Original Research Paper

SANITATION AND HYGIENE PRACTICES OF NIGERIA'S COASTAL COMMUNITIES AND ASSOCIATED SOCIO-ECONOMIC CHARACTERISTICS: STUDY OF TWO AKWA IBOM COMMUNITIES

ABSTRACT

Aims: The hygiene and sanitation practices in correspondence with the socio-economic levels and cultural characteristics of two typical coastal/riverine communities in Nigeria, Uta-Ewa (Ikot Abasi LGA) and Ibaka (Mbo LGA) of Akwa Ibom State, were studied to determine how these factors have affected their sanitation and hygiene behaviours.

Methodology: A sample size of 300 respondents was used for the study. Questionnaires and interviews were used to obtain data for the study from primary sources, key informants and opinion leaders. The data were coded and subjected to analysis with the use of descriptive statistical tools.

Results: In both communities, the average monthly income primarily from fishing and crop farming was between ₦5,000 ($22.7) – ₦20,000 ($90.9). There was a near absence of potable water sources except for a few boreholes provided by the government and private individuals. The communities practice open defecation into the streams and disposed of household wastes into surrounding bushes and nearby dumps. Lack of space and cost were given as the major reasons for non provision of human waste disposal facilities by households. They have poor sense of personal hygiene and seldom wash their hands with soap.

Conclusion: Appropriate hygiene and sanitation technology options must therefore be economically feasible to be acceptable and sustained by the populace. Both communities will need improved and sustained basic and health education to be able to appreciate the need to embrace healthful and sanitary living.

Key words: *Riverine, Appropriate Latrine, Sanitation, Hygiene*

1. INTRODUCTION

Sanitation and hygiene practice among Nigeria's populace and communities is generally below world standards. The 2006 joint monitoring programme (JMP) report puts the coverage at 53% in 2004 for urban areas and 36% for rural areas [1]. The Millennium Development Goal 7 (MDG 7), target 10 is to halve, by 2015, the proportion of people without sustainable access to basic sanitation. This target is far from being achieved with 2.5 billion people globally still lacking access to improved sanitation, and 1 billion people (and about 39 million people in Nigeria, i.e. 22% of the national population) practicing open defecation [2].

Sanitation and hygiene situations are worse in the riverine communities than other parts of the country due to very difficult terrain, especially very shallow water table in the region. Most of the inhabitants defecate in the water which also serves as a source of drinking water and other domestic purposes. Excreta, both feces and urine, contain an array of pathogenic viruses, bacteria, protozoa and helminths and are principal means for transmission and spread of a wide range of communicable diseases [3]. According to an analysis [4], about 2.3 billion people in the world suffer from diseases that are linked to water and sanitation and these diseases kill millions of people each year and prevent millions more from living healthy lives. Supporting this finding [5] stated that around 2,000 children are lost every day to diarrhea caused by lack of access to safe toilets and clean water.

This study is therefore, considered appropriate, timely and significant because it will provide appropriate and acceptable sanitation technology options for excreta disposal and management and general sanitation in riverine areas.

The study was carried out in the riverine communities of Ibaka and Uta Ewa in Mbo and Ikot Abasi Local Government Areas (LGAs) of Akwa Ibom State, Nigeria and was undertaken to examine the socio-

economic and cultural variables that can impinge on the choice of appropriate latrine options in riverine communities bearing in mind that an appropriate latrine is that which is environmentally friendly, socio-culturally acceptable and economically feasible.

Uta Ewa is situated along the coast of the Imo River as it opens up into the Atlantic Ocean. The area is bounded by coordinates 07°49'02" E and 4°35'01" N (Fig.1). It is about eighty (80) minutes drive from Uyo (the capital city of Akwa Ibom State).

Ibaka community on the other hand is a major fishing settlement along the coast of the Atlantic Ocean. It is about 110 minutes drive from Uyo and about 30 minutes drive from Oron main town. The area is bounded by coordinates 8°18'15" E and 4°39'04" N (F ig.1). It shares boundaries with the Islands of Bakassi that were recently ceded to Cameroun.

Fig.1: A map showing location of the study areas

The census figures of 1991 puts the population of these communities at about 507 and 2925 persons with projected figures of 578 and 3136 for 1996 [6,7] for Uta Ewa and Ibaka respectively. Given the population growth rate of about 2.83%, and using the exponential growth extrapolation technique, it is expected that the current population of these communities will be about 831 and 4504 persons in Uta Ewa and Ibaka respectively, ceteris paribus. With these projections, the need to provide adequate and sustainable hygiene and sanitation technology options for these areas calls for urgent action.

