

The Reality and Tough Choices about Water and Sanitation in Nigeria's Coastal Settlements: a Preliminary Discussion

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ABSTRACT

This paper aims at developing a better understanding of local social, cultural and ecological geographies of water and sanitation in Nigeria's coastal settlements. In-depth interviews, field observations and secondary sources of data were used to capture local complexities associated with these issues in Ibeno-a coastal settlement in Akwa Ibom state, Nigeria. Findings showed that the daily water and sanitation practices of the people depend, to a large extent, on the nature of the locational/physical environment as well as the wider social and cultural circumstances of the people (located in beliefs, spiritualities and socio-economic status). As behavioural responses, a number of coping resources and methods were observed to be central to meeting the daily challenges of water and sanitation in the area. In conclusion, the paper argues that theories working on behavioural changes and human cognition alone are not sufficient in deepening understanding of the complexities surrounding water and sanitation issues in developing countries. The wider social and environmental contexts are important variables for considerations.

Keywords: *water and sanitation challenges, tough choices, coping measures, coastal environments, Nigeria.*

1. INTRODUCTION

The environment has always been discussed as a critical factor in human behaviour (Akpabio and Subramanian, 2012; Young et al., 2006; Mühlhäusler and Peace, 2006; Koning and Smailing, 2005; Robbins, 2004; Zimmerer and Basset, 2003 and Flyvbjerg, 2001). Bertalanffy (1981, cited in Akpabio and Subramanian 2012) had earlier written about this relationship when he saw human nature in a two-sided perspective: the physical or material side-human being lives with a biological body, physically equipped with impulses, instincts and limitations on each species. In the other side, each person creates, uses,

dominates and is dominated by a universe of symbols¹. This observation emphasizes the association between ecology and cultures. Ecology is usually associated with the physical or material world, which is interrelated with human beings. In this context, humans are seen as part of an ecosystem, and such unity of nature and culture contribute in producing meanings and values over time.

Bruner's (1989) transactional contextualism, which emphasizes a process in which the person constructs the self in the context of the environment, and Gibson's (1986) consideration of the environment from both physical (ecological context) and phenomenological (visual perception) perspectives, have enabled the argument that the environment is both physical and phenomenological in that persons perceive objects in the environment by the affordances they offer (also see Dunn et al., 1994). These theoretical perspectives have served to highlight the spatio-temporal elements of cultural, socioeconomic and physical contexts of human relationship with the environment. However, the potential contribution of these contextual factors in the areas of understanding water and sanitation practices has not been thoroughly explored. Relying on extensive review of literature, Jewitt (2011) had noted both the spatial and temporal dimension of cultural and environmental factors that constrain intervention efforts at addressing water and sanitation challenges in developing countries. Popular among such factors were the taboos and ambivalence characterizing human excreta. Arising from some related observations, some scholars (Akpabio, 2012a; Banda et al., 2007) have argued for more place sensitive and locally evolved approaches that take account of the various socio-economic, cultural, political and physical/ecological environments rather than pure physical infrastructures and assumptions of ignorance often credited to the intended beneficiaries of water and sanitation interventions. This paper aims at developing a better understanding of local social, cultural and ecological geographies of water and sanitation in Nigeria's coastal settlements. It is expected this will serve as a contribution to evolving a framework for flexible engagements with local actors and target population on these issues.

The topic is discussed in sections. Immediately following the introductory section, comes some insights into the thesis on environmental determinism as a framework to further understand human-environment relationship. The next section runs an overview of the state of global water and sanitation with some focus on Nigeria's situations. Section four discusses the background of the study area. The fifth section presents the results and discusses necessary findings. This is followed by the concluding remarks.

¹ For more clarification the symbolic dimension encompasses both the spiritual and the symbolic parts. It consists of the norms that rule each social group, that is, ideas, interpretations, beliefs, traditions and even aspirations.

