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Determinants of households' participation in environmental sanitation in Liberia: A case study of Duport Road Community, Monrovia

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Abstract---In many developing nations of the world, unsuitable environmental sanitation conditions have contributed to public health menace. In major cities in Liberia, poor waste management has become part of the regular environmental ecosystem. This study surveyed the sanitary condition of a sampled urban community in Monrovia, the capital of Liberia. It employed a cross sectional survey of Duport Road Community. A multistage sampling technique was used to select 383 households in the community. A well-structured questionnaire was used for collection of necessary household data. The data were analyzed using descriptive statistics and multiple logistic regressions. The study observed that noxious practices such as open defecation and irregular participation in environmental sanitation were predominant in the sampled community. The study showed that household head age (28-37 years) had increasing and significant effect on frequency of clearing the surrounding bushes, but had decreasing and significant effect on frequency of cleaning the drainage. Having tertiary level of education had increasing and significant effects on cleaning of surrounding bushes and drainage. Also, smaller size households had increasing and significant effect on clearing the surrounding bushes, while larger size households had

and significant effect on same. Lastly, households inhabiting mud and concrete houses had significant and increasing effects on frequency of clearing the drainage. It was therefore recommended that government should review and update the existing legislation with respect to urban planning, building standards, infrastructure and environmental regulations; legislations should be entrenched towards participation in environmental sanitation; and introduction of health education at all levels of educational and religious systems.

Keywords---environmental sanitation, household's participation, sanitary conditions, monrovia.

Introduction

After the breakthrough in the developed nations, it was appraised that 2.5 billion people, which represented 40% of global population, are yet deficient of access to basic hygiene and sanitation (UNICEF/WHO, 2008). One of the objectives of Millennium Development Goal (MDG) is halving the share of populaces that have no access to hygiene and sanitation by 2015. In the sub-Saharan Africa, 50% of the people are being denied of this fundamental human right. The possibility of meeting this goal before 2072 is not feasible if current situation remains (Lancet, 2008). United Nations General Assembly labelled 2008 as International Year of Sanitation (IYS). It recognized that access to environmental sanitation was critical to guaranteeing healthiness, self-worth and viable socio-economic improvement for the poorest global nations. The essence of sanitation and the consequent numerous advantages are usually inadequately implicit. Hence, the issue of sanitation is not given sufficient consideration that it warrants by administrations and other stakeholders.

Environmental sanitation comprises management of solid wastes, drainage and hygiene practices. Enhanced environmental sanitation touches an extensive array of development indicators. Sanitation has influence on each objective of the MDGs. The annual cost of meeting the water and sanitation of the MDG targets until 2015 was valued at U.S. \$9.5 to 11.3 billion (Hutton and Haller, 2004; UNICEF/WHO 2006). Considering the amount of the required investment it is important that the horde of socio-economic benefits of enhanced environmental sanitation are adequately comprehended by all stakeholders. Globally, inadequate access to safe drinking water, sanitation and hygiene has been a devastating cause of about 4 billion incidents of ailments on yearly basis (Kariuki et al. 2012). From the findings of WaterAid (2006), nearly 2.6 billion people have no access to suitable sanitation. It was also specified that about 2.2 million people in less developed countries die yearly as a result of diarrhoea linkable to inaccessibility to safe drinking water, poor sanitation and deprived hygiene. Most of these victims are children. The World Health Organization (WHO) evaluations indicate that 88% of the health problems attributable to harmful water supply, sanitation and hygiene ruthlessly affects children in less developed countries (Lubaale and Musyok 2011). In many less developed countries, poor sanitation generally has worrying effects on the burden of diseases. WHO also estimates that 97,900 people die every year due to poor sanitation.

According to Adane et al. (2017), urbanization rapid growth with no commensurate development in sanitation infrastructure would only result in reduction in incapacitation for African countries with respect to adequate provision suitable sanitation facilities for the teeming population. Owusu (2010) reported existence of overflowing garbage containers in many cities has proven that there is poor solid waste management strategies in these countries. African municipalities and households have an array of sanitation problems such as inadequate sanitation amenities, pitiable qualitative water supply, poor drainage system, presence of refuse and garbage littering environment, unclean food, and congested accommodations. The poor households are the ones that are mainly concerned with the problem of poor sanitation.

