

Full Length Research Paper

An assessment of environmental sanitation in an urban community in Southern Nigeria

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Inadequate environmental sanitation has been recognized as a public health hazard worldwide. In some Nigerian cities, living with waste as part of the natural environment has become a way of life. This study examined the sanitary condition of an urban community in Akwa Ibom State, Nigeria. It used a cross sectional survey design for a population of 123,033 inhabitants of four villages in North Eastern Akwa Ibom. Multi-stage sampling was used in selecting 237 inhabitants in this community and structured questionnaire was used for data collection. Data was analyzed using frequencies, percentages, Chi-square test and multiple logistic regressions. Results showed that tap water was the major source of water, usually disinfected by boiling. Results of multiple logistic regression showed a significant association between gender and their participation in environmental sanitation ($p < 0.05$) with males showing 9 times more odds of participation than females (OR = 9.84, C.I = 1.225-79.018). Unwholesome practices like open refuse dumping and building of pit latrines close to the house were prevalent in this community. Therefore, to enhance the sanitary condition in this community, government should establish and enforce a more robust environmental sanitation approach and health education.

Key words: Environmental sanitation, sanitary condition, diarrhoea, disease.

INTRODUCTION

In its modern concept, environment includes not only water, air and soil but also the social and economic conditions under which we live (Park, 2011). The key to man's health lies largely in his environment. In fact, much of man's ill-health can be traced to adverse environmental factors such as water, soil and air pollution, poor housing conditions, presence of animal reservoir and insect vectors of diseases which pose threats to man's health. Often, man is responsible for the pollution of his

environment through urbanization, industrialization and other human activities.

According to the National Sanitation Foundation of USA, the word sanitation is defined as a "way of life that is expressed in the clean home, farm, business, neighborhoods and community (Park, 2011). Also, World Health Organization (WHO) defines sanitation as the provision of facilities and services for the safe disposal of human urine and faeces (UNICEF AND WHO, 2012).

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Hence, inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. The word 'sanitation' also refers to the maintenance of hygienic conditions through services such as garbage collection and wastewater disposal. In addition, environmental sanitation according to World Health Organization is the control of all those factors in man's physical environment which exercise or may exercise a deleterious effect on his physical development, health and survival. It could also be seen as the principle and practice of effecting healthful and hygienic conditions in the environment to promote public health and welfare, improve quality of life and ensure a sustainable environment (Alabi, 2010). The essential components of environmental sanitation include: solid waste management; medical waste management; excreta and sewage management; food sanitation; sanitary inspection of premises; market and abattoir sanitation; adequate potable water supply; school sanitation; pest and vector control; management of urban drainage; control of reared and stray animals; disposal of the dead animals; weed and vegetation control; hygiene education and promotion.

In most developing countries adequate environmental sanitation has not been strictly adhered to. For example in some parts of Nigeria, living with waste as part of the natural environment has become a way of life. Although there has been a remarkable improvement from what it used to be in the late eighties/early nineties, there is still much to be done as Lagos, our "Nigerian Centre of Excellence", has been depicted a vast slum (Alabi, 2010). In the United States, slum is often used to refer to marginalized neighborhoods, but in developing countries, it usually means a settlement built in or near a city by residents themselves, without official authorization or regulation. Such housing units are typically substandard, and the infrastructure and services range from non-existent to improvised.

Furthermore, environmental hazards are responsible for about a quarter of the total burden of disease worldwide and as much as 30% in regions such as sub-Saharan Africa. As many as 13 million deaths can be prevented every year by making our environments healthier. These facts and figures highlight the impact of environmental factors on public health. More than 2.4 billion people in the world currently lack access to adequate sanitation and are forced to dispose of their excreta in unimproved and unsanitary conditions. Those who suffer from this, lack most basic human needs and also tend to be victims of poverty, ill health and an overall poor quality of life (WHO, 2013).

In developing countries like Nigeria, the main diseases of the environment are diarrhoeal disease, lower respiratory infections, unintentional injuries, and malaria. In children under the age of five, one third of all disease is caused by

the environmental factors such as unsafe water and air pollution (WHO, 2010). The poor state of food sanitation in the country has been shown to play a significant role in the etiology of food borne diseases. One of the most significant diseases that arise from poor sanitation is diarrhea. Deaths resulting from diarrhea are estimated to be between 1.6 and 2.5 million every year (WHO, 2012). National records show that every year, about six hundred thousand (600,000) episodes of diarrhoea occur in children under the age of five (Alabi, 2010).