2. METHODOLOGY

2.1 Sampling Techniques and Sample Size

The sampling technique employed for the study involved a combination of purposive and random sampling in a multistage procedure. In the first stage, purposive samples of two communities (Uta Ewa and Ibaka, being riverine communities) in Ikot Abasi and Mbo Local Government Areas (LGAs), respectively were selected as study locations. In the second stage, the household list compiled by the family heads in Uta-Ewa community was used as a sampling frame from which a random sample of 100 household heads was chosen using the lottery method. However, in Ibaka community it was difficult to obtain a compiled household listing, therefore a purposive sampling method was adopted to

select two hundred (200) households from the 9 families that make up the community. In all, a sample size of three hundred (300) respondents was obtained and used for the study.
Data for this study was obtained mainly from primary sources. The data were collected with the use of questionnaires, interviews with key informants and with a cross section of opinion leaders in the communities including the youths and women.

The latter method involved the use of Focus Group Discussions (FGDs) and Participatory Rural Appraisal (PRA) sessions. The information that was obtained using the FGD and PRA methods include; settlement history of each community; the political organization and hierarchy of authority; land ownership patterns existing in these communities, the existence of socio-cultural and religious organizations, festivals and taboos, sources and channels of information dissemination within and without the communities among others.

Other information collected include the presence of traditional religion tourism sites such as shrines and sacred grooves; human waste disposal problems in the communities and potential solutions; as well as their expectations about the proposed project.

Information on the socio-economic and cultural characteristics of the respondents, knowledge of household hygiene, methods of human waste management and their willingness to adopt any new human waste disposal options to be introduced to the communities were obtained with the use of questionnaires. The questionnaires were validated and thereafter pre-tested before actual field enumeration began. Field assistants (3 in Uta Ewa and 5 in Ibaka) were trained and used for the pre-testing and actual questionnaire administration and retrieval from household heads (respondents). Key informants were also administered questionnaires to provide information on rural infrastructure in the community.

The settlement patterns and some infrastructure in the communities were also assessed visually. Table 1 shows that of the total of 300 questionnaires administered, only 272 were retrieved (about 90.50%). However, out of this number, only 266 were properly filled and thereafter used for the analysis.

Table 1: Questionnaire Administration and Retrieval Rate

S/N	Community	No. of Questionnaires Administered	Number of Questionnaires Retrieved	Retrieval Rate (%)
1.	Ibaka	200	182	91.00
2.	Uta Ewa	100	90	90.00
	Total	300	272	90.50*,

Source: Field data 2009. * Mean rate of questionnaire retrieval

2.2 Data Analysis

Data from the questionnaires were coded and subjected to analysis with the use of descriptive statistical methods such as, frequency tables, percentages, means, bar charts and Microsoft Excel tools.

3. RESULTS

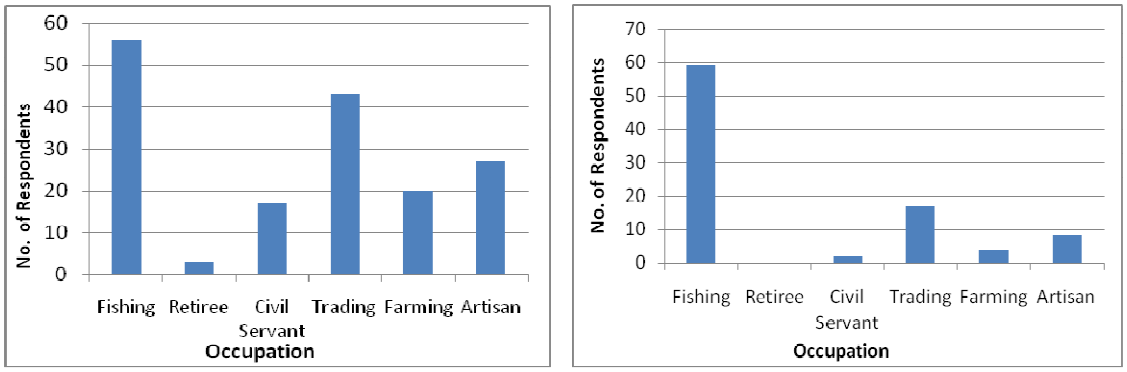
3.1 Settlement Pattern

The communities exhibit linear, cluster and compact settlement patterns. Houses are located along the roads and streets within the community. Houses by the water front are so compact that it is difficult for individuals to build personal latrines for lack of space. With this kind of settlement pattern, outbreaks of diseases can be difficult to contend with.