The unfortunate blending of poor water supply system, deprived hygiene and sanitation has grievous consequences. These embrace diseases like diarrhea, dysentery and infections as witnessed globally, particularly in developing countries (Worley 2016). Despite the significant evident of the effects, a considerable number of people worldwide yet lives with inadequate sanitation amenities. Clasen et al. (2010) reported that an approximate of 40% of inhabitant of Africa have no access to developed water supply and sanitation systems. Water and Sanitation Program (WSP) (2012) indicated that poor sanitation results into output losses, nonattendance at work and school due to the associated infectious diseases and the time spent caring for the sick. Poor personal hygiene, sanitation and water supply is a major cause of diarrheal disease which is reported as the second leading cause of 525,000 mortality among under five children annually (WHO 2017; Worley 2016; Norman et al. 2010; Clasen, et al. 2010). This condition is worsened by inadequate toilets facilities because improperly disposed faeces generally contribute to pollution of water resources. Ample circumstances surrounding man's illness are traceable to hazardous environmental elements like water, soil and air pollution, poor housing conditions, incidence of animal reservoir and insect vectors of diseases. All these put pressures on human health.

Liberians would not hastily forget the incidence of Ebola some years ago. Without mincing words, inadequate environmental sanitation practices contributed in no small way to this disease transmission. Deprived housing also contributes to poor environmental health as well as the consequent effects on the health of the resident households. The environmental sanitation-related infections worsen the poverty status of households by weakening household productivity and income. Furthermore, the national cost of lost productivity, reduction in educational potential and massive therapeutic health costs constitute most important drain on the micro-economies of households and macro-economy of the nation at large. In addition, filthy environments with the associated health consequences could serve as means of deterrence to tourists and investors. The resultant effect of this is undermining of possible economic benefits from tourism accruable to the country. Consequently, extensive engagements are prerequisite to solving environmental sanitation problems in order to lessen and/or prevent their adverse health, economic and developmental effects. Therefore, this study investigates the factors that influences household participation in environmental sanitation activities in an urban community of Monrovia, Liberia.

The problem statement

During Liberian Civil War, deliberate devastation of lives and properties were carried out. This resulted in endless decline in the quality of urban infrastructure. By 2003, access to suitable sanitation infrastructure deteriorated to 7% at the national level (AfDB, 2012). Acknowledging the necessity for enhanced environmental health and its intensification towards meeting the MDGs, the government of Liberia and the development partners have been joining forces together to recover the awful sanitation status, principally in Monrovia that inhabits more than 37% of the country's population. The city also serves as the resident for about 70% of the urban population who live in slums and informal communities. The obtainable sewage treatment facility in Monrovia has been reportedly out of operation for several years (AfDB, 2012). Currently, there exist poor and inadequate environmental sanitation conditions in the urban slum communities. Public toilets are in very deplorable conditions, poorly managed, or redundant.

Occupants of these communities cannot meet the expenses of the cost of consistent de-sludging or maintenance of their septic tanks. Usually, the septic tanks are manually emptied and sewage discharges cause grave environmental contamination and public health menaces. Pollution has been an important challenge in Monrovia (Edwin, 2014). The World Bank made payments to sanitation companies to collect wastes, but waste collections were carried out irregularly (Edwin, 2014). The problem of uncollected garbage in the Paynesville area of Monrovia became so severe that traders and residents burnt the huge garbage piles that was almost cutting off the main road from Monrovia to Kakata (Edwin, 2014). Flooding causes further environmental harms to residents. In 2009, not more than one-third of Monrovia's 1.5 million people had access to hygienic toilets. Those without toilets excrete in narrow passageways between their houses, or on the beach, or inside plastic bags and dump into nearby piles of rubbish or into the sea (IRIN News, 2009). Congested housing with no toilets and lack of urban planning have collectively created harmful sanitation conditions in the Liberian capital (IRIN News, 2008).