Similarly, there have been increasing numbers of cases of cholera over the years. From January to December 2010, Nigeria reported 41,787 cases including 1,716 deaths from 222 Local Government Areas (LGAs) in 18 States of the country. The most affected states were Borno, Bauchi and Katsina. In addition to the disease burden, Nigeria loses about N455 billion annually which is equivalent to 1.3% of Gross Domestic Product (GDP), due to poor sanitation as reported by water and sanitation program of the World Bank (Vanguard 2013). Most of the affected are young children below the ages of five. Other diseases that are caused by poor sanitation include schistosomiasis, trachoma, soil transmitted helminthiasis, and malaria (WHO, 2013).

Vector-borne diseases constitute major health problems in Nigeria. Malaria, a highly endemic vector borne disease, remains one of the five leading causes of morbidity and mortality among children below the age of five years and pregnant women. It also accounts for remarkable economic loss thus contributing significantly to poverty and underdevelopment. Malaria along with other important endemic vector-borne diseases such as Onchocerciasis (River Blindness) and other Filariasis, Schistosomiasis, Yellow Fever and Trypanosomiasis have remarkable social, economic and political implications. While their spread is often enhanced by factors such as population growth, urbanization, the opening up of previously sparsely inhabited areas for development projects, migrations, refugees, and conflicts; previous efforts to control them with massive and widespread use of chemicals (pesticides) have had serious consequences on the quality of the environment

Poor sanitation accounts for almost 50 percent of a child being underweight since it has a direct link to diarrhea. Sanitation is a serious issue that is affecting most parts of the world especially the developing countries. On a global scale, the most affected are children who in most cases lose their lives due to diseases caused by poor sanitation. A pleasant environment that promotes healthful living and is hazard free is a fundamental right of all Nigerians. There is an increasing national consciousness on the need for judicious management of the Nigerian environment in a sustainable manner. Therefore, ensuring improved Environmental Sanitation standards has become high on the political agenda of Government in the democratic dispensation. This was

demonstrated in the creation of the Federal Ministry of Environment to address amongst other things, the problems of poor Environmental Sanitation and is expected to engender improved productivity and foster equitable share of the job and joy of national economic development.

One of the essential public health care elements is provision of safe drinking water and sanitation. However, deposition of faecal matter near homes, contamination of sources of drinking water (sometimes caused by poorly designed or maintained sewage system), dumping of refuse and sweeping into the gutters, defecating and disposing of faeces by the street corners and waterways and selling of food stuffs and cooked food by the road side are all unwholesome practices that pose potential risk to the development of diseases. Water quantity is as important as water quality. Washing of hands after defecation and before preparing food is of particular importance in reducing disease transmission, as has been demonstrated by Nigeria's recent control over Ebola Viral Disease. Poor housing also contributes to poor environment health and its consequent input in the health of the urban dwellers. Measures for the prevention of cholera mostly consist of providing clean water and proper sanitation to populations who do not yet have access to basic services. Health education and good food hygiene are equally important.

The environmental sanitation-related diseases exacerbate poverty by diminishing productivity and household income. In addition, the national cost of lost productivity, reduced educational potential and huge curative health costs constitute a major drain on the local and national economy. Besides, a dirty environment with its attendant health consequences, prevailing in most of our cities, can discourage tourists/investors and undermine the economic benefit of tourism to the country. Consequently, wide-ranging actions are required to solve Environmental Sanitation problems in order to reduce and avert their adverse health, economic and developmental effects. Therefore, this study assesses the sanitary conditions in an urban community in Akwa Ibom state, South-South, Nigeria.

MATERIALS and METHODS

This study was conducted in Ibiaku Itam 1 which is a community in Itu Local Government Area of Akwa Ibom State, South-South, Nigeria. This community comprises four villages namely Ntak inyang, Ikot-Obio Atai, Ikot Obong Odong and Atai Ibiaku Itam. The Itu Local Government Area is bounded in the North and North-East by Odukpani in neighbouring Cross River State and Arochuku. In Abia State, in the West by Ibiono Ibom and Ikono Local Government Area and in the South-South and South-East by Uyo and Uruan Local Government Area respectively. A cross-sectional design was adopted in a study population of 123,033 inhabitants in these four villages in Ibiaku Itam 1 in Itu Local Government Area of Akwa Ibom State, South-South, Nigeria. Sample of 215 was

estimated for the study using the StatCalc in Epi Info Version 7 developed by the America Centre for Disease Control and Prevention, Atlantic Georgia. To allow for 10% attritions rate, the sample size was approximated to 237.