3.2 Socio-Economic Status of the Communities

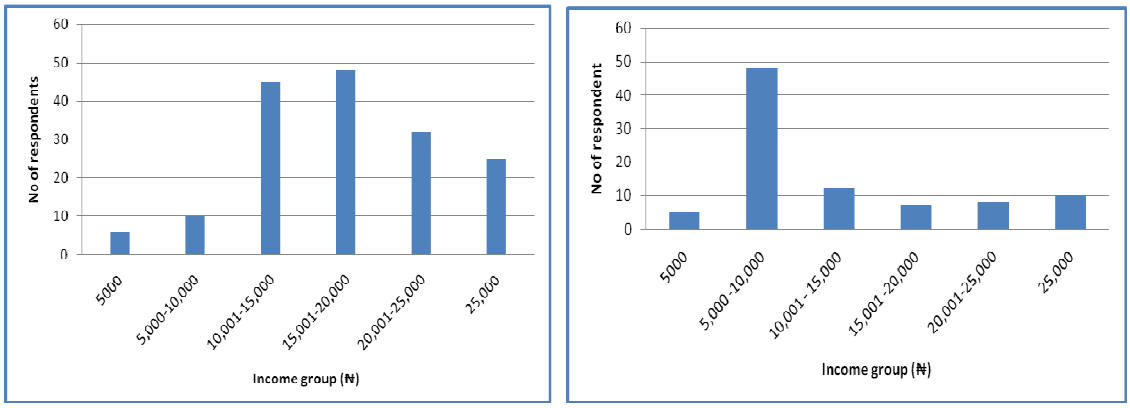
A significant number of the respondents (34% in Ibaka and 66% in Uta Ewa) had fishing as their primary occupation (Figs. 2a&b). Most people in other employments in the community also took fishing and/or fish marketing as their secondary occupation.

The investigation further indicated that majority of respondents in Ibaka earned between ₦10,000 ($45.5) and ₦20,000 ($90.9) as monthly income, while in Uta Ewa majority of the respondents were between the N5,000 ($22.7) and ₦15,000 ($68) income bracket (Figs. 3a&b).



(a) Ibaka (b) Uta Ewa

Fig. 2: Distribution of respondents by Occupation



(a) Ibaka (b) Uta Ewa

Fig. 3: Distribution of respondents based on income group

3.3 Traditional Institutions and Local Governance

The people of Ibaka and Uta Ewa are governed by organized and hierarchical traditional institutions that are recognized by government. The chiefs in these communities are the custodians of the culture, customs, law and order. The hierarchy of authority in these communities shows the Village Head at the apex and followed in order of importance by the Chairman of the Village Council.

The subjects in the two communities appear to be very loyal to the village heads. At their directives, the members of the communities became very committed to the success of this field work.

3.4 Social Organizations

Youth associations, age grades and women organizations exist and are very important rallying points for members during celebration, ill health and burial activities. They are formed to assist members socially and financially. The youth organizations are also useful in the area of sanitation and security (Vigilante groups).

Various cooperative organizations abound in the communities. Some of these organizations are moribund, while others are still active. Government and other organizations find it easier to channel funds through cooperatives and therefore the existence of cooperatives in any community augurs well for the well being of the individuals and the community at large [8].

3.5 Available Rural Infrastructure

Available infrastructure in both communities is inadequate. The availability of certain infrastructural facilities in any community speaks volume of the stage of development of such communities.

The road leading into Uta Ewa community and the Cement Company (under construction) was asphalted and therefore motorable. This infrastructure had been recently provided by the present government as part of its massive construction and rehabilitation of roads and other infrastructural projects in the State.

In Ibaka, the major road leading into this community was in poor condition - narrow and untarred. The Local Council had attempted to grade the road, but not enough to ensure free flow of the vehicular traffic experienced daily on this only road. The road will certainly become quite deplorable and unmotorable when the rains set in. The commonest means of transport in the community was the use of motorcycles and engine and speed boats.

Communication facilities available in the community were the Postal Agency (in Ibaka) and the Global Services of Mobile Telephony (GSM). Individuals in the communities, who did not own hand sets, patronize the commercial call centres to receive and make calls. These services were provided by the three important players in the telecommunication industry in Nigeria i.e. MTN, Zain and Globacom.