2. HUMAN-ENVIRONMENT RELATIONSHIP AND THE FRAMEWORK OF ENVIRONMENTAL DETERMINISM

Most studies have asserted that human character, lifestyles, preferences and behaviours are products of environmental influences (Bodin, 1608; Dickinson, 1951; Sheppard, 2011 and Ballinger, 2011). These arguments draw dominantly on the idea of environmentalism which has been discussed at various perspectives and scales. In a common understanding, environmental determinism which also may be known as climatic determinism or geographical determinism is the view that the physical environment, rather than social conditions, determines culture. The promoters of the view look at humans and human societies as defined and shaped by the dynamics of stimulus-response. In other word, aspects of physical geography do influence the psychological mindset of individuals, which in turn define the behaviours and culture of the society that those individuals formed. Environmental geographical factors, to a large extent, have been implicated in the processes of development, behaviours and distribution of human activities and processes. Location and climate have been frequently cited in the literature as influencing human behaviour. Coastal regions, for instance, have emerged as an important variable in shaping human livelihood conditions and nature of social behaviours (Gallup et al., 1999). Where a modern system of infrastructure is not common, local coastal inhabitants seem to derive their livelihoods on the natural geographical environment. In the view of Ballinger (2011: 14) ‘ignoring geography means imagining a uniform world with no differentiation in physical characteristics...’

The idea that the environment exerts deterministic influence on human behaviours and culture was rejected in the 1950s purely on moral grounds (Dickinson, 1951 and Ridley, 2003, all cited in Ballinger 2008: 8). The central point for its rejection was the seeming intellectual direction it offered to justify racism and imperialism. The rejection of environmental determinism was immediately followed by the development of a counter thought in the form of environmental possibilism-the argument which sees the environment as setting certain constraints or limitations. Most scholars particularly cautioned against the assumption that nature and actions of humans were determined by the physical environment they inhabited. Blaut (2000: 149) had argued that ‘environmental determinism is the practice of falsely claiming that the natural environment explains some fact of human life when the real causes, the important causes, are cultural, not environmental’ (cited in Ballinger 2011: 9).

Although progress in understanding environmental determinism was undermined for its racial connotations, growing evidence in human social development and human-environment relationship seems to point to the fact that some elements of the theory could still be used in explaining the distribution of human behaviours and cultures across scales (Sheppard, 2011). This paper

contributes to enriching this debate by fostering further understanding of such relationship in coastal settlements in Nigeria.

3. THE STATE OF WATER AND SANITATION: OVERVIEW OF THE GLOBAL AND NIGERIAN PICTURES

The importance of water supply and sanitation² system has been a subject of serious attention reflected in the measurement of human development and in their inclusion in the Millennium Development Goals³ (MDGs). This priority treatment follows official reports estimating about one billion people in the world living without access to improved drinking water supplies while 2.6 billion people live without adequate sanitation (see Lane, 2012; WHO, 2010; WHO/UNICEF, 2010; UNICEF and WHO, 2004 and UN-Habitat, 2003). Nearly 80% of the people using water from unimproved sources are reportedly concentrated in three regions namely, sub-Sahara Africa, Eastern Asia and Southern Asia. For sanitation, overall levels of use of improved facilities are noted to be far lower than for drinking water (WHO and UNICEF, 2006). These represent serious global health burden especially when viewed in terms of the consequences associated with a lack of access to drinking water, inadequate sanitation and poor hygiene. Although some countries, especially in the less developed realm, are making significant progress in addressing the challenges of water supply and sanitation, reports on sub-Sahara Africa is particularly not encouraging as only 36% of the population was officially estimated as having access to basic sanitation (UNICEF and WHO, 2004) while 37% of her population still relies on unimproved sources of water (Onabolu et al., 2011).