In order to allow for good representation in this individual survey, the multistage sampling technique was used. At the first stage of the sampling, Ibiaku Itam 1 Community was selected through a simple random sampling from the list of communities in Uyo which is the capitals of Akwa Ibom State. At the second stage of sampling, three villages were selected also by simple random sampling. The selected villages are Ikot Obong Odong, Ntak Inyang and Atai Ibiaku Itam. In the third stage of sampling, 80 houses in each village were selected by systematic sampling and adults that understood basic communication in every fourth house was surveyed until the sample size was attained. At most, three individuals per household were selected.

Furthermore, structured questionnaire was used in data collection. This questionnaire contained 51 items divided into the sections A and B. Section A conveyed the demographics of the respondent while the second section of the questionnaire assessed the sanitary condition of the study area. To enhance the validity of this instrument, all items on the questionnaire were framed in such a way that was easy and simple to understand. Also, draft copy of the instrument was presented to experts in public health to validate. Corrections provided by these experts were taken note of before the final draft of the questionnaire was administered. After permission was granted by the Village Heads of the three selected villages, the questionnaire were administered by the researcher and his assistants with the help of community representatives from the selected villages. The sampled population covered young adults and older adults between ages 19 to 50 years.

After gathering the responses of the respondents, the resulting data was entered into the Statistical Package for Social Sciences (SPSS Version 20.0) for data analysis. Frequencies and percentages were computed for categorical variables, univariate associations between categorical variables were examined using chi-square test and multivariate analysis association was examined using the multiple logistic regressions. Statistical significance was tested at the 0.05 level of significance.

RESULTS AND DISCUSSION

Of the 237 copies of the questionnaire administered 229 useable copies (97%) of the questionnaire were retrieved.

Table 1 shows the distribution of demographic characteristic of the respondents, 115 respondents (50.2%) were male and 114 respondents (49.8%) were female. One hundred and thirty-nine respondents representing 60.7% of the respondents were between ages 19-29 years while 24.5%, 6.1%, 8.3%, and 0.4% were between ages 30-39 years, 40-49 years, greater than 50 years respectively. Only 1 respondent did not indicate his or her age group. Majority of the respondents were from Akwa Ibom State (90%) and of Ibibio tribe (72.5%). Furthermore, a large percentage of the respondents were students (38.4%) while 1% and 2% of the respondents did not indicate their educational status and occupation respectively. Results are as summarized in Table 1.

Results in Table 2 shows that the major source of water in the study area was tap water (76.9%). This is in

Table 1. Demographic Characteristics of the Respondents (N =229).

| Variables | No. of Respondents | Percentages (%) |
|---------------------------|---------------------------|------------------------|
| Sex | | |
| Male | 115 | 50.2 |
| Female | 114 | 49.8 |
| Total | 229 | 100.0 |
| Age(years) | | |
| 19-20 | 139 | 60.7 |
| 30-39 | 56 | 24.5 |
| 40-49 | 14 | 6.1 |
| 50 and Above | 19 | 8.3 |
| No Response | 1 | 0.4 |
| Total | 229 | 100.0 |
| State of Origin | | |
| Akwa Ibom State | 206 | 90.0 |
| Other States | 22 | 9.6 |
| No response | 1 | 0.4 |
| Tribes | | |
| Ibibio | 166 | 72.5 |
| Annang | 23 | 10.0 |
| Oron | 18 | 7.9 |
| Others | 22 | 9.6 |
| Total | 229 | 100.0 |
| Educational status | | |
| None | 2 | 0.9 |
| Primary | 58 | 25.3 |
| Secondary | 105 | 45.9 |
| Tertiary | 63 | 27.5 |
| No response | 1 | 0.4 |
| Total | 229 | 100.0 |
| Occupation | | |
| Students | 88 | 38.4 |
| Farming | 36 | 15.7 |
| Trading | 68 | 29.7 |
| Civil Servant | 27 | 11.8 |
| Clergy | 4 | 1.7 |
| Politician | 4 | 1.7 |
| No response | 2 | 0.9 |
| Total | 229 | 100.0 |

contrast to a Benin study where the major source of water supply was borehole (50.4%) and a marginal 22% for tap water (Isah and Okojie, 2007). This was usually stored in closed containers (81.29%). Results also reveal that the water purification method usually adopted by the respondents was boiling (36.7%) followed by the use of chemical disinfectant (34.1%). Filtration was the least

practiced method of water purification by the respondents (10.0%). However, in the same Benin study above, majority (68.8%) respondents did not use any form of purification method.