There were also some commercial television viewing centres provided by individuals and patronized by members of these communities especially the youths.

3.6 Water and Electricity Supply

In Ibaka the borehole water facility provided by the State Government was non- functional as a result of the breakdown of the generator needed for pumping the water. The people depended on the four privately owned boreholes and streams as sources of water for various uses, including drinking. However, in Uta Ewa, the only borehole provided by the State government was still functional though not adequate enough to meet the community's demand for water.

Uta Ewa community was provided electricity power by the electrification project of the Aluminium Smelter Company (ALSCON) as part of its corporate social responsibility to host communities. The supply of electricity power from this source was relatively stable. However, in Ibaka, electricity power which was being supplied by the Power Holding Company of Nigeria (PHCN) was quite erratic and therefore those who could afford it made do with electricity generating sets as source of power supply.

3.7 Educational and Medical Institutions

Ibaka community has one government primary school, about twelve (12) privately owned nursery schools, one secondary school and three Adult Education Centres that provided educational services

to young first school leavers. In Uta Ewa community, there was only one primary school. Pupils from this community attended secondary schools in Ikot Abasi which is about seven kilometers away from the community.

The available medical institutions in Ibaka community include; hospital, several patent medicine shops, traditional healing homes and traditional birth attendants. In Uta Ewa community, there was a health centre manned by a Staff Nurse and a few Community Health Assistants as well as few patent shops and traditional healing homes.

In both communities, the numbers of qualified public health workers to attend to the health needs of the community were few and in the case of emergencies (as in the case of outbreak of Cholera in both communities some years back), it could be very disastrous.

Figure 4 shows that most of the respondents in both communities had basic education (68.5% and 82.2% in Ibaka and Uta Ewa respectively). Within this group, majority had attained primary School level of education. The importance of education is critical in bringing about social change by modifying cultural heritage and development of sanitation and hygiene awareness among others (Ekong, 2003) in a developing rural community. Unfortunately about 32% percent of the respondents in Ibaka and 18% in Uta Ewa had no form of formal education and therefore a cause for concern.

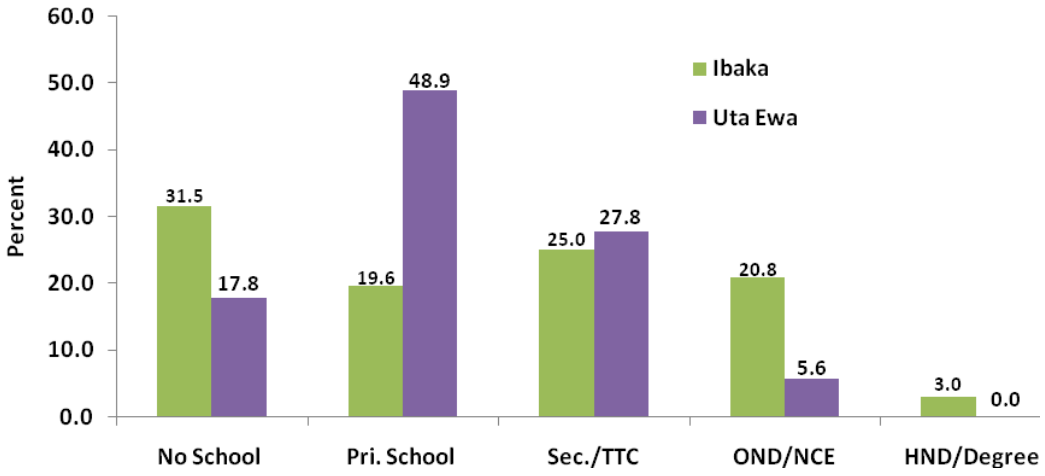


Fig. 4: Distribution of respondents by educational level

3.8 Household Waste and Excreta Disposal

Household wastes were disposed of indiscriminately in the surrounding bushes, nearby dumps and ultimately in the streams/rivers. Human wastes in particular were disposed of using the streams and rivers (Plate 1). It was also common to see children defecating in refuse dumps (an indication that they appear to see nothing bad about the sight of excreta in places they ought not to be found). Latrines were in short supply and mostly communal and not properly kept (Plate 2).

Plate 1: A typical scene ("water system") in one of the communities

Plate 2: A typical latrine in Ibaka where deposited excreta was carried by receding tide

There were privately managed pour flush toilets provided in the market vicinity as public conveniences in Ibaka. Members of the community and visitors made do with them for a fee. However, the number was inadequate to cater for the entire community and visitors who come in daily to carry out businesses in the community.

