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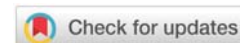
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Research Article

Study on Excreta Disposal Methods and the Occurrence of Faeco-oral Diseases in Owerri-North L.G.A, Imo State

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Abstract

Introduction: Access to excreta disposal facility (sanitary toilet) is a necessary human right of everybody and the fundamental sign of sustainable development. Children and adults regularly suffer from diarrhea and typhoid fever which are diseases that are spread mostly through faeco-oral route. The general objective of this study was to determine the excreta disposal methods and the occurrence of faeco-oral diseases in Owerri-north L.G.A., Imo State.

Methods: A cross-sectional study design was performed for this study. The sample size was calculated using Yamane formula as such the sample size was 400. Multi-stage sampling method was used in selecting communities that participated in the study. Data was collected with the aid of a structured questionnaire. Data analysis was done using Statistical Package for Social Science (SPSS) version 21. Data collected was presented using descriptive statistics such as frequencies and percentages; the hypotheses were tested using chi-square (χ^2) statistic at ≤ 0.05 level of significance.

Result: The result revealed that of the 400 households sampled; 83.3% uses water closet/ pour-flush latrine, 11.0% uses pit latrine, 3.8% uses VIP latrine, 1.0% practices wrap and throw methods, 0.5% uses bucket latrine while 0.2% practices both digging in the compound and sand fill/ open defecation respectively. Frequently reported faeco-oral diseases include; Typhoid fever (34.0%), Diarrhea (20.3%) and Dysentery (4.8%). The study also revealed that there was a significant relationship between faeco-oral diseases suffered by members of the households and the type of the toilet system used by the household ($\chi^2=96.2702$, $P<0.002$).

Conclusion: Although most households in this study area use water closet/pour flush latrine, which is the most convenient and environmental friendly excreta disposal method yet majority of them suffer from faeco-oral diseases. Therefore, households should practice hygienic use of their various excreta disposal facilities in order to prevent occurrence of faeco-oral diseases.

Introduction

The dangerous and most persistent challenge besetting most developing countries and their cities are the health impact of urban pollution that originate from poor fecal waste management [1]. A basic fact of life is that human beings, old and young, rich and poor, need to get rid of their faeces every day. Proper faecal disposal methods provide safe disposal of faeces to stop it from polluting the environment [2]. Some people resort to open defecation where human faeces are dumped in the environment, while others dispose the faeces

with or without the use of water. Most rural areas in developing countries do not have piped water, and where it be present, the quantities may not be sufficient. This condition needs the use of non-water systems, commonly referred to as conservancy systems, instead of the more superior, hygienic water carriage system [3].

Conservancy systems are those types of sanitation which faeces are returned directly to earth or are for the time being stored pending removal. It is any system where water is not used to transport the excreta. Common conservancy systems



used in rural areas are traditional pit latrine. The system is also called “drop-and-store”. It needs a reasonable amount of open space; soil that can be dug, low ground water level and a site that is not predisposed to flooding [4]. Generally it consists of a pit and floor, including the superstructure. Simplicity, use of local materials in construction and low cost makes it inexpensive by majority of the people in developing countries [5-7]. However, in places where the soil is weak, the sides of the pit may cave in and create large openings that create odor nuisance causing people to avoid using the pit [8]. Apart from fly and odor nuisances, the warm hydrogen gas that comes out of the pit makes most people uncomfortable, especially women who believe that they can get infections by using the pit latrine; therefore they avoid it [9].

Ventilated Improved Pit latrine (VIP) is an improved pit latrine designed to minimize odor and flies. Unlike the ordinary pit latrine, a vent pipe covered with a gauze mesh or fly-proof netting is incorporated into the design to remove odorous gases from the pit, prevent flies entering the pit and trap any flies trying to leave. The vent pipe can be located inside or outside the latrine. The interior of the superstructure is usually dark to deter flies, but there is a gap, usually above the door to allow air to enter. This gap is at least three times the cross-sectional area of the vent pipe [10,11].