Nigeria is one of the countries in sub-Sahara Africa whose records on general access to water supply and sanitation facilities by the citizens remain very poor. The Nigerian cities in particular are fraught with inexorable rise of squatter settlements, overcrowding dwellings, breakdown of waste disposal arrangements, air and water pollution and inadequate water and sanitation services. Many problems of mortality, morbidity and poverty have been reported

² The author's idea of sanitation relates to all aspects of personal hygiene, waste disposal, and environmental cleanliness which could have impact on health (Black and Talbot, 2005: 101). There often exists a lineal connection between dirt, water, and disease - covering personal and domestic hygiene, vector control, food cleanliness, drinking water storage. Most intervention efforts these days conceive of sanitation in a narrow form of toilet construction, rather than a package of environmental and household cleanliness, with water assuming a central position.

³ The Millennium Development Goal (MDG) 7 aims to halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation. By WHO/UNICEF (2010) estimates, sub-Saharan Africa faces the greatest challenge in increasing the use of improved drinking water facilities with 37% of the 884 million people that still use unimproved sources living in this region (see Onabolu et al., 2011).

in the literature as consequences of a lack of safe drinking water supplies as well as poor sanitation coverage (Nwankwoala, 2011; WHO, 2010; Nyong and Kanaroglou, 1999; Sodeinde et al., 1997). Given these poor pictures, the question arises of what, probably, could be the main problem of inability to secure access⁴ to safe drinking water and basic sanitation for the populace. Many studies seem to agree to the fact that a lack of political will to tackle the problem is one of the most responsible factors (see Mara, 2012; Lane, 2012; Moe and Rheingans, 2006). While this is largely and generally true, this paper argues that political commitment alone may not provide a one-off solution to the general problem. There is the need for more researches on complexities relating to the wider social and cultural ecologies of water and sanitation issues. This present study will contribute empirical knowledge to foster practical understanding of these complexities. The study uses the coastal settlement of Ibeno, Akwa Ibom State, in addressing this topic.

4. STUDY AREAS AND METHODS

Ibeno is one of the 31 local government areas located in the southern part of Akwa Ibom state. It is a coastal settlement that is bounded by the Atlantic Ocean. It has a humid tropical climate characterized by high daily temperature (between 260 C and 330 C), relatively high annual rainfall (3000mm–4000mm) and very high relative humidity (>80%). The influence of the sea water contributes not only in moderating the high daily temperatures; it equally influences the relatively high annual rainfall situation in the areas.

There are two sources of water supply in Ibeno: the natural sources and the modern supply sources. While the modern sources revolve around borehole which could come from government, multinational, private and non-governmental sources, the reality is that a vast majority of the people still depend on the natural sources of water supplies from available rivers/streams, hand-dug wells and rainwater. Of all these, rainwater (harvested from the roof top) has emerged as a long time historical and cultural practices in addressing the domestic water needs of the settlements which are largely affected by salinity of ground water and a lack of fresh water sources. The quality of local ground water is extremely poor and polluted that it cannot be used for uses such as cleaning, bathing, washing, and drinking. The demand is partly met by private and commercial water supply initiatives which are rather expensive for low

⁴ Access is defined by the National Policy on Water and Sanitation (2000) as the percentage of population that uses drinking water from improved sources. When sanitation is used, it is seen as the percentage of the population that uses improved sanitation facilities. Improved drinking water in Nigeria includes households' connections, public standpipes, boreholes, protected wells, springs while improved sanitation includes public sewer or septic system, pour flush latrines, ventilated improved pit latrines and pit latrines with slaps.

income earners in terms of cost and distance. From the economic point of view, roof water harvesting remains a viable alternative. The entire coastal settlement still depends on the nearby water bodies for bathing, laundry activities and disposal of waste products. This trend seems a common practice in coastal settlements given that Kumar (2004) had reported of similar observations that riverine settlements depend on the natural flows in rivers for meeting their sanitation needs and for a variety of other uses. In such conditions, roof water harvesting have provided immense hydrological opportunities for supplementing household water needs for drinking and other purposes (see also a related study by Ilyas, 1999).

