is likely a source of more than 500,000 mortality each year and is a sources of diseases such as diarrhoea, dysentery, and cholera [10]. The study done in India shows that only 11% of the rural population is saved by house hold water connection, and the survey of microbial water quality in India have shown extensive faecal contamination of drinking water supplies [11]. On the other hand, water can be safe, but it can be contaminated during collecting, transporting, and storing. In developing country there is a lack of safe drinking water, people drink water which is not boiled, not filtered, and not disinfected. Study done by Boisson, Stevenson showed that globally768 million people are yet using unsafe drinking water sources[11]. The study done by Boisson, Stevenson showed that the best solutions of ensuring safe drinking water is treatment and good storage of drinking water at home [11]. Methods which are used in water treatment include boiling, disinfection, and filtration of water at home.

In Tanzania, it was found that that up to 88% of all children with diarrhoea disease is because of poor hygiene, unclean water, and poor sanitation [12].

Poor Preparation of Food

Evidence shows that how food is handled has a major contribution to diarrhoea in children below the age of five living in low financial status [13]. Parents and children in poor economic countries are likely to experience poor cleanliness practices such as cooking in the dirty environment and using utensils which are not clean. Poor preparation of food during cooking and saving may increase the burden of diarrhoea up to 70% [13]. The percentage of food borne disease is considered to be precipitated by poor preparation of food at home, poor eating behaviours among users, unsatisfactorily cooking, and how they handle their foods including storage of foods [14].

Improper Hand Washing

Globally hand washing is still the best and less cost method in prevention of infectious diseases such as diarrhoea. Improper hand washing practice especially to care takers of under five children increases the risk of health problem to their children [15]. Hand washing is one of the major ways of promoting hygiene that can prevent the transmission of pathogen which cause diarrhoea to under five children. Hand washing after toileting and before and after preparing meals can decrease the threats of

diarrhoea [16]. Hands washing by using soap and running water may significantly reduce morbidity and mortality resulting from an infectious disease transmitted by fecal oral route or by personal to personal contact [17]. Therefore, the purpose of this study was to determine environmental factors associated with diarrhoea among under-five children attending at MNH in Tanzania.

Specific Objectives

To assess association of social demographic characteristics with diarrhoea among under five children attending at MNH.

To identify association of environmental factors with diarrhoea among under five children attending at MNH.

Methodology

This research was conducted to determine environmental factors associated with diarrhoea among under five children attending at MNH in Tanzania. The study was conducted at Makuti A ward and at emergency department (EMD). Makuti A is a specialized ward for admitting children under eleven years of age suffering from diarrhoea, and EMD is the place for receiving referral cases and patients coming from home and from lower lever hospitals. Following the study being conducted at MNH which is the national referral hospital receiving patients from different parts of Tanzania, the findings of this study is expected to be generalized all over the country.

The study population were caregivers or parents of the children of under the age of five years attending at MNH whom the chief complaint on admission was diarrhoea. Another inclusion criterion of participants were those carers who provided consent and were speaking English or Kiswahili (National language of Tanzania). However, the study excluded the caregivers/ parents whom their children were serious sick as they were maintaining close observation to their children. Another exclusion criterion was those caregivers who were not willing to participate.

A quantitative approach with cross sectional study design was employed. Simple random sampling methods were used in selecting participants who were parents or caregivers of under-five children who met inclusion criteria. A total of 100 participants were sampled for the study. Data were collected using questionnaires and were entered, cleared, and analysed by using SPSS version 20. Data analyses was done by categorizing the social demographic characteristics and clinical characteristics using mean, median, and proportions. Results were presented in the form of cross tabulation and inferential statistics were analysed by indicating chi square.

The ethical approval provided by ethics review committee of the university. The permission to collect data was provided by head of teaching and Consultancy Unit at MNH with Reference number MNH/TRC/Permission /2019/037. Informed consent was obtained from each participant before engaging them in the study. Consent form was developed in English language and translated to Kiswahili for the respondents who were not using English. There was not any compensation offered for their participation. Participation of carers did not affect their child health services provided by the hospital facility. All their rights were observed and respected. Respondents had rights to refuse to participate in the study and were having the right to withdraw from the study at any point without any effect on the care of their child. Confidentiality was maintained by ensuring that name of the participant and the name of a child did not appear on the questionnaire whereby the number was used instead of names. Information was collected and stored in the soft copy and saved in the researcher laptop with a password protection. No one was having access to data, apart from the researcher and supervisor. The hard copy was kept in a locked cupboard. Privacy was maintained during data collection. No harm was caused by this study.

Results

A total of 100 respondents participated in the study. Most of the participants (50%) were aged between 26-35 years. most of the participants (46%) had primary education. Other characteristics of the participants are shown in table 1.