In most (50.23% and 56.55%) of the respondents' households in Ibaka and Uta Ewa respectively the use of open defecation in rivers in disposing of human wastes was common and ironically, they called it 'water system'. The other group defecated in surrounding bushes. A small percentage of the respondents made use of pit latrines while a smaller percentage paid and used the pour flush latrine provided by a private individual near the market.

Results of the questionnaire analyses (Table 2) show that majority (48.8% and 48%) of the households in Ibaka and Uta Ewa communities respectively dumped the waste they generated in the streams and rivers. This is an indication of the poor sanitation knowledge of most of the members of these communities.

3.9 Household Hygiene

The study indicates that majority (77.11% in Ibaka and 46.67% in Uta Ewa) of the respondents in the communities sometimes washed their hands after defecation and cleaning of children's excreta (Table 3). In addition, about 83.13% and 68.89% (in Ibaka and Uta Ewa respectively) of them did not wash their hands with soap at all. However, 49.40% and 53.33% of the respondents (in Ibaka and Uta Ewa respectively) cleaned their compounds daily.

Table 2. Distribution of Respondents Based on household waste and excreta disposal

	Frequency *(%)	
Variables	**Ibaka**	**Uta Ewa**
Household waste disposal		
i) Refuse dump	37(22.29)	20(20.00)
ii) Surrounding bushes	48(28.92)	32(32.00)
iii) Rivers/streams	81(48.80)	48(48.00)
Total	**166(100)**	**100(100)**
Type of Toilet facility used by household		
i) Open fields/surrounding bushes	54(25.12)	34(23.45)

ii) Traditional pit	21(9.77)	28(19.31)
iii) Flush toilet	32(14.88)	1(0.69)
iv) Rivers/streams	108(50.23)	82(56.55)
Total	**215(100)**	**145(100)**
Reasons for choice of option		
i) Cheap and affordable	21(9.42)	0(0.00)
ii) Easy to maintain	21(9.42)	1(0.59)
iii) Easy to construct	11(4.93)	28(14.77)
iv) Only one available	72(32.29)	88(44.21)
v) Lack of space to build toilet	98(43.95)	82(41.21)
Total	**223(100)**	**199(100)**
Preferred Latrine option		
i) Traditional pit	10(6.02)	24(26.67)
ii) Very Improved Pit	90(54.22)	56(62.22)
iii) Pour flush	61(36.75)	10(11.11)
iv) Water closet	5(3.01)	0(0.00)
Total	**166(100)**	**90(100)**
Preferred type of ownership		
i) Private	28(16.87)	10(11.11)
ii) Communal	86(51.81)	24(26.67)
iii) Compound	52(31.33)	56(62.22)
Total	**166(100)**	**90(100)**
Ability to afford preferred latrine		
i) Yes	2(1.20)	5(5.56)
ii) Yes with government support	28(16.87)	10(11.11)
iii) No	136(81.93)	75(83.33)
Total	**166(100)**	**90(100)**

Source: Field Survey data 2009 **Note: ***Frequency exceeds total due to multiple responses.

Table 3. Distribution of respondents with respect to hygiene practices

	Frequency *	
Variables	**Ibaka**	**Uta Ewa**
Frequency of hand washing after defecation and cleaning of children's excreta		
i) Always	18(10.84)	28(31.11)
ii) Sometimes	128(77.11)	42(46.67)
iii) Not at all	20(12.05)	20(22.22)
Total	**166(100)**	**90(100)**
Frequency of Hand washing with soap		
(i) Always	-	-
(ii) Sometimes	28(16.87)	28(31.11)

Variables	Frequency * Ibaka	Uta Ewa
(iii) Not at all	138(83.13)	62(68.89)
Total	**166(100)**	**90(100)**
Frequency of House & compound cleaning		
i) Daily	82(49.40)	48(53.33)
ii) Weekly	22(13.25)	12(13.33)
iii) Twice a week	40(24.10)	30(33.34)
iv) Monthly	22(13.25)	-
Total	**166(100)**	**90(100)**
Knowledge of good latrine		
i) Provide privacy		
Yes	166(100)	90(100)
No	-	-
Total	**166(100)**	**90(100)**
ii) Not clean and covered		
Yes	-	-
No	166(100)	90(100)
Total	**166(100)**	**90(100)**
iii) Children can use it with assistance		
Yes	24(14.46)	42(46.67)
No	142(85.54)	48(53.33)
Total	**166(100)**	**90(100)**
iv) Close to the house		
Yes	84(50.60)	40(44.44)
No	82(49.40)	50(54.56)
Total	**166(100)**	**90(100)**

Source: Field Survey data 2009 **Note: ***Frequency exceeds total due to multiple responses

4. DISCUSSION

Results from this study tend to indicate that the socio-economic status, cultural characteristics and location of the two typical riverine communities have very much dictated their level of hygiene and sanitation practices and general health and well being of the populace.