An aqua privy is a tank filled with water into which excreta falls via a drop pipe. It uses a water seal to prevent odors getting out of the tank and a soak-away pit to dispose of sullage and effluent. The drop pipe in the tank extends below the surface of the water to prevent the escape of odors. The tank is usually watertight to ensure prevention of groundwater pollution. Hence it requires emptying about every three years [7].

The pour-flush latrine, also known as water-seal latrine, is a type of pit latrine in which small volumes of water (usually 1-3 liters) is used to flush feces into the pit. It has a small collection pan placed on a slab in which excreta is deposited through a section of pipe bent into a U shape (a U-bend) to maintain a water seal for reducing fly and odor problems. The pit is sometimes connected to a soak-away to permit liquids to infiltrate the soil, leaving solid waste to decompose. Like the VIP latrine, twin pits are provided, while one is used, the other is reserved until the first is filled before use [12].

The septic tank also known as “on-site sanitation is the best suitable and reasonable system of fecal disposal based on water-carriage in individual residences, small groups of houses or institutions located in areas out of reach of sewer system [3]. It consists of a covered settling tank into which the raw sewage is flushed in from the building sewer. It is the most convenient and environment friendly sanitation technology used in both rural and urban areas, provided a suitable site for the soak-away is existing [13].

The increase in the occurrence of faeco-oral disease is a public health problem of a major concern. Faeco-oral diseases are diseases in which the infectious agents are found in faeces (stool) and enter the body through the mouth (oral route). The mode of transmission may be in contaminated food or water, on the hands, or on objects such as bowls, spoons and cups [14]. Faeco-oral diseases can be caused by a wide range of infectious

agents, including bacteria, viruses, protozoa (single-celled parasites) and helminths (parasitic worms). Some examples of Faeco-oral diseases are Cholera, Typhoid fever, Shigellosis (bacillary dysentery), Viral diarrhoeal diseases, Hookworm etc which kill children every 21 seconds [15]. Evidence based studies also indicate that sanitary excreta disposal facility combined with hygiene (hand washing) serve as the most effective mediation for reducing disease mortality/ morbidity rates, especially diarrhea diseases e.g. cholera, typhoid fever etc. It acts as a principal barrier in breaking the transmission cycle of these diseases. For example, provision of toilets alone can lessen the occurrence of diarrhea and deaths of kids below 5 years by more than 30%, including underfeeding [16].

This study is relevant nationally and internationally because defecation is a necessity of every human being, and as such access to excreta disposal facilities becomes important. These facilities when not available forces people to excrete indiscriminately which can lead to occurrence of faeco-oral diseases, which is a leading communicable disease in the world today. Most of these faeco-oral diseases occur mostly in rural and semi-urban communities. Hence this study aimed at determining the excreta disposal methods practiced by households in Owerri-North L.G.A and the occurrence of different types of faeco-oral diseases in the area.

To the best knowledge of the researcher there is dearth of empirical works in this study area. It is expected that the findings of this study will form input for appropriate health programmes to address the identified problem.

Methods

Study area

The study was conducted in Owerri-North L.G.A which is one of the local government in Imo State. Owerri-North LGA occupies a total area of 198 square kilometres and has a median temperature of 27 degrees centigrade. The target population was 34,686 head of households in Owerri-North L.G.A. The number of households was derived by the researcher from the current estimated population of Owerri North LGA which was 242,800 inhabitants with the area mostly populated by members of the Igbo ethnic group according to National Population Commission of Nigeria and National Bureau of Statistics (2017). The household for the study was selected randomly from the twenty one communities that make up Owerri-North L.G.A. Some of these communities are rural communities such as Agbala, Akwakuma, Emii, Ihitaoha, Ihitta-ogada, Obibiezena while Orji, Obibi uratta, Naze, Emekuku and Amakohia are semi-urban communities

Study design

This was a cross-sectional survey that was conducted in Owerri-North L.G.A in Imo State. The study participants consisted of households residing in Owerri-North. The researcher obtained the participants' consent and collected information on their excreta disposal facilities and faeco-oral diseases suffered by members of the household with a structured questionnaire. A household was represented by the head of the house. In their absence any mature adult/ care giver was considered. When none of the above was present that household was not sampled.