Over the past few decades, Ibeno has become an important economic areas for Nigeria given its status as an oil producing area. The presence of some oil multinationals in the area has contributed in the transformation of the area (both positively and negatively) in the forms of influencing the cost of living, provision of some physical infrastructures (roads, electricity etc), environmental degradation through oil spillage and gas flaring etc. In spite of the impact of oil exploration, the rural people still depend on agriculture and related activities for livelihood and income. While the impact of some physical infrastructures of the oil multinationals such as roads, electricity and water may be felt in some core urban settlements, virtually all the rural and island settlements hardly get linked to such benefits (Brown, 1998). Consequently, the people depend on individual and community efforts in surviving through the constraints of the natural environment. In such circumstance, it is natural that surviving in such difficult environments will depend, to a large extent, on the rich cultural and religious beliefs⁵ as important frameworks for relating with the natural environment.

This study is part of the Niger Delta Development Commission's (NDDC) funded project on 'flood and erosion control in Akwa Ibom state' (2010–2014). The project in this case was managed by Still Waters Consults while the principal researcher led the study team in Akwa Ibom State. The study was particularly attracted to Ibeno local government area and a small island settlement-Itak Abasi. It is of interest to report here that Itak Abasi is a small island settlement on the opposite side of the Atlantic shore with a population of 1081 (NPC, 2006). The settlement was completely wiped off by the 2010 coastal flood, which forced settlement relocation by the surviving members of the community to other areas such as 'Okoroutip' while others opted to the other side of the Atlantic namely 'upenekang', the most relatively stable and less disruptive by natural forces.

In the course of one of the regular visits to the island settlements for some hydrological and socio-economic data, keen interest was developed mostly

⁵ Generally, local knowledge of water and sanitation in the area is nested in beliefs, myths and superstitions such as seeing water as 'God-given' or 'nature-given' or the idea that 'water places' are the dwelling places for the 'spirits.' These cultural orientations and beliefs influence behavioural attitudes toward water at any given time (see a related work by Akpabio, 2012b).

around the state of water and sanitation in the small settlements of Upenekang and Okoroutip prompting three separate study visits (with two research assistants and two locals) which occurred on the 6th, 13th and 20th January 2013. In-depth interviews were conducted with 30 respondents (21 males and 9 females). The interview questions were mostly generated around the prevailing water and sanitation situation. Notes were taken on key socio-economic characteristics of the respondents including education, occupation, incomes and age brackets. Interest was developed in such issues as sources of drinking water and fecal wastes disposal; coping measures around water and sanitation issues; perceptual and attitudinal issues formed around fecal wastes; seasonal impacts on waste management; relationship with water, among other issues.

The respondents were selected on random basis given that the general socio-economic characteristics of the population were not significantly different. Additionally, some authorities and individuals were consulted including commercial water operators; spoke persons for the villages, some village elders, students and experts. The study equally depended on the MSc project of the second researcher as important source of secondary information (Brown, 1998).

It is important to acknowledge that this particular study only concentrated in the dry season. Although efforts were made to have insights into the water and sanitation issues in the areas at wet season through interviews, this however would not adequately compensate for physical monitoring and study to have a firsthand appreciation of the situation. As the title has indicated, this paper is a preliminary report and account of the general water and sanitation situation in coastal settlements of Nigeria, and has the potential of stimulating more researches to enrich theoretical debates and facilitate practical interventions.

5. RESULTS

The 30 interviewees produced 21 males (70%) and 9 females (30%) whose socio-economic characteristics were dominated by the less educated (>40%) and those without formal education (>30%). The occupational structure is quite typical of the scenarios in the rural areas in developing countries: 'individuals and families laying hands on what is available for livelihood supports.' Although fishing and farming activities were important occupational practices, other small businesses including trading, crafts, commercial transports were complementary livelihood sources of local specializations. Only two (>6%) respondents were civil servants who also depended on traditional farming and fishing for their living (Table 1).

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Table 1. Respondents by socio-economic characteristics.