Table 1: Socio-demographic characteristics of the participants in MNH (n=100)

Variable		Frequency	Percentage
Age of care giver in years	16-25	31	31.0
	26-35	50	50.0
	36-45	9	9.0
	46-55	5	5.0
	56-65	5	5.0
	Total	100	100
Education level	Primary	46	46.0
	Secondary	35	35.0
	University	9	9.0
	No formal education	10	10.0
	Total	100	100.0
Marital status	Single	31	31.0
	Married	63	63.0
	Divorced	3	3.0
	Widow	3	3.0

	Total	100	100.0
Relationship with the child	Father	1	1.0
	Mother	86	86.0
	Grandfather	1	1.0
	Grandmother	8.0	8.0
	Others	4.0	4.0
	Total	100	

Table 2 shows that participants had a challenge of hand washing whereby 93% of them were not washing their hands appropriately.

Table 2: Risk factors associated with diarrhoea among under-five children attending at MNH (n=100)

VARIABLE	FREQUENCY	
	YES	NO
Hand washing facilities at home.	20 (20%)	80 (80%)
Hand washing by using clean water and soap	8 (8%)	92 (92%)
Hand washing before feeding the baby	19 (19%)	81 (81%)
Hand washing before feeding	7 (7%)	93 (93%)
Boiling and filtering drinking water	31 (31%)	69 (69%)
Suitable infrastructure for grey water disposal	1 (1%)	99 (99%)
Proper place for waste disposal	15 (15%)	85 (85%)
Covering of food after preparing	90(90%)	10 (10%)
Proper place for cooking food	22(22%)	78 (78%)
Washing utensils used for serving meals for children	88 (88%)	12 (12%)

Figure 1 shows that majority of participants (77%), were getting drinking water from public tap. Other information is shown in the figure

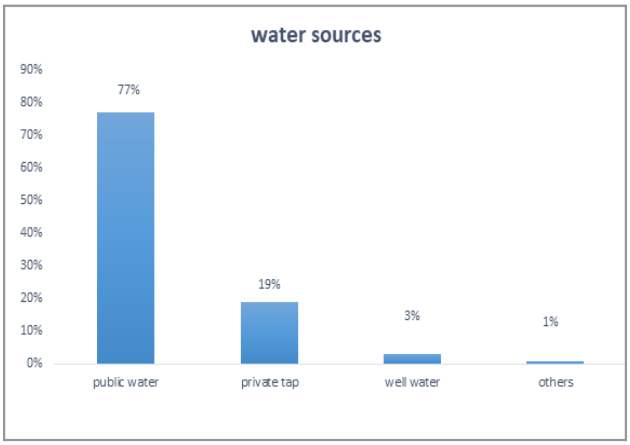

Figure 1: Distribution of water sources

From the study findings, two participants' characteristics were associated with diarrhoea among under five children. One the identified characteristic was age of participants whereby children cared by participants aged between 26-35 years were at greater risk of diarrhoea (p value=0.041). Another participants' characteristic was education status whereby the findings shows children cared by carers with primary level of education were at greater risk of diarrhoea (p-value=0.001) as it is shown in table 3.

Table 3: Association of demographic data as risk factor for diarrhoea among under-five children at MNH (n=100)

				X2	Df	P-value
		High risk	Low risk			
Age of the care giver	16-25	27	4	9.957	4	0.041
	26-35	29	21			
	36-45	8	1			

	46-55	4	1			
	56-65	4	1			
	Total	72	28			
Education status of the care giver	Primary	44	2	3.980	4	0.001
	Secondary	18	17			
	University	1	8			
	No formal education	9	1			
	Total	72	28			
Relationship with the caregiver	Father	0	1	38.270	3	0.409
	Mother	61	25			
	Grand father	1	0			
	Grand mother	7	1			
	Others	3	1			
	Total	72	28			
Marital status of the care giver	Single	26	5	3.140	3	3.70
	Married	42	21			
	Divorced	2	1			
	Widow	2	1			
	Total	72	28			

The study also found that 81.8% of respondents neither boiled nor filtered water for drinking. There was an association between not boiling and filtering drinking water and diarrhoea (P-value=0.001). Also, the study found that there was an association between improper hand washing and diarrhoea in under-five children (P-value=0.001). It was found that 72% of participants did not wash their hands appropriately. Other risk factor identified to have association with diarrhoea was improper place for waste disposal (P=0.01). A total of 85(85%) respondents indicated to have no proper place for waste disposal.

Furthermore, the study showed that there was a statistical association between a place of cooking and diarrhoea (P-value=0.001), and improper washing of utensils used for serving meal with diarrhoea (P-value =0.001). A total of 67% respondents stated to have no proper place for cooking food. Sources of water for drinking and for domestic use had association with diarrhoea both with P-value was of 0.001, and 0.001.