Data collection

The data was collected with the aid of a structured questionnaire by the researcher or research assistants. The respondents that are literate were allowed to fill the questionnaire themselves but for those respondents that are non-literate in English language, the questions were asked in local language (or were translated to them through an interpreter) and their responses were filled by the researcher (or research assistant). Each questionnaire did not exceed 5-10minutes time to be completed. The questionnaire was structured into two sections.

Section A focused on the methods of human excreta waste disposal used by households, excreta disposal methods were classified into Bucket latrine (those types of sanitation which faeces are stored in the bucket for the time being pending removal), Pit latrine (those types of sanitation which faeces are returned directly to earth or are for the time being stored pending removal), VIP latrine (it is an improved pit latrine designed to minimize odour and flies), Water closet/ Pour-flush latrine (also known as water -seal latrine, is a type of latrine in which water (is used to flush faeces into the soak-away), Open defecation (fondly called bush attack, defecating in open environments), wrapping the excreta and throwing away, and digging in the compound to defecate and fill up the holes with sand.

Section B focused on reported faeco-oral diseases suffered by members of the households for the past three months.

Data analysis

The data collected was entered into an excel spreadsheet and exported into SPSS software version 21 for analysis. Descriptive statistics was used for excreta disposal methods used by respondents and reported faeco-oral diseases suffered by members of the households for the past three months. Data was presented in form of frequency distribution tables. Chi square test was used to determine association between excreta disposal methods and the occurrence of faeco-oral diseases/infections. P-value less than or equal to 0.05 was considered statistically significant.

Ethical consideration

Ethical clearance was obtained from Ethical Committee, Department of Public Health, Federal University of Technology, Owerri. An introductory letter was given for the benefit of conducting the study; verbal informed consents were obtained from respondents that participated in the study.

Result

Excreta disposal methods used by respondents

Out of the 400 households sampled; 333(83.3%) respondents reported that the excreta disposal used by the household was water closet/ pour-flush latrine, 44(11.0%) respondents reported that the excreta disposal used by the household was pit latrine, 15(3.8%) respondent reported that the excreta disposal used by the household was VIP latrine, 1(0.2%) respondents

reported open defecation (fondly called bush attack), 1(0.2%) respondents reported digging in the compound and filling it with sand and 4(1.0%) respondents reported that the excreta disposal used by the household was wrap and throw (Table 1).

Frequently reported faeco-oral diseases/infections

One hundred and thirty six (34.0%) respondents reported that they were diagnosed of typhoid fever, 81(20.3%)

Table 1: Distribution of respondents by Excreta Disposal Methods Used.

Excreta disposal methods	Frequency (n=400)	Percentage(%)
Toilet System		
Bucket latrine	2	0.5
Pit latrine	44	11
VIP latrine	15	3.8
Pour flush latrine/ Water closet	333	83.3
Open defecation (Bush attack)	1	0.2
Wrap and throw	4	1
Dig in the compound and fill with sand	1	0.2
Criterion indicating pit/tank/pan is full and needs emptying		
0.3-0.5m to brim		
Excreta/sludge almost to the brim	5	1.3
Difficulty in flushing through	46	11.5
Stench strength from pit/tank	307	76.8
	42	10.4
Who empties the latrine when it is full		
Landlord/Caretaker		
Tenants	334	83.5
Municipal authority	38	9.5
Other	1	0.2
N/A	4	1
	23	5.8
How is the emptying of the pit/tank/pan done		
Employment of manual emptiers		
Employment of mechanical emptiers	4	1
Employment of chemicals to destroy/shrink the fecal sludge	349	87.3
Sand filling of the filled pit and the digging of another one		
Others	16	4
	29	7.3
What do u think happens to the sludge after emptying from the latrine		
Buried on site/neighborhood	2	0.4
Dumped offsite		
Reused		
Others	49	12.3
Unknown	317	79.2
	7	1.8
	3	0.7
	24	6