Parameters					
Education	No formal -11 (36.7%)	FSLC-14 (46.7%)	Secondary-4 (13.3%)	Tertiary-1 (3.3%)	
Occupation	Fishing-30 (100%)	Farming-30 (100%)	Civil service-2(6.7%)	Trading-27(90%)	Other businesses-30 (100%)
Income	Not certain (many errors in estimation)	Not certain (many errors in estimation)	Not certain (many errors in estimation)	Not certain (many errors in estimation)	Not certain (many errors in estimation)
Age brackets	Under 20 years but not below 18 yrs-3 (10%)	21 yrs.-30 yrs.-5 (16.7%)	31 yrs.-40 yrs. 11 (36.7%)	41 yrs. to 50 yrs. 8 (26.7%)	50 yrs. and above 3 (10%)

N/B: FSLC-First School Leaving Certificate

Major water sources, available toilet systems, general sanitary condition of the surrounding environment were the major focus of discussions and interviews. The sources of water supplies were mixed but dominated by rainwater (through roof harvesting), commercial supplies and complemented by many other sources including the seawater, private system, public supplies and locally dug wells (Table 2).

Table 2. Available sources of water.

Sources of water supplies	Situations	No. of respondents	Remarks
Private supplies	Not common	2	Extremely few. One was noted at Upenekang, which also serves as a commercial source. Run by the wealthy and local politicians
Public supplies	Not common	4	Few public infrastructures may be available but rarely supply water
Rainwater	Dominant	30	Rainwater are harvested from thatch and zinc roof for drinking and other domestic needs(once available)
Commercial supplies	Dominant	30	Varies between #10 (\$0.07) and #15 (\$0.10) per 25 litres
Others	Complementary	30	1. Locally dug wells (for bath and laundry) 2. Seawater for bath and laundry

All the respondents indicated rainwater and commercial supplies as their regular and steady sources of water for various uses. While rainwater was discussed as the most regular source for every activities (drinking, domestic uses, washing), commercial supplies were available options in case of delayed or absence of rainfall. Household economy determines patronage of commercial supplies. The geological condition of the study area is very unfavourable to borehole drilling as the respondents reported of borehole water as colourful, salty and of poor quality even after chemical treatments. Household or individual choices for commercial (borehole) supplies are constrained by a lack of regular alternative especially in periods of delayed rainfall. Given that the cost for a 25 liter of water is fixed at #10 (\$0.07), island settlements such as Itak Abasi and Okoroutip (at the other side of the sea) tends to spend more to access commercial water supplies at Upenekang. The sum of #100 (\$0.7) is spent as

transport cost to cross over the sea by boat to Upenekang and back, excluding the cost of conveying the water in containers. Given such hard choices, the respondents admitted having to depend on the sea water and locally dug wells for occasional drinking, bath and washing. Although public taps were found in each of the settlements, they were not supplying water, they carried the status of abandoned infrastructures. For Itak Abasi, the 2010 coastal flood had submerged the only public tap which the respondents claimed were not even supplying water prior to the flooding incident. One woman in her late 30s (at one of the Island settlements) spoke on the water situation in the area and is here translated as follows: ‘we depend on rainwater for drinking and domestic activities... we bath and wash in the sea but some people drink the sea water when rainwater is exhausted... as many people cannot be paying to buy water at Upenekang (the other side).’

The sea not only served as local dominant source of water supply, it was understood to be at the center of sanitation practices. All the respondents admitted the sea has dominated the sanitation practices of the coastal settlements. Virtually every respondent has no toilet facilities in the areas. Consequently, faecal wastes are openly disposed of at the beach and inside the surrounding bodies of water (Table 3).

Table 3. *Sources for fecal wastes disposal.*

Fecal waste disposal	No. of respondents	remarks
On the sand beach	30 (100%)	Dominant source (most especially at ukpenekang)
In the bush	30 (100%)	Dominant on the other side of the beach (Itak Abasi, Okoroutip) with bushes. Not common in upenekang where there is no bush
Regular pit toilet	Nil	-
In-house toilet system	2 (6.7%)	Local politicians and the wealthy were reported to own in-house system
Others	18 (60%)	Wrapped fecal wastes in polythene bags and papers disposed of in the sea, gutters and bushes

Three means of fecal wastes disposal were identified as ‘wrap and throw’, open defecation in the bush or on the sand beaches and controlled defecation (through in-house toilet system). All the respondents practiced ‘wrap and throw’ either into the sea or bush; and ‘open defecation’ either in the bush or on the sand beaches. Only 2 respondents (>6%) maintained in-house toilet systems. There was no respondent with knowledge of the availability of pit toilet system.