The study revealed that appropriate latrine was a felt need of these communities. The main reason adduced by majority of the respondents for their choice of mode of excreta disposal (in this case, not owning a sanitation facility) was lack of space in their houses to build toilets. The lack of space given as the main reason was mainly because the houses were originally built without sanitation facilities and too close to each other, on land communally owned by the extended family. This finding is in line with results of studies obtained elsewhere [9]. This was easily observable. The linear cluster and compact settlement patterns especially along the water front made it most difficult to provide spaces for toilets and disposal facilities, and make outbreak of communicable diseases a possibility. A large proportion of the land in those areas was permanently water-logged and unfit for erecting structures. For this reason, 50.23% in Ibaka and 56.55% in Uta-Ewa defecate in open streams. Water from these streams are often also used for domestic purposes.

Another reason given for inability to own a sanitation facility was lack of money. Since there is a positive correlation between income and standard of living, the levels of income generated by the

communities members may not be enough for them to access quality health services (build and maintain good latrines inclusive), nutrition and education for their households. In communities where the average monthly income was between ₦10,000 ($45.5) - ₦ 20,000 ($90.9) (in Ibaka) and ₦5,000 ($22.7) - ₦15,000 ($68) (in Uta Ewa), this is near impossible This points to the fact that the communities will need external assistance to own decent sanitation facilities. This is more so that the areas have perculiar topographical problems that will make construction of any toilet facility cost prohibitive. Any technology that will help to improve the hygiene and sanitation practices and so, the health and longevity of the communities must therefore take these into consideration.

Provisions for potable water in both communities were very poor. Potable water was a scarce commodity as the people depended on only a few private/government boreholes and the streams for their general water requirements. The quality of the water from the available boreholes was yet to be ascertained given that water from most boreholes in rural communities in the State are often not treated. This has serious health implications given the low levels of sanitation in rural riverine communities. A group of workers [10] reported that anthropological and animal activities in the vicinity of water collection sites as well as settlements lacking proper sanitation facilities, contributed to the poor water quality of the different ground water sources they sampled. The communities either collectively or individually cannot afford to provide clean water facilities because of their low incomes.

The number of educational institutions in the communities appears inadequate to cater for the increasing educational needs of the members of these communities now and in the nearest future. Although this study did not correlate educational status with ownership of a sanitation facility, a similar study [9] showed that there was an association between education and sanitation and hygiene awareness. Education plays a very important role because it is only through the basic understanding of the need for sanitation can the people be mobilized for its implementation. Critical to the coastal communities is the need to inform community members about the health and environmental hazards caused by their traditional practice of defecating on the surface water [11].

Health education which in Nigeria is championed by Community Health Centres and Public Health Clinics (Primary Health Care, PHC, Centres) is virtually non existent in the two typical riverine communities. There was no PHC centre in Ibaka and only one in Uta-Ewa. This is grossly inadequate especially in consideration of the very grave health challenges facing most coastal communities.

Hygiene education is of critical importance in such communities where more than 75% of the respondents disposed of their human and other household wastes in the streams/rivers and surrounding bushes. This practice has also been reported in similar studies in the Niger Delta [11, 9]. This indiscriminate dumping of wastes into the river causes serious environmental hazards and health risks [12]. In addition, most of the few available toilet facilities were found in unhygienic conditions.

The respondents in the communities appeared not to have adequate knowledge of personal hygiene with reference to hand washing and toilet habits. This has serious implications on their health status with respect to diseases that are transmitted through the feco-oral route such as cholera, dysentery, diarrhea and typhoid. It has been estimated that hand washing with soap alone can reduce the incidence of diarrhoea by 47% and was able to prevent 0.5 – 1.4 million deaths per year [13]. Studies elsewhere have reported that the unhygienic conditions of the sanitation facilities, the improper disposal of children faeces, and the poor hand washing behaviour of the respondents were perhaps responsible for the number of childhood diarrhea reported in the community [13, 14].