respondents reported that they were diagnosed of diarrhea, 19(4.8%) respondents reported that they were diagnosed dysentery, 1(0.3%) respondent reported been diagnosed of cholera, 3(0.8%) respondent reported been diagnosed of giardiasis, 5(1.3%) respondent reported been diagnosed of ascariasis, 3(0.6%) respondent reported been diagnosed of hookworm, 8(2.0%) respondent reported been diagnosed of tapeworm. 86(21.5%) reported not being diagnosed of any faeco-oral disease, 37(9.3%) reported being diagnosed of other faeco-oral diseases. Twenty one (5.3%) said they cannot remember having any faeco-oral disease (Table 2).

Relationship between faeco-Oral Disease Suffered by Members of the Households and the Type of Toilet System Used by the Household

The relationship between faeco-oral diseases suffered by the household and the type of the toilet system used by the household indicated that, of the 93 respondents who reported that their household suffered diarrhea within the past three months; 4(9.1%) uses pit latrine, 3(20.0%) uses VIP latrine, 86(25.8%) uses water closet/pour-flush latrine as their excreta disposal methods. For the 81 respondents who reported that their household suffered typhoid fever within the past three months; 10(22.7%) uses pit latrine, 4(26.7%) uses VIP latrine, 66(19.8%) uses water closet/pour-flush latrine while 1(100%) digs in the compound and fill with sand. Of the 8 respondents who reported that their household suffered tapeworm within the past three months; the entire 8(2.4%) uses water closet/pour-flush latrine excreta disposal method. In addition, the result shows there is a significant statistical association between faeco-oral disease suffered by the households and the type of the toilet system used by the household ($X^2=96, 2702, w=0.002$) (Table 3).

Discussion

The most excreta disposal methods used by households

in Owerri-North L.G.A were water closet/ pour-flush latrine 333(83.3%). This is in line with the study carried out among selected residents of Ogbogu, a small semi -urban community in Rivers State where most of the facilities were flush toilets (61.07%) and they formed 87.95% of the 83 facilities found to be in good hygienic condition [17]. This study when compared to another study carried out by Ikurekong, Esin and Udofia [18], indicated that majority of the respondents use pit latrine, 29.50% uses pour-flush and VIP latrine and 13.50% are without toilet facilities. In Tambiri 11 community of Biseni Clan in Yenagoa L.G.A, Bayelsa; 265(95%) out of 280 respondents practiced open defecation while 15(5%) used pour-flush toilet [19]. According to Miner, et al., [20], the predominant type of toilet used among residents of Abattoir community in Jos South L.G.A, Plateau State pour-flush/water closet connected to septic tank (67.5%), 25.8% used simple pit latrine and 6.7% resorted to open defecation. This is not in consonance with Uta-Ewa(Ikot Abasi L.G.A) and Ibaka (Mbo L.G.A) Of Akwa Ibom State, majority of the households practiced open defecation and ironically they called it “ water system”, the other group defecated in surrounding bushes, small percentage used pit latrine while smaller percentage used pour-flush latrine provided by a private individual near their market [21]. This contradiction could be attributed to varied geographical location, subject location and other demographic factors considered in earlier study.