Research Methods

The study area

Monrovia is the capital city of the West African country of Liberia. The city is situated on Cape Mesurado on the Atlantic coast, and is the country's most populated city. As of the 2021 population estimate, with 1,569,000 inhabitants, it was home to about 30% of Liberia's total population (Global Statistics, 2010). Also Monrovia is the country's economic, financial and cultural center. Liberia's economy is chiefly centered on Monrovia's haven, and it serves as the seat of national government. Monrovia lies along the Cape Mesurado peninsula, between the Atlantic Ocean and the Mesurado River, whose aperture forms a large natural harbor. The Saint Paul River lies directly north of the city and forms the northern boundary of Bushrod Island. Monrovia is situated in Montserrado County and is Liberia's administrative, commercial and financial capital (Liberia Housing Profile, 2017).

Monrovia has a tropical monsoon climate (Climate-Data.org 2014). It is the global wettest capital city, with annual rainfall averaging 4,624 mm (182.0 in). It has a wet season and a dry season, but gets precipitation even during the dry season. Its temperatures are relatively constant throughout the year, averaging around 26.4 °C (79.5 °F). Monrovia comprises several districts spread across the Mesurado peninsula; the greater metropolitan area encompasses the mouth of the swampy Mesurado River. The historic downtown area is at the very end of the peninsula; the major market district, Waterside, immediately to its north, faces the city's large natural harbor. Northwest of Waterside is the large, low-income West Point community. To the west and southwest of the downtown area is Mamba Point, traditionally the city's principal diplomatic quarter. South of the city center is Capitol Hill which is the site for the national administrative and the judiciary arms of government. Further east along the peninsula is the Sinkor section of Monrovia. This is originally a suburban residential and commercial district. It includes many residential neighborhoods, including informal communities such as Plunkor, Jorkpentown, Lakpazee and Fiamah. At the southeastern base of the peninsula is the independent township of Congo Town, and to its east is the large suburb of Paynesville inside which the Duport Road Community is situated.

Sampling and analytical techniques

This study was conducted in Duport Road Community which is a community in Paynesville, Monrovia, Liberia. This community comprises four neighborhoods namely Cow Field, Harmond Field, Sharah and Zubah. A cross-sectional design was adopted in a study population of 34,996 (according to 2014 census) inhabitants in these four neighborhoods in Duport Road Community. Sample size of 400 households was used for the study. The study employed multistage sampling technique. In the first stage, Duport Road Community was purposively selected because it is the most populous community in Paynesville, Monrovia. Secondly, Sharah and Cowfield were selected through simple random sampling. Thirdly, systematic sampling was employed to select 200 households in each of the two selected neighborhoods. An approximate of 1150 and 1200 households respectively resided in the neighborhoods. Every sixth household was surveyed until the sample size was attained. The household heads were selected as respondents for the data collection. A structured questionnaire was used for data collection. The data collected include the demographic characteristics of the households and the sanitary conditions of the households' environments. After gathering the responses from the households, the Statistical Package for Social Sciences (SPSS Version 20.0) was used for data analysis. Frequencies and percentages were computed for categorical variables, and multivariate analysis association was examined using the multiple logistic regressions. Statistical significance was tested at the 0.05 level of significance. Out of the 400 copies of the questionnaire administered 383 useable copies (95.75%) of the questionnaire were retrieved.

Results and Discussion

Demographic characteristics of the selected households in the study area

Table 1 shows the demographic characteristics of the selected households. These include the sex, age, educational level, household size, religion, type of house, frequency of clearing surroundings bushes, presence of drainage system, frequency of cleaning the drainage, and type of toilet facilities.