The most critical challenge to health in these communities is the issue of improper human waste disposal. It has been reported that an estimated 2.4 billion people in the world lack access to proper human waste disposal system and most of these persons live in developing countries like Nigeria [15, 16]. Uta-Ewa and Ibaka communities are also faced with similar conditions. The situation in the two communities typifies the situation in almost all the riverine and coastal communities in Nigeria as has equally been noted in earlier studies [9, 11]. The very poor and sometimes dehumanizing sanitary and hygiene practices is as a result of the socio-economic status of these communities occasioned by provision of very poor rural infrastructure due to location disadvantages.

Proper disposal of human waste in the two communities poses a technological challenge. The high water table, settlement pattern and lack of enough solid land space have made it very difficult to provide these facilities. Majority of the respondents in both communities (54.22% and 62.22% in Ibaka and Uta Ewa respectively) preferred to have Ventilated Improved Pit (VIP) latrines provided for them with communal ownership option as a result of space and cost. Most of them were also of the opinion that they cannot afford their preferred latrine for now except there is an improvement in their standard of living via enhanced income. The selection of an appropriate latrine technology by persons in any rural community is influenced by how much would be required of them to acquire and maintain them, with or without external financial assistance. Where there is the guarantee that these facilities will be provided at no cost or very minimal cost, choice of an option is easier. In their study of latrine technology options in India [17] reported that pour-flush latrines which were promoted by the government were well beyond the means of most of the rural poor who were the target population and this had affected the adoption and continuous use of these latrines by the rural people. Construction of built-up pit with the raised portion sealed against leakage and protected against erosion in locations with a high water table had been suggested [18].

In the opinion of [19], human waste disposal costs could be reduced when the development of a range of technical options is financially supported by government and or development agencies. They suggested that to achieve low-cost, culturally sensitive latrine technologies in particular, there was need for further research and that designers should keep an open mind about possible appropriate latrine technologies. More so, without subsidy, such research projects should provide latrine options that will be affordable to the great majority of households. A study on investigating gender mainstreaming and appropriate latrine technology in rural India [20] found that, higher cost of latrine technologies caused a lower rate of adoption of promoted latrine technologies by the rural dwellers. It is important therefore that options that are deemed appropriate must also be economically feasible given poverty prone rural economy.

5. SUMMARY AND CONCLUSION

The major findings of this study may be summarized as follows:

a) The two pilot communities – Ibaka and Uta-Ewa have large fishing settlements and lie below other parts of the town;
b) Major occupation of the people was fishing but they also engaged in the cultivation of food crops;
c) The communities were relatively poor with average monthly income of the majority of the respondents in the two communities ranging between ₦5,000 and ₦20,000;
d) The two communities lacked adequate public facilities for human waste disposal. Ibaka had only one such facility on the water front while Uta-ewa had none. Only two families in Uta Ewa and eight in Ibaka had latrine facilities;
e) Human waste disposal was mainly by open defecation into water bodies or in the bush;
f) The respondents in the communities appeared not to have a good sense of personal hygiene with reference to hand washing and toilet habits;
g) Major sources of water included river, rain and a few public and private boreholes;
h) The people preferred communal latrines provided by government as most of them expressed lack of space for toilet within the homes and cannot afford their preferred choice for now except there is an improvement in their standard of living via enhanced income.

Latrine and other waste disposal technology options must therefore take into consideration the socio economic status and cultural practices of the people for such technology to be sustained. Such factors include:

a) Poor economic and earning power of the people. Any option must therefore be cheap enough to be within the reach of the people

b) Difficult terrain such as the high water table that will make some of the options not feasible
c) Lack of space, making it impossible for individual families to provide latrine facilities and may resort to communal provisions
d) Lack of adequate sanitation and health education among its populace.

In conclusion, it is evident that appropriate latrine and other waste disposal facilities are a felt need of the people. An appropriate latrine has been described as one which must be environmentally friendly, socio-culturally acceptable and economically feasible. On the long run however, the choice of the acceptable appropriate technology rest with the eventual users or beneficiaries. It is important therefore that options that are deemed appropriate must be economically feasible given the average income levels of the communities. Where possible the human waste disposal facilities should be constructed with materials that are readily available in the communities or the immediate environment to enhance ease of construction by residents who may wish to own personal facilities. These facilities should also be provided in schools and other public places. In addition, it is important to note that improvements in water and sanitation will need to be accompanied by improved basic and health education to have the desired impact. Basic education will equip the people of poor rural communities with the knowledge and will to overcome their poverty and manage hygiene and sanitation better. Governments should make conscious efforts to improve the income potentials of coastal communities through the provision of basic infrastructure.