As shown in Table 3, 157 (68.6%) respondent had access to flush toilets, 19 (8.3%) use VIP latrine, 45 (19.7%) make use of pit latrine, 4(1.7%) used Bucket

Table 2. Source, storage, water care and water purification among in the study area.

| Variables | No. of Respondents | Percentages (%) |
|--|---------------------------|------------------------|
| Major Source of Water | | |
| Tap | 176 | 76.9 |
| Ground water (well, spring, Borehole) | 25 | 10.9 |
| Stream | 12 | 5.2 |
| Rain | 7 | 3.1 |
| Others | 9 | 3.9 |
| Total | 229 | 100.0 |
| Method of Water Storage | | |
| Open containers | 14 | 6.1 |
| Closed containers | 186 | 81.2 |
| Direct from the source | 24 | 10.5 |
| Others | 2 | 0.9 |
| No Response | 3 | 1.3 |
| Total | 229 | 100.0 |
| Water treatment/purification | | |
| Boling | 84 | 36.7 |
| Chemical disinfectant (water guard) | 78 | 34.1 |
| Filtration | 20 | 8.7 |
| Others | 23 | 10.0 |
| No response | 24 | 10.0 |
| Total | 229 | 100.0 |

Table 3. Toilet use and toilet hygiene practice by the respondents.

| Variables | No. of Respondents | Percentages (%) |
|--|---------------------------|------------------------|
| Types of Toilet | | |
| Flush toilet | 157 | 68.6 |
| VIP Latrine | 19 | 8.3 |
| Pit Latrine | 45 | 19.7 |
| Bucket Latrine | 4 | 1.7 |
| No facility (bush or field) | 2 | 0.9 |
| Non Response | 2 | 0.9 |
| Total | 229 | 100.0 |
| Toilet Covered | | |
| Always | 146 | 63.8 |
| Sometimes | 40 | 17.5 |
| Never | 36 | 15.7 |
| No response | 7 | 3.1 |
| Total | 229 | 100.0 |
| Distance from the House if not flushed Toilet | | |
| Close to the house | 49 | 72.0 |
| Far from the house | 19 | 28.0 |
| Total | 68 | 100.0 |
| Regularity of Toilet washing | | |
| Daily | 121 | 52.8 |

Table 3. Contd.

| Variables | No. of Respondents | Percentages (%) |
|---|--------------------|-----------------|
| Types of Toilet | | |
| Regularity of Toilet washing | | |
| Alternate days | 52 | 22.7 |
| Weekly | 48 | 21.0 |
| Monthly | 3 | 1.3 |
| Occasionally | 4 | 1.4 |
| Total | 299 | 100.0 |
| Offensive Odour from Toilet | | |
| No foul odour | 154 | 67.2 |
| Slight intolerable odour | 55 | 24.0 |
| Highly intolerable odour | 18 | 7.9 |
| No response | 2 | 0.9 |
| Total | 229 | 100.0 |
| Types of disinfectant used in cleaning Toilets | | |
| Kerosene | 21 | 9.2 |
| Acid | 9 | 3.9 |
| Dettol | 88 | 38.4 |
| Bleach | 19 | 8.3 |
| Soap/Detergent | 75 | 32.4 |
| Water only | 16 | 7.0 |
| No Response | 1 | 0.4 |
| Total | 229 | 100.0 |

latrine, 2(0.9%) did not have toilet facilities but rather used the bush or open field while the remaining 2 respondents (0.9%) did not indicate any response. This is in consonance with the Benin study where 75.8% and an Owerri study where 83.8% respondents used water cistern (Anunonwu et al., 2009). Majority of the respondents claimed that they always covered their toilets (63.8%). Out of 68 respondents, who had non-flushable toilet, a large percentage said that these toilets were close to their houses (72%). Also they washed their toilet daily (52.8%) with the use of Dettol (38.4%) and that there was no foul odour from these toilets (67.2%).