Table 1
Demographic characteristics of the selected households in the study area

Items	Frequency	Percent	Average
Sex of household head			7.28
Male	207	54.05	
Female	176	45.95	
Age of household head			
18-27	81	21.15	
28-37	106	27.68	
38-47	78	20.37	
48-57	77	20.10	
58-67	29	7.57	
68-77	12	3.13	
Education level			
No formal education	69	18.02	
Primary	88	22.98	
Secondary	88	22.98	
Tertiary	138	36.03	
Household size			
1-3	129	33.68	
4-6	170	44.39	
7-9	75	19.58	
10-12	9	2.34	
Religion			
Christian	245	63.97	
Muslim	88	22.98	
Traditional	50	13.05	
Type of house			
Zinc house	43	11.23	
Story building	34	8.88	
Mud house with zinc roof	80	20.89	
Incomplete building	42	10.97	
Concrete house with zinc roof	184	48.04	
Rate of clearing surroundings bushes			
Weekly	101	26.37	
Monthly	132	34.46	
2-3 months	86	22.45	
Once in 6 months	8	2.09	
Irregularly	56	14.62	

Presence of drainage system	257	67.10	
Available	126	32.90	
Non available			
Rate of cleaning the drainage	77	20.10	
Daily	88	22.98	
Weekly	84	21.93	
Monthly	19	4.96	
2-3 months	115	30.03	
Not at all			
Type of toilet facilities	122	31.85	
Polythene bag	73	19.06	
No facility (bush/open field)	88	22.98	
Pit latrine	100	26.11	
Flush toilet			

Table 1 shows the distribution of demographic characteristics of the households. About 54% of the selected households were male-headed and about 46% were female-headed. About 21% of the household heads were between ages 18-27 years while 27.68%, 20.37%, 20.10%, 7.57%, and 3.13% were between ages 28-37 years, 38-47 years, 48-57 years, 58-67 years, and 68-77 years respectively. About 18% of the household heads had no formal education; about 23% of them had only primary or secondary education. About 36% of the household heads claimed to have tertiary education. About 34% of the selected households had household size of 1-3 members; 44.39% had household size of 4-6 members; 19.58% had household size of 7-9 members, while 2.34% had household size of 10-12 members. The average household size in the study area was 7.28. Majority (63.97%) of the household heads were Christians; 22.98% were Muslims, while the rest (13.05%) were traditionalists.

Table 1 further shows the type of houses inhabited by the households. About 43% of the households lived in poor quality houses such as zinc houses, mud houses, and uncompleted buildings. Such kind of houses are derisive and contemptuous. This suggests the level of poverty within the area of study. About 26% of the households cleared their surroundings on weekly basis; 34.46% cleared their surroundings on monthly basis; about 22.45% cleared their surroundings quarterly. The rest were irregularly involved in clearing of their surrounding environment. About 67.10% of the selected households claimed to have drainage system within their house premises, while the rest did not have any form of drainage system. About 20.10% claimed to clean their drainage on daily basis. Approximately 23% of the households clean their drainage on weekly basis; 21.93% clean their drainage on monthly basis; about 4.96% clean their drainage every quarter. The rest were never involved in cleaning drainage system. Lastly, the table shows the types of toilet facilities possessed by the households. Less than 50% of the households have either pit latrine or flush toilet. More than half of the households disposed their faeces by use of polythene bags or through open defecations. It could be implied that the area of study would be relatively susceptible to considerable environmental hazards which could serve as impediment to the health status of the households' members.

Determinants of household participation in environmental sanitation activities among the selected households

Table 2 shows the household determinants that influenced participation in environmental sanitation activities among the selected households in the study area.

Table 2
Multiple Logistic Regression showing the factors influencing participation in environmental sanitation activities