Fecal wastes disposal among the population was noted to be determined not only by the spatial distance from the sea, time factor equally was discussed as important. While the two island settlements of Itak Abasi and Okoroutip depended mainly on the sea and available bush for their fecal waste disposal, the nature of Upenekang, to some extent, provided little opportunity for those who could afford to maintain in-house toilet and sanitation facilities depending on

location of settlements. For instance, households located in-land away from the sea have the option and opportunity of running in-house toilet system depending on the household economy. The two households who were able to run in-house toilet facilities happened to be the elite members of the area who have their houses a bit far away from the sea. In an earlier study, Akpabio (2012a) argued that households' decision to own a toilet facility overwhelmingly depends on the locational and environmental conditions to the extent that households living closer to the riverside and large expanse of vegetative areas are less likely to own a toilet facility. Though locational distance and circumstance have been used in explaining such tendency to deviate from common practices, the level of education and awareness about sanitation issues were possible factors that could account for a lack of conformity with prevailing practices. In this context, Jenkins and Curtis' (2005) observation that wealth and income, exposure and education do influence household water and sanitation practices bear great relevance in the present study.

Time elements featured as important determining factor of sanitation behaviours in the study areas. 'Day or night', 'dry or wet' seasons etc., accounted for 'where to defecate' or 'what method to use.' Incidence of 'wrap and throw' was known to be time dependent: 'wrap' at night and 'throw' away in the early hours of the morning for some, especially for safety reasons or 'wrap' at certain hours of the day and 'throw' away subsequently for others, especially those with 'privacy' concerns. For safety reasons, the women and children were discussed as needing more protection. For privacy reasons, the women and visitors were discussed as priorities. This observation seems not so significantly different from the study by Avvannavar and Mani (2008) who observed that women in Africa focused more on privacy and safety when making decisions on where and when to defecate. The authors argued that in such circumstance, the natural environment with bushes and shrubs suits their requirement the most, with the option to defecate in the early hours of the day in the absence of the later.

The most important outcome of human waste practices were excreta materials or fecal wastes either floating on the sea or lying at every walking distance on the sand beaches. The filths were most common at Upenekang side of the settlements than the island settlements of Itak Abasi and Okoroutip. In the wet season, regular tidal washes keeps the beaches relatively less filthy than the situation in the dry season. Interestingly, the beaches serve as sporting grounds (for children and adults), eateries, strolling and relaxation as well as providing avenues for diverse economic activities including buying and selling, fishing and points for take-off and landing for local boat transportation. At every visits, the sea was observed to serve swimming, washing and bathing needs of the local settlements. Instance of direct drinking from the sea was not confirmed although some respondents and local informants claimed the inhabitants occasionally drink directly from the sea. This may be possible especially going by the various scholarly reports of the spiritual values placed on the extra powers of 'filth',

'taboos' and 'human wastes' (Akpabio, 2012a; Douglas, 1966 and van der Geest, 1998).

By comparison, the island areas (Itak Abasi, Okoroutip) have relatively better sanitary conditions (largely attributed to natural factors) than Upenekang areas. The availability of bushes and surrounding bodies of water including the Atlantic Ocean provide natural sinks for all sanitary practices. The other side of the islands namely, Upenekang, was observed to be very poor sanitary condition. A combination of high population (Upenekang has 7856, over three times heavily populated than Itak Abasi and Okoroutip combined), high economic activities (Upenekang provides the major market for the island areas) and limited number of surrounding bodies of water were observed as possible factors for observed differences. These are locational issues that tend to reinforce individual and household sanitation attitudes, behaviours and differences in the study areas.