Table 4 shows the distribution of regularity of waste disposal among respondents based on some of their demographics (sex, educational qualification and occupation). Result shows that there is no significant association between sex and regularity of waste disposal ($p=0.722$, $p>0.05$). Result obtained based on their occupation was also not significant ($p=0.111$, $p>0.05$) but for educational qualification, a significant association was obtained ($p=0.007$, $p>0.05$); showing that a minimum of secondary education was correlated with regular refuse disposal.

Result in Table 5 shows a significant association between methods the respondents used in disposing

refuse and their sex ($p = 0.002$, $p<0.05$), with their educational level ($p = 0.009$, $p<0.05$). Association between their occupation and the method they used in disposing refuse was not significant ($p = 0.182$, $p<0.05$).

Result of multiple logistic regression as presented in Table 6 shows a significant association between respondents' sex and their participation in environmental sanitation ($B = 2.286$, Wald test = 4.63, $p = 0.031$, $p<0.05$) but result obtained for education was statistically insignificant ($B = 0.402$, Wald test = 0.24, $p = 0.631$, $p<0.05$). Participation of the males in good environmental sanitation practices was more than 9 times higher than that of the females (OR = 9.84, C.I = 1.225 – 79.018). Furthermore, there was no significant difference between the odds of participation in good environmental sanitation practices between respondents with higher and lower educational qualification (OR = 0.67, C.I= 0.135 – 3.307).

Conclusion

This study assessed the sanitary conditions in an Urban Community in Akwa Ibom State, South-South, Nigeria and found that tap water was the major source of water. This was stored using closed containers and disinfected

Table 4. Uni-variate association between respondents' regularities of waste disposal and some of their demographic characteristics.

| Demographic characteristic | Regularity of waste disposal | | | | | χ^2 | p- value |
|----------------------------------|------------------------------|-----------|---------|----------|------------|----------|----------|
| | Daily | Weekly | Monthly | Others | Total | | |
| Sex | f(%) | f(%) | f(%) | f(%) | f(%) | | |
| Male | 38(33.9) | 66(58.9) | 2(10.8) | 6(5.4) | 112(49.6) | 1.33 | 0.722 |
| Female | 31(27.2) | 73(14.0) | 2(11.8) | 8(7.0) | 141(50.4) | | |
| Total | 69(30.5) | 139(61.5) | 4(1.8) | 14(6.2) | 226(100.0) | | |
| Educational qualification | | | | | | | |
| None | 0(0.0) | 2(100.0) | 0(0.0) | 0(0.0) | 2(0.9) | 22.603 | 0.007** |
| Primary | 19(33.3) | 38(66.7) | 0(0.0) | 0(0.0) | 57(25.3) | | |
| Secondary | 36(35.0) | 59(75.3) | 4(3.9) | 4(3.9) | 103(45.8) | | |
| Tertiary | 14(22.2) | 39(61.9) | 0(0.0) | 10(15.9) | 63(28.0) | | |
| Total | 69(30.7) | 138(61.3) | 4(1.8) | 14(6.2) | 225(100.0) | | |
| Occupation | | | | | | | |
| Student | 25(28.1) | 58(62.2) | 0(0.0) | 6(6.7) | 89(39.8) | 18.15 | 0.11 |
| Farming | 11(31.4) | 22(62.9) | 1(2.9) | 1(2.9) | 35(15.5) | | |
| Trading | 26(38.8) | 36(53.7) | 2(3.0) | 3(4.5) | 67(29.6) | | |
| Civil servant | 4(14.8) | 19(70.4) | 0(0.0) | 4(14.8) | 27(11.9) | | |
| Others | 3(37.5) | 4(50.0) | 1(12.5) | 0(0.0) | 8(3.5) | | |
| Total | 69(30.5) | 139(61.5) | 4(1.8) | 14(6.2) | 226(100.0) | | |

**significantly associated at 1 % (p<0.01), those that do not add up to 229 were because of the missing values.

Table 5. Uni-variate association between method of refuse disposal and some Respondents' Demographics Characteristics.