Majority of the respondents (72%) initiated complementary feeding to their children before six months of life which indicated association with diarrhoea with the P value of < 0.03.

Discussion

This study was to determine risk factors associated with diarrhoea among under-five children attending at MNH. The study involved parents or carers for under five children attending at MNH.

The study found that age (P-value=0.01) and educational status of the caregiver (P-value=0.001) have shown association with environmental factors contributing to diarrhoea. Having higher level of education of caregivers increased knowledge on preventing diarrhoea to their children. This finding is supported by the study done in Ethiopia whereby mothers with higher level of education experienced superior chance of their children to be safe from diarrhoea [18].

Also, the study found that neither boiling nor filtering drinking water is among of the risk factors contributing to diarrhoea to under five children. The results is vice versa of the findings of the study done in Ethiopia which revealed that lack of clean and safe water was among of the contributing factors to diarrhoea among under five children [19]. Similarly, the study done by Godana and Mengiste, found that an accessibility of home based drinking water treatment was the preventive measures of occurrence of diarrhoea in under-five children. In addition, children whom their families doing home treatment of drinking water such as boiling and application of chemicals such as chlorine and or filtering of water were found to have low chances of acquiring diarrhoea [6, 20].

Furthermore, in this study, there was a significant association between the availability of hand washing facilities with childhood diarrhoea. Families that have got access to hand washing facilities at their homes had lower risk of developing diarrhoea. The findings is the same as in the study done by Al-Ghamdi, Bentham which suggested that the availability of water could have an impact on hand washing, basically because when water is nearby, hand washing is extra common and this encourages hygiene improvement [14].

Unsafe source of water appears to have association with diarrhoea. This is consistent with study on unimproved water source as the major risk factor for diarrhoeal diseases transmission. Families with unprotected water sources were expected to have children with diarrhoea three times more and vice versa [6].

This study found that eating of streets food sold by food sellers which is not prepared at clean and safe environment had association with diarrhoea among under-five children. This findings is same as the study done by Agustina, Sari which found that the practice of getting cooked food made out of home is associated to the source of food borne transmitted diseases including diarrhoea in children [13].

Furthermore, initiating complementary food before the age of 6 months seems to be among of the risk factors for diarrhoea. This study found that children who started complementary feeding below the age of six months had diarrhoea. This is similar to the study done in India that showed that 55.6% of children who kept in EBF up to six months were at low risk of developing diarrhoea compared to those who started complementary feeding before completing six months of life [21]. Another study recommended that introducing weaning food to the children made in dirty environment are usually infected with pathogens and are the major risk factor for diarrhoea in under-five children [13].

More factors revealed to have association on diarrhoea in this study were place for waste disposal especially latrines at home. As per previous study done by Godana and Mengiste found that children from homes without toilet facilities were at high risk of having diarrhoea compared to children from families having latrine facility [6]. The availability of latrine rises the chance of its use that enables the safe disposal of faeces. Improper disposal of children faeces was strongly connected with acute diarrhoea in children. Likewise, the study done in Ethiopia by Gbru, Tasha found that that children whose their families perform improper waste disposal were at risk of developing diarrhoea compared to children whose their families were performing proper waste disposal [22].

Strengths

This study determined environmental factors associated with diarrhoea among under five children attending at MNH in Tanzania and had several strengths. Data were collected from parents and care givers. The pilot study was conducted to ensure appropriate implementation of the methodology in the Tanzanian context. This study was the first such study to be conducted in the commercial capital city of Tanzania. The association of dependent and independent variables using p-values was determined.

Limitation

Some respondents who met inclusion criteria were not ready to participate in the study as they were busy with taking care of their children which limited the sample size.

Implications for Practice

The findings of this study will help parents/ care givers and health workers on modifying environmental factors associating with diarrhoea among under five children. In addition, the healthcare workers will use the findings to give proper health education to parents. Furthermore, findings will inform policy makers on setting guidance on how environmental factors associating with diarrhoea among under-five children can be addressed and eliminated.

Conclusions

The findings identified important environmental determinants that contribute to diarrhoea in under-five children attending at MNH. Both facilities and behavioural aspects of environmental health act more notably as determinants of childhood diarrhoeal disease. The findings show that childhood diarrhoea has several environmental determinants, particularly environmental health risk factors such as poor knowledge on caused of diarrhoea, lack of improved sanitation and poor hand washing facilities. This indicates the importance of environmental health as a determinant of preventing diarrhoea among under five children. Therefore, it is important to provide health education on ways of preventing diarrhoea such as improved sanitation and good hygiene practices. Moreover, the health education should focus on the availability and use of hand-washing facilities and ensuring parents and or caregivers have knowledge about the causes of diarrhoea.

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Conflicts of Interests

None of the authors have any conflicts of interests in this study

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