This study provides background information that will enable further research and development of appropriate latrine and other waste disposal technology options peculiar to Nigeria's riverine/coastal communities. The governments (state and federal) may need to take up this challenge through the Niger Delta Development Commission and the Ministry of Niger Delta Affairs.

REFERENCES

1. WHO/UNICEF JMP. Meeting the MDG Drinking Water and Sanitation target. The Urban and Rural Challenge of the Decade. 2006. Accessed 10 November 2009. http://www.wssinfo.org/fileadmin/user_upload/resources/1198239354-JMP_06.pdf
2. WHO/UNICEF JMP 2014. We can't wait while 2.5 billion people don't have access to improved sanitation. World Toilet Day. 2014. Accessed 1 March 2015. http://assemblyonline.info/opendefecationnigeria/
3. Feacham RG, Bradley DJ, Garelick H, Mara DD. Health Aspects of Excreta and Sullage Management: A State-of-the-Art Review, Washington D.C.: World Bank;1980.
4. Water Supply and Sanitation collaborative Council (WSSCC)/Global Sanitation Fund (GSF). Sanitation Sector status and Gap Analysis: Nigeria. 2009.
5. WaterAid (2012). Briefing note-1 in 3 women lack access to safe toilets.
6. NPC. Final Census Report of the Federal Republic of Nigeria. National population Commission Abuja, Nigeria; 1991
7. NPC. Population Estimates of the Federal Republic of Nigeria. National population Commission, Abuja; 1996.
8. Ekpe E, Idiong IC. Role of cooperatives in agricultural development: A study of selected Local Government Areas of Kogi State. ESUT Journal of Development Management. 1999;1(1):15 – 20.
9. Ordinioha B, Owhondah G. Sanitation facilities and hygiene practices in a semi-urban community in Rivers State, south-south Nigeria. The Nigerian Health Journal. 2008;8(1-2):10-15.
10. Zamxaka M, Pironcheva G, Muyima NYO. Microbiological and Physico-chemical assessment of the quality of domestic water sources in selected rural communities of the Eastern Cape Province, South Africa. Water SA. 2004;30(3):333-340. Accessed 18 August 2012. Available: http://www.wrc.org.za
11. Ogbonna DN, Idam DY. Appropriate Sanitation Systems for low-income Coastal and Water front Communities in the Niger Delta, Nigeria. J Applied Sci. 2007;7(8):1116-1123.

12. Phiri O, Mumba P, Moyo BHZ, Kadewa W.Assessment of the impact of industria effluent s on water quality of receiving rivers in urban areas of Malawi. Int J Environ Sci Tech. 2005;2:237-244.
13. Curtis V, Cairncross S. Effect of washing hands with soap on diarrhoea risk in the community: a systematic review. The Lancet infectious diseases. 2003;3: 275-281.
14. Fewtrell L, Kaufmann R, Kay D, Enanoria W, Haller L,Colford J. Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. Lancet Infect Dis 2005; 5: 4252.
15. Uchegbu SN. Environmental Management and Protection. Precision Printers and Publishers, Enugu, Nigeria; 1998.
16. Jensen PD, Haebs J, Mang EH, Warner W, Refsgaard K, Strenstom TA, Alsae KW, Guterstrom B. Ecological Sanitation and Reuse of Waste Water: A Think Piece. Agricultural University of Norway; 2004.
17. Kolsky P, Bauman E, Bhatia R, Chilton J, van Wijk C. Learning from Experience– Evaluation of UNICEF's Water and Environmental Sanitation Programme in India, 1966-1998. Evaluation Office, Division of Evaluation, Policy and Planning UNICEF Headquarters, New York. Commissioned by the Swedish International Development Agency (SIDA), UNICEF, New York, USA; 1998.
18. Cairncross S, Feachem F. Environmental Health Engineering in the Tropics. An introductory text. 2nd Ed. London.John Wiley; 1993.
19. Brandberg, B. Latrine Building: A Handbook for Implementation of the SanPlat System. Intermediate Technology Development Group Publishing, London, UK; 1997.
20. Regmi SC, Fawcett B. Men's Roles, Gender Relations, and Sustainability in Water Supplies: Some Lessons from Nepal. In the Oxfam Working Paper: Beyond Rhetoric –Men's Involvement in Gender and Development Policy and Practices. Edited by C Sweetman. Oxfam, Oxford, UK; 2001.