International Journal of Science and Healthcare Research
Vol.5; Issue: 4; Oct.-Dec. 2020
Website: ijshr.com
Original Research Article *ISSN: 2455-7587*

An Investigation into the Relationship between Sanitation Practices and Water-Borne Enteric Diseases in Ihechiowa Community, Arochukwu, Southeastern Nigeria

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ABSTRACT

Universal, affordable and sustainable access to Water, Sanitation and Hygiene (WASH) is a key public health issue. The objective of this study is to investigate the relationship between sanitation practices and occurrence of water-borne enteric diseases among residents in Ihechiowa community, Arochukwu L.G.A., Southeastern Nigeria. The study was a descriptive cross sectional study to investigate the sanitation practices and occurrence of water-borne enteric diseases in Ihechiowa community, Arochukwu, Southeastern, Nigeria. The multistage sampling technique was adopted to select samples for the study. A well-structured questionnaire was used to interview the subjects and obtain data for the study. Data was uploaded into the SPSS version 23 software and the Chi-square was used to test for association at 5% level of significance. All subjects used for this study gave an informed consent to be part of the study. A total of 242 subjects were used for this study. The water-borne enteric diseases identified among the respondents in the study area include diarrhoea (20.4%), typhoid fever (50.0%), dysentery (1.4%) and cholera (28.2%). There was a significant relationship [P (0.015) < 0.05] with the type of latrine used and the presence of water-borne enteric diseases. There was also a significant relationship [P (0.001) < 0.05] with the material used for anal cleansing and the presence of water-borne enteric diseases. Further investigations revealed that hand washing after toilet use had a significant relationship [P (0.015) < 0.05] with the presence of water-borne enteric diseases. In conclusion, sanitation practices were found to be associated with water-borne enteric diseases. Health promotion and awareness campaigns on water, sanitation and hygiene were recommended.

Keywords: Water, Sanitation, Hygiene, Water-borne, Enteric diseases.

INTRODUCTION

The concept of Water, Sanitation and Hygiene (WASH) in communities is not only to promote hygiene and increase access to quality health but also to support national and local interventions to establish equitable, sustainable access to safe water and basic sanitation services in every community/society. [1] The provision of water, sanitation, and hygiene has been known to have profound effects on human health. [2] Despite progress made in extending access to safe water and sanitation through the Millennium Development Goals (MDGs), over one third of the global population live in households/communities without safe water, sanitary disposal of human waste, and personal hygiene as basic services to

humanity. [3] In recognition of the importance of WASH in this setting, WASH in communities is explicitly captured in the post-2015 Sustainable Development Goals (SDGs). [4] Lack of access to safe water and basic sanitation, as well as poor hygiene cause nearly 90% of all deaths from enteric infections like diarrhoea and it occur mainly in children. [5] While 87% of the world's population now has access to improved water sources, 39% still lack access to improved sanitation. [6]

Primary prevention of water-borne enteric diseases like (diarrhoea, cholera and typhoid fever) through water, sanitation and hygiene interventions is based on reducing the faecal-oral transmission of pathogens, and includes the provision of an improved water supply, water safety planning, household water treatment and safe storage, improved sanitation facilities, and hygiene education. [7] Improved water supplies refer to technologies such as piped household water connections, public taps, standpipes, or protected dug wells, springs or rainwater collection. Improved sanitation facilities may include flush/pour flush toilets to a confined system, improved latrines (e.g. ventilated with slab), or composting toilets. [7] Water safety planning considers the management of water from the source to tap. [8] Water treatment may be carried out at source or in the home, and safe water storage takes place in containers, preventing recontamination of water in the household. [9] Hygiene education can address a number of practices, including hand washing after toilet use and before the preparation of food. [10] Water, sanitation and hygiene interventions also prevent intestinal parasitic infections alongside diarrhoea, and these infections also have synergistic effects with malnutrition. [11] Various studies have documented how access to safe water, sanitation and adequate hygiene can predict child growth and malnutrition. [12]

Behavioral factors are important in determining the uptake and sustainable adoption of water, sanitation and hygiene technologies and practices. While water, sanitation and hygiene interventions are highly efficient, their effectiveness in part depends on behavior change and context. The installation and functioning of water and sanitation facilities need to be accompanied by the transfer of knowledge on how to use them, together with sustainable behavior change. [13] Maintenance and periodic replacement of existing services/facilities, and hygiene promotion are also necessary to achieve improvements. Poor sanitation, water scarcity, inferior water quality and inappropriate hygiene behavior are a major cause of mortality for children and young adult. [6] This condition is also detrimental to the health of people, mostly those who spend long hours in a define institution outside their home. Some common water related diseases are shown in table 1.