6. DISCUSSION

Geography, history, cultural, temporal and socio-economic factors can best explain the behaviours and practices around water and sanitation in the coastal areas under study. The very basis for coastal water and sanitation practices depends on the nature of the environment and proximity to natural bodies of water. The geological characteristics of the coastal settlements hardly favour the ownership and sustenance of simple water and sanitation infrastructures such as boreholes and toilet systems, among others. Available bodies of water naturally fill such gap. As can be seen in the study areas, the sea has become the natural points of human interaction providing avenues for the disposal of human excreta and other waste materials. Such natural and favourable conditions would tend to be less favourable as locational distance from the sea becomes higher. Few households in Upenekang located relatively some distances away from the sea tend to maintain in-house toilet facilities than those located closer to the sea. However, for this condition to hold relatively and positively well, associated favourable natural locational factors such as the availability of open bushes and deep gutters must be absent.

To a large extent, it can be argued that the coastal environment sets the limits on human choices. Consequently, most water and sanitation behaviours and practices are influenced by the prevailing contexts of the environments. A number of studies in human and development ecology literatures tend to use the environment as an important context for understanding and characterizing human behavior (Bertalanffy, 1981; Young et al., 2006; Zimmerer and Bassett, 2003). Findings from this study have served to strengthen such argument.

Local notions of water among the local populations equally can give some insights on the general sanitation practices observed in the area. A number of beliefs, values and ideas about water transcends its material characteristics and

are of more cultural and spiritual relevance to individual existence with some religious myths around it (for a review of cultural and religious meanings of water see Akpabio, 2012a; Akpabio and Subramanian, 2012). The 'sink' function of water is linked to the notion that says 'it is only water that can wash away dirt' (English translation of the Ibibio proverb that says mmọọṅ mmọọṅ eyet idioknkpo, idioknkpo iyetke mmọọṅ). This indirectly provides justification for living with bodies of water that also serve as points for disposing human excreta. One elderly man (in his late 50s) seems to support this point when he said: 'we have lived here for ages... and the water has always been serving the same purposes of bathing, drinking, washing from childhood... we depend on it to dispose of all our material and human wastes without any problem...' living and socializing in such conditions of 'water and wastes' has been part of the experiences of the local inhabitants and which could be more repulsive to an outsider, visitor or stranger. The respondents did not see the general conditions of water and sanitation in the areas as capable of generating health risks. This, as Akpabio (2012a) argued, is because local knowledge of water and sanitation problems are often attributed to spiritual and seasonal causes, rather than to poor water and sanitation systems.

The context of belief, meanings and attitudes about water and sanitation really reflect how the coastal environment is constructed in the imaginations of the inhabitants. The knowledge system of the people in this context is not far from the contextual environment. Bonaiuto et al. (2002: 633, cited in Akpabio and Subramanian 2012: 6) study on "local identity processes and environmental attitudes..." explained why studies should pay attention to human knowledge of the contextual environment as follows: "generally, research on environmental concern does not take into specific account of the actual places in which and toward which pro-environmental attitudes occur. Environmental concern tends to be seen as a product of attitudes, values or worldviews, considered only in their global and abstract dimension, with the idea that these general evaluations, which are out of context, should remain constant across different objects or situations." The study findings have shown that individual and group knowledge of the environment, to a large extent, determine norms of behaviours characterizing water and sanitation practices.

Socio-economic characteristics of the respondents were equally important in understanding water and sanitation behaviours as well as potential for attitudinal adjustments. A combination of education and exposure to better information provided possible reasons for the decision to own in-house toilet facilities by the over 6% of the respondents. However, these two socio-economic factors may not, by themselves, provide the necessary change in behaviours. Income level provides a much more practical explanation of the potential for a change of attitudes. People could opt for improved water and sanitation facilities with financial capability as well as the prospect of a cooperative natural environment. Discussions with local informants revealed that the unfavourable geological environment implies, for instance, that money could be spent for water and

sanitation infrastructures without favourable outcomes. The only public tap at Itak Abasi had never served the water needs of the people till it was finally uprooted and submerged by the 2010 ocean flood. Also, the experiences of few private attempts at drilling water at Upenekang which ended up not successful in spite of huge monetary costs spent on infrastructures, services and treatments can give insights on the financial and cost barriers of sustaining water and sanitation facilities in the areas.