Environmental sanitation activities	Variables	Wald	Sig.	Exp(B)	Information
Rate of clearing surroundings bushes	<i>Sex of household head</i>				
	Male	0.000	0.989	3.906	Not significant
	Female	0.053	0.818	1.182	Not significant
	<i>Age of household head</i>				
	18-27	0.631	0.427	2.129	Not significant
	28-37	8.350	0.004	10.712	Significant
	38-47	.	.	.	
	48-57	0.000	0.999	7.357	Not significant
	58-67	0.000	0.989	3.019	Not significant
	68-77	0.000	0.989	3.214	Not significant
	<i>Education level</i>				
	No formal education	0.000	0.992	2.250	Not significant
	Primary	.	.	.	
	Secondary	0.000	0.994	2.319	Not significant
	Tertiary	1.903	0.016	2.585	Significant
	<i>Household size</i>				
	1-3	276.420	0.000	2.221	Significant
	4-6	.	.	.	
	7-9	278.496	0.000	0.386	Significant
	10-12	.	.	.	
Pseudo R-sq Cox and Snell – 0.538 Nagelkerke – 0.858 McFadden – 0.772	<i>Religion</i>				
	Christian	387.690	0.000	5.397	Significant
	Muslim	.	.	.	
	Traditional	.	.	.	
	<i>Type of house</i>				
	Zinc house	.	.	.	
	Story building	0.000	0.989	0.113	Not significant
	Mud house with zinc roof	.	.	.	
	Incomplete building	0.000	0.990	0.537	Not significant
	Concrete house with zinc roof	0.000	0.995	0.011	Not significant
Rate of cleaning the drainage	<i>Sex of household head</i>				
	Male	0.000	0.995	4.315	Not significant
	Female	0.246	0.620	0.749	Not significant
	<i>Age of household head</i>				
	18-27	0.112	0.737	0.809	Not significant

<i>Pseudo R-sq</i> <i>Cox and Snell</i> – 0.578 <i>Nagelkerke</i> – 0.763 <i>McFadden</i> – 0.690	28-37	13.677	0.000	0.140	Significant
	38-47	.	.	.	
	48-57	0.000	0.994	0.259	Not significant
	58-67	0.000	0.993	0.745	Not significant
	68-77	0.000	0.994	0.119	Not significant
	<i>Education level</i>				
	No formal education	0.000	0.994	0.518	Not significant
	Primary	.	.	.	
	Secondary	0.000	0.994	5.634	Not significant
	Tertiary	17.691	0.000	8.583	Significant
	<i>Household size</i>				
	1-3	.	.	.	
	4-6	0.308	0.579	2.020	Not significant
	7-9	.	.	.	
	10-12	0.119	0.730	0.637	Not significant
	<i>Religion</i>				
	Christian	.	.	.	
	Muslim	0.055	0.814	0.720	Not significant
	Traditional	.	.	.	
	<i>Type of house</i>				
	Zinc house	0.043	0.835	1.301	Not significant
	Story building	.	.	.	
	Mud house with zinc roof	291.361	0.000	2.036	Significant
	Incomplete building	.	.	.	
	Concrete house with zinc roof	350.598	0.000	1.920	Significant

Conclusion and Recommendations

This study assessed the sanitary conditions in Duport Road Community of Monrovia, Liberia. It found that education at tertiary level was critical to household's participation in environmental sanitation activities. It also concluded that household size influenced environmental sanitation participation. Moreover, an advantage of religious beliefs could be harnessed in order to enhance households' environmental sanitation participation. Also, flush and pit latrines were found to be existent in just one out of every two households. It means that one out of every two households practiced open defecation. Again, one out of every three households did not have drainage system within their premises. It was also revealed that at least one out of every six households were irregularly involved in environmental sanitation activities.

The study has examined the sanitary condition in a Liberian community. It has established that many of the households in this community participated in environmental sanitation activities. It can therefore be concluded that households' participation in environmental sanitation practices in this community is moderate. Although, there were still some negative environmental practices like open defecation and building of pit latrines close to the houses. Based on the findings of this study, the following are recommended to enhance participation in environmental sanitation in this study area and even in the country at large:

1. The government should review and update the existing legislation with respect to urban planning, building standards, infrastructure and environmental regulations in order to make them more realistic, attainable and compatible with local conditions.
2. Legislations should be entrenched and enforced towards participation in regular community sanitation exercise.
3. Health education should be formally introduced at all levels of educational system, and informally at household levels by the local authority and central government, on the need for household hygiene at various homes.
4. Religious leaders could also lend their voices in making much emphasis on environmental health and household hygiene, since many citizens belong to one religion or the other, and usually take the words of their religious leaders serious.

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