Table 1: Sub-categories of water-related diseases [14]

Category	Type of Water exposure	Examples
Waterborne microbiological Disease	Drinking Water	Cholera, Typhoid fever, viral gastroenteritis e.g. due to Norovirus
Waterborne chemical disease	Any water used for washing/ personal hygiene	Arsenicosis
Water hygiene Diseases	Recreational Water	Scabies, shigellosis; trachoma
Water contact Diseases	Untreated freshwater Sources	Schistosomiasis (bilharzia); cyanobacteria
Water vector habitat diseases	Drinking water and untreated water sources	Malaria (mosquitoes); filiariasis (mosquitoes); onchocerciasis (aquatic flies); schistosomiasis (snails); trypanosomiasis (tsetse flies)
Excreta disposal Diseases	Drinking or raw water Sources	Ascariasis; faecal-oral infections e.g. shigellosis; schistosomiais; trachoma
Water aerosol Diseases	Drinking or raw water Sources	Legionellosis (legionnaires' disease; humidifier fever); Norwalk-like viral gastroenteritis

MATERIALS AND METHODS

The study was a descriptive cross sectional study to investigate the sanitation practices and occurrence of water-borne enteric diseases in Ihechiowa community, Arochukwu, Southeastern, Nigeria. The multistage sampling technique was adopted to select samples for the study. A well-

structured questionnaire was used to interview the subjects and obtain data for the study. All subjects used for this study gave an informed consent to be part of the study. Data was uploaded into the SPSS version 23 software and the Chi-square was used to test for association at 5% level of significance.

RESULTS

A total of 242 subjects were used for this study. The water-borne enteric diseases identified among the respondents in the study area include diarrhoea (11.98%), dysentery (4.13%) cholera (19.83%) and typhoid fever (51.24%). Table 3 showed the type of latrine used by the subjects and the number of people who have suffered from water-borne enteric diseases. All the subjects that used bucket latrine, silt-mounted latrine and ventilated improved pit latrine have suffered from water-borne enteric diseases. Forty-nine (86%) of those who used a pit latrine have suffered from water-borne enteric diseases. There was a significant relationship [P (0.015) < 0.05] with the type of latrine used and the occurrence of water-borne enteric diseases. Table 4 showed that all the subjects that used small wooden stick and corn-cob for anal cleansing suffered water-borne enteric diseases. Other materials used for anal cleansing and the frequency that suffered from water-borne enteric diseases include paper (89.9%), tissue paper (94.9%), water (86.2 %), tissue paper and water (74.2%). There was a significant relationship [P (0.001) < 0.05] with the material used for anal cleansing and the presence of water-borne enteric diseases. Table 5 showed that 88.3% of subjects that washed their hand after toilet use have suffered from water-borne enteric diseases. There was a significant relationship [P (0.015) < 0.05] with hand washing after toilet use and the presence of water-borne enteric diseases. Table 6 showed that 84.2% of subjects that cleaned their toilet daily suffered from water-borne enteric diseases. For other frequency of toilet cleaning and the occurrence of water-borne infections: weekly, 91.6%; monthly, 88.5%, every three months, 100%. There was a significant r relationship [P (0.012) < 0.05] with frequency of toilet cleaning and the presence of water-borne enteric diseases.

Table 2: Distribution of Water-borne Enteric diseases

Water-borne Enteric diseases	n	%
None	31	12.81
Cholera	48	19.83
Diarrhoea	29	11.98
Dysentery	10	4.13
Typhoid fever	124	51.24

Table 3: Relationship of type latrine used and Water-borne enteric diseases

Type of Latrine	No. that suffered water-borne enteric diseases				
	Total	Yes	%	No	%
Bucket latrine	4	4	100.0	0	0.0
Silt-mounted latrine	17	17	100.0	0	0.0
pit latrine	57	49	86.0	8	14.00
Ventilated improved pit -latrine (VIP)	3	3	100.0	0	0.0
Pour flush latrine	34	26	76.47	8	23.53
Water cistern (WC)	128	112	87.4	16	12.6
Combined options	3	3	100.0	0	0.0
P value	`0.015				

Table 4: Relationship of material used for anal cleansing and Water-borne enteric infections

Material used for anal cleansing	No. that suffered water-borne enteric infection				
	Total	Yes	%	No	%
Small wooden stick	5	5	100.0	0	0.0
Corn-cob	3	3	100.0	0	0.0
Paper	42	38	89.9	4	10.1
Tissue paper	86	81	94.9	5	5.1
Water only	16	14	86.2	2	13.8
Tissue paper and water	51	38	74.2	13	25.8
Tissue paper with water and soap	26	24	91.5	2	8.5
P value	0.001				

Table 5: Relationship of hand washing after toilet use and Water-borne enteric diseases

Hand washing after toilet use	No. that suffered water-borne enteric diseases				
	Total	Yes	%	No	%
Yes	231	204	88.3	27	11.7
No	7	7	100.0	0	0.0
Non response	4	4	100.0	0	0.0
P value	0.015				