According to the communities, typhoid fever and diarrhea were the most prevalent faeco-oral diseases/infections (34.0% and 20.3% respectively). This is in agreement with other studies; according to Kilakime, et al., [19], Tambiri 11 community of Biseni Clan in Yenagoa L.G.A, Bayelsa revealed that out of 280 respondents studied, 104(37%) reported that diarrhea was common in the community; 62(22%) identified typhoid fever; It also corresponded with another study carried out in a poor urban community in Zimbabwe where diarrhoeal diseases were the most prevalent disease (50%) related to poor

Table 2: Relationship between Faeco-Oral Disease Suffered by the Households and the Type of the Toilet System used by the Household.

Faeco-oral disease suffered	What type of toilet system serves the household							Total
	Bucket latrine	Pit latrine	VIP latrine	Water closet/Pour-flush latrine	Open defecation (bush attack)	Wrap and throw	Dig in the compound and fill with sand	
Diarrhea	0	4(9.1)	3(20.0)	86(25.8)	0	0	0	93(18.9)
Cholera	0	1(2.3)	2(13.3)	38(11.4)	0	2(50.0)	0	43(8.8)
Dysentery	0	4(9.1)	4(26.7)	32(9.6)	0	0	0	40(8.2)
Typhoid fever	0	10(22.7)	4(26.7)	66(19.8)	0	0	1(100.0)	81(16.5)
Giardiasis	0	1(2.3)	1(6.7)	24(7.2)	0	0	0	26(5.3)
Ascariasis	0	1(2.3)	0	18(5.4)	0	0	0	19(3.9)
Hookworm	0	1(2.3)	0	14(4.2)	0	0	0	15(3.1)
Tapeworm	0	0	0	8(2.4)	0	0	0	8(1.6)
None of the above I can't remember	2(100.0)	7(15.9)	5(33.3)	77(23.1)	0	2(50.0)	0	93(18.9)
Others	0	13(29.5)	2(13.3)	18(5.4)	1(100.0)	0	0	34(6.9)
Total	0	10(22.7)	0	29(8.7)	0	0	0	39(7.9)
	2(0.5)	52(11.0)	21(3.8)	410(83.3)	1(0.3)	4(1.0)	1(0.3)	400(100.0)

Chi-square=96.2702, P-value=0.002.



Table 3: Distribution of Frequently Reported Faeco-Oral Diseases/Infections by respondents.

Reported diseases	Frequency (n=400)	Percentage(%)
Signs and symptoms presented by a family		
Frequent stooling	89	16.0
Vomiting	50	9.0
Fever	142	25.5
Abdominal pain	92	16.5
Sweating/shivering	9	1.6
None of the above	172	30.9
All of the above	2	0.5
Disease diagnosed at the hospital		
Diarrhea	59	19.3
Cholera	18	5.9
Dysentery	19	6.2
Typhoid fever	66	21.6
None of the above	86	28.1
I can't remember	21	6.9
Others	37	12.0
Measures taken to prevent infections/diseases		
Wash hand after defecation	141	35.3
Flush/clean toilet after use always	130	32.4
Boiling water before drinking	67	16.8
Covering food to avoid flies/eating food while its hot	62	15.5

sanitation [22]. The findings disagrees with another study carried out by [20], where no cases of diarrhea were reported in 90% of households of Abattoir community in Jos South L.G.A, Plateau State. This disagreement could be attributed to demographic factors.

Conclusion

Although most households in this study area use water closet/pour flush latrine, which is the most convenient and environmental friendly excreta disposal method yet majority of them suffer from faeco-oral diseases. Therefore, households should practice hygienic use of their various excreta disposal facilities in order to prevent occurrence of faeco-oral diseases. Also responsible agencies should develop appropriate health programmes to prevent and control faeco-oral diseases in this locality.

Authors' contributions

Chikwe Chidinma Miriam. Conceived the study, designed the instruments for data collection and performed data collection.

Okereke Chike C, supervised the work and also contributed in correction of the questionnaire

Ebirim Chikere I.C performed the statistical analysis

Ibe Sally N.O participated in review of work and contributed in designing of the questionnaire.

Chukwu Rita. O participated in data collection and review of the work.

Nwakwasi E.U contributed in data collection

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