| Variables | How do you dispose refuse | | | | | | χ^2 | p- value |
|----------------------------------|---------------------------|---------|--------------|--------------------------|---------|------------|----------|----------|
| | Burning | Burying | Open dumping | Municipal Waste Disposal | Others | Totals | | |
| Sex | f(%) | f(%) | f(%) | f(%) | f(%) | f(%) | | |
| Male | 39(33.9) | 10(8.7) | 11(9.6) | 55(47.8) | 0(0.0) | 1125(50.2) | 16.77 | 0.002** |
| Female | 44(38.6) | 0(0.0) | 22(19.3) | 46(40.4) | 2(1.8) | 114(49.8) | | |
| Total | 83(36.2) | 10(4.4) | 33(14.4) | 101(44.1) | 1(0.9) | 229(100.0) | | |
| Educational Qualification | | | | | | | | |
| None | 0(0.0) | 0(0.0) | 2(100.0) | 0(0.0) | 0(0.0) | 2(100) | 26.67 | 0.009** |
| Primary | 17(29.3) | 5(8.8) | 12(20.7) | 24(41.4) | 0(0.0) | 58(100) | | |
| Secondary | 35(33.3) | 5(4.8) | 13(12.4) | 50(47.6) | 42(1.9) | 105(100) | | |
| Tertiary | 31(49.2) | 0(0.0) | 6(9.5) | 26(41.3) | 0(0.0) | 63(100) | | |
| Total | 83 | 10 | 33 | 100 | 2 | 228 | | |
| Occupation | | | | | | | | |
| Student | 41(45.6) | 1(1.1) | 13(14.4) | 35(38.9) | 0(0.0) | 90(100.0) | 20.91 | 0.182 |
| Farming | 7(19.4) | 4(11.1) | 5(13.9) | 20(55.6) | 0(0.0) | 36(100.0) | | |
| Trading | 25(36.8) | 3(4.4) | 9(13.2) | 30(44.1) | 1(1.5) | 68(100.0) | | |
| Civil servant | 7(25.9) | 1(3.7) | 6(22.2) | 2(44.4) | 1(3.7) | 27(100.0) | | |
| Others | 3(37.5) | 1(12.5) | 0(0.0) | 4(50.0) | 0(0.0) | 8(100.0) | | |
| Total | 83 | 10 | 33 | 101 | 2 | 229 | | |

**significantly associated at 1 % (p<0.01).

Table 6. Multiple Logistic Regression Results of the association between respondent's participation in Environmental Sanitation and some of their Demographics Characteristics.

| Variables | B | S.E | Wald Statistic | p-value | OR | 95% Confidence Interval |
|--------------------------|--------|-------|----------------|---------|------|-------------------------|
| Sex (Male/Female) | 2.286 | 1.063 | 4.63 | 0.031* | 9.84 | 1.225 – 79.018 |
| Education (Higher/Lower) | -0.402 | 0.815 | 0.24 | 0.6322 | 0.67 | 0.135 – 3.307 |
| Constant | 2.755 | 0.736 | 14.01 | <0.001 | NA | NA |

NA = Not Applicable, * significant at 0.05

by boiling. This finding is in contrast to the study conducted in Benin where majority of the respondents did not adopt any form of water purification method. Also, flush latrine was found to be common in these communities. Moreover, the finding that majority of respondents used open field for defaecation corroborates the study carried out in Benin and Owerri. This study also found a significant association between respondents' academic qualification and their regularity in disposal of refuse. The methods used in refuse disposal were also found to have a significant association between educational qualification and sex. This study also found a significant association between sex and respondents' participations in environmental sanitation. The males had more than 9 times higher chance of getting involved in environmental sanitation than the females.

The study has examined the sanitary condition in a Nigerian community and has established that most of the residents in this community have access to tap water and dispose their refuse regularly. It can therefore be concluded that the sanitary condition in this community is moderate although there were still some negative environmental practices like dumping of refuse openly and building of pit latrines close to the houses.

Based on the findings of this study, the following are recommended to enhance the sanitary condition in this study area and even in the State and Nigeria at large:

1. The government at all levels should continually review and update 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 enforced concerning indiscriminate dumping of refuse at road-sides and non-participation in the regular community sanitation exercise. Defaulters should be made to face the full wrath of the law. Health education should be done by the local authority on the need for household hygiene at various homes vis-à-vis keeping their toilets clean, disinfecting drinking water and protecting their water sources.
3. Health education should be carried out on the need for the inhabitants to adopt the habit of regular hand washing after using toilets and before embarking on food preparation or taking meals. The local authorities should

endeavour to provide more refuse containers and place them at strategic positions. The various communities should be empowered with sanitation tools like spades, cutlasses, wheelbarrow etc. for effective participation.

Declaration of conflict of interest

I hereby declare I have not received financial support or otherwise from any source to warrant a distorted research.

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