Table 6: Relationship between frequency of cleaning toilet and Water-borne enteric diseases

Frequency of cleaning	No. that suffered Water-borne enteric diseases				
	Total	Yes	%	No	%
Daily	83	70	84.2	13	15.8
Weekly	95	87	91.6	8	8.4
Monthly	38	34	88.5	4	11.5
Three Months	16	16	100.0	0	0.0
Others	10	10	100.0	0	0.0
P value	0.012				

DISCUSSION

Everyday people are put at risk through drinking contaminated water, eating food prepared in bowls or with utensils washed with contaminated water, through poor personal hygiene, bathing and washing in unhygienic water. [15] Table 2 showed that majority of the subjects studied have suffered infections relating to water, sanitation and hygiene (WASH). According to WHO [16], over 3 million people die each year from water-related diseases mostly from developing countries with 80% of the total disease burden coming from the poor countries. It is estimated that up to half of all hospital beds in the world are occupied by victims of water contamination. [15] The biggest killer is diarrhoea contracted from micro-organisms in water contamination by sewage resulting in 1.8 million child deaths per year. In places like Sub-Saharan Africa and South Asia, up to half of all cases of malnutrition are caused by diarrhoea. [17] Various studies [13,14] and outbreak incidences have found an association between poor water quality and diarrhoea. The health consequences of inadequate water and sanitation services include an estimated 4 billion cases of diarrhoea and 1.9 million deaths each year, mostly among young children in developing countries. [18] Diarrhoea diseases lead to decreased food intake and nutrient absorption, malnutrition, reduced resistance to infection and impaired physical growth and cognitive development.

A survey by the Department of Physical and Health Knowledge and Practice among secondary school children in Zaria, Nigeria; observed that poor knowledge and practice of personal health and environmental health increased prevalence of diarrhoea among children of school age. [19] Organizations are often faced with the difficult decision of where to focus limited resources in order to improve water and sanitation conditions. Selecting the most appropriate interventions for a specific location depends on existing water and sanitation conditions, cultural acceptability, hydrology and water quality, implementation, feasibility and local conditions. [18] Inadequate water, sanitation and hygiene account for a large part of the burden of illness and health in developing countries. Approximately 4 billion cases of diarrhoea per year cause 2.2 million deaths, most of them children under the age of five with about 15% of deaths in developing countries. Diarrhoeal diseases account for 4.3% of the total global burden. An estimated 88% of this burden is attributable to unsafe drinking water supply, inadequate sanitation and poor hygiene. [7] These risk factors are second after malnutrition, in contributing to the burden of the disease. [16] Improving global access to clean water and sanitation is one of the least expensive and most effective means to improve public health and save lives. The concept of clean water and sanitation as essential to health is not a novel idea.

Typhoid fever was reported in 51.24% of the subjects in this study. It occurs as a result of infection with the bacteria *Salmonella typhi*. It can survive in water for 7 days and in sewage for 14 days. [20] Typhoid fever has a worldwide distribution although they are endemic in communities where the standards of sanitation and personal hygiene are low. Typhoid fever presents one of the classical examples of a water-borne infection. All ages and both sexes are susceptible. The disease is clinically characterized by a typical continuous fever for 3 to 4 weeks, relative bradycardia with involvement of lymphoid tissues and considerable constitutional symptoms. [21] Enteric fevers are observed all through the year. Outside the human body, the bacilli are found in water, ice, food, milk and soil for varying periods of time. These factors are compounded by such social factors as pollution of drinking water supplies, open air defecation and urination, low standards of food and personal hygiene and health ignorance. [22] Typhoid fever can be transmitted through contaminated water, milk or food, or through flies. Typhoid fever

has been reported in similar studies on water-borne diseases. [10,13]

All these water-borne enteric diseases can be mitigated by practicing good sanitation and hygiene. Pour flush and water cistern are known to be more hygienic and related studies [23, 24] have advocated for the use of pour flush in an effort to eradicate open defecation. The use of tissue paper together with soap and water for anal cleansing is much better and more hygienic in preventing water-borne enteric diseases. The frequency of toilet cleaning should be at least once a day and should increase where there are more users of the toilet.

In conclusion, there is relationship between sanitation practices and water-borne enteric diseases. It is recommended that adequate health promotion and awareness campaigns on water, sanitation and hygiene practices are intensified especially in the areas of hand washing, provision of toilet facilities and anal cleansing.

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How to cite this article: Okereke, E.E., Amadi, C.O.A., Iro, O.K. et.al. An investigation into the relationship between sanitation practices and water-borne enteric diseases in Ihechiowa community, Arochukwu, Southeastern Nigeria. *International Journal of Science & Healthcare Research.* 2020; 5(4): 447-452.

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