Within these perspectives, the environment alone may not fully set the limits on behaviours pertaining to water supply and sanitation practices. Human capability reflected in socio-economic improvements could as well determine behavior change in coastal water supply and sanitation situations. Findings have shown that respondents in the high socio-economic and income categories are less likely to depend on the controlling influence of the coastal environment over their water and sanitation behaviours. As few respondents were able to use the modern water and sanitation infrastructures, the prospects of massive change in behaviours could be high with significant public intervention in the provision of water and sanitation infrastructures.

7. CONCLUDING REMARKS

Coastal settlements in Nigeria face difficult challenges bordering on water and sanitation. Such challenges create necessities for coping. The study has shown that people depend on a range of spiritual, environmental, knowledge and time resources in making choices about water and sanitation. Such choices are shaped by perceptions of risks and knowledge of reality. The role of water and knowledge of it in mediating and absorbing human excreta and other waste materials is embedded in the wider spiritual ecology of the coastal settlement (see Bernard and Kumalo 2004 for discussions on spiritual ecology). Faced with an environment unfriendly to water and toilet infrastructures, the people resort to coping by 'learning to live with the condition.' The notions of linking water with the gods and goddesses and divine purity have provided the spiritual basis for disposing human excreta into water and at the same time using it for bath, washings and occasionally drinking from it. The reality and daily necessity of relating with the physical environment and the people equally shape daily behaviours and practices associated with water and sanitation. Consequently, time resources have become useful tool in managing privacy and risk of safety especially relating to when, where to defecate and how to dispose of the wastes. The study has shown that 'wrap and throw' method or the use of open bushes have played diverse roles in guaranteeing the privacy of some categories of individuals as well as ensuring safety at certain periods of time. Timing the periods for defecation, or the practice of 'wrap and throw' are coping measures essentially reserved for women, children and visitors or strangers. For women privacy during the day and safety at night are important considerations. In the

case of children, the major concern borders on safety while visitors and strangers must have to be given privacy as well as protection from unsafe situations.

Taken together, this study has demonstrated that the physical environment as well as social, cultural and temporal factors operates as fundamental contexts defining knowledge of behaviours and decisions relating to problems of water supply and sanitation practices. This aligns with Briggs' (2003) multiple exposure-multiple effects (MEME) model, which emphasizes the divergent, multiple links between exposure and effects. Within this perspective, the social, economic, cultural and ecological environments are important in understanding human water and sanitation behaviours in the coastal environment. While the physical environment tends to set hard limits, the cultural and socio-economic environments offer challenges as well as opportunities on behavior change.

Changing the water and sanitation behaviours and attitudes of the people depends to a large extent on knowledge and awareness of danger. Knowledge and awareness of danger alone would hardly perfect the magic of improving water and sanitation circumstances given the practical and environmental difficulties and sometimes the 'unproductive' cost of sustaining water and sanitation infrastructures. Theoretically, theories working on behavioural changes and human cognition often place too much emphasis on individuals as the unit of intervention and analysis. Individuals are considered targets for behavioural change while the wider socio-cultural and environmental contexts that directly and indirectly influence behavioural compliance are ignored. While we acknowledge that exposure and knowledge of risk and danger could force a change in individual attitudes in favour of improved water and sanitation infrastructures, we equally believe the difficult environmental condition could shape general individual attitudes. Practical intervention could contribute to a change in attitudes. Consequently, coastal settlements in Nigeria need public resources and supports in the form of heavy investment in water and sanitation infrastructures as contributions to influencing behavioural change.

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