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Exploring Factors Associated With Environmental Menaces in a Typical Nigerian City: Challenges to Sustainable Development

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Abstract

Creating and maintaining a sustainable environment remain one of the most pressing issues in the world today. Human settlements are confronted with the challenges such as the fall out of climate change, natural disasters such as flooding, diseases outbreak resulting from improper waste disposal, poor environmental sanitation and various degrees of human and economic crises. Overtimes, however, activities of man coupled with some ecological factors have become a very critical threat to the achievement of a sustainable environment. In this study, we presented an elucidating analysis and reports of some factors associated with the prevailing environmental challenges in Mowe, Ogun state, Nigeria. The possible causes, effects and lasting solutions to these problems were also presented. Detailed statistical analysis of the interrelationships between variables of interest was also carried out. Our results show that, of the 200 participants in the study, 106(53.0%) uses their backyard or compound as dump hills while 42(21.0%) uses the community dumps hills. Also, 159(79.5%) of buildings have septic/soak away systems while 23(11.5%) of them use open gutter and 11(5.5%) of the buildings have no sewage disposal systems at all. Results of the Multiple Logistic Regression show those who have drainages around their houses were more likely to be those who use backyard/community dump hills for sewage disposal, while those who use open Gutter and those with no defined sewage disposal system were more likely (than those who use the methods of sewage disposal) to perceive neglect of their area by the government

1. Introduction

The challenges of environmental sustainability and its consequences have attracted the attention of many researchers for decades. This is because a healthy and sustainable environment is crucial not only to human existence but also for the wellbeing and the interrelationship between the habitat and the inhabitants as well as the atmospheric conditions of a defined locality (Kuuder, 2012). To this end, many developed countries have policies and machineries for managing environmental inevitable (Sheppard, 1995; UNFPA, 2005; Morenike, 2008; World Bank, 2008; Madden and Ajzen, 1986). In addition to that, many environmental researchers (in some of the developed world) are working tirelessly to uncover some inherent factors aiding environmental problems (Keivani, 2009; Ndahlahwa, 2005; Paterson, et al. 2007) which could in turn become useful sources of information and strategies for policy makers in environmental management.

However, in the developing world, although the reality is that, most cities are facing acute and growing environmental problems ranging from polluted water, lack of proper sewage management systems, to bad roads and erosion menaces (Sada and Odemerho, 1988; Sangodoyin, 1993; Onwioduokit, 1998; Dauda and Osita, 2003; Longe and Williams, 2006; Oduwaye, 2009), convincing policies on environmental management are not in place in many countries. The cumulative effect of these problems is acutely damaging not only the health of the people but also the ability of the cities to support economic growth (Zubairu, 2004). Also, high population density, poor housing system, traffic congestions and poor environmental sanitation have been reported to pose serious threat to many cities in the developing countries (Osuide and Uanikhoba, 2004; Zafarilyas et al, 2008; Jimoh, 2008 and Babanyara et al, 2010). In particular, 40% to 60% of urban dwellers in developing countries have been reported to have inadequate sanitation (Tripping et al, 2005) while in some countries, not less than 50% of the population occupies sub-standard houses and neighborhoods (Jiboye, 2011; Osuide and Uanikhoba, 2004).

In Nigeria, the picture is not different (Babanyara et al, 2010; Ifegbesan, 2010). Nigeria has over 140 million people with high population density, bad roads, poor environmental sanitation and increasing urban decay (Osuide and Uanikhoba, 2004). In a study by Babayemi and Dauda (2009), though the level of awareness of waste collection services and waste management regulations were relatively higher in Abeokuta (the Ogun State Capital), the percentage of those who disposes waste indiscriminately were higher. Other past studies describing different aspects of environmental problems in Nigerians cities include (Babanyara et al, 2010; Jimoh, 2008; Ogu, 2000; Ajewole and Oni, 2010; Omofoworan and Osa-Edoh, 2008; Zubairu, 2004; Awoyemi and Soyemi, 2009; Agunwamba, 1998 and Ifegbesan, 2010).

Despite the aforementioned environmental challenges, a sustainable environment is non negotiable if human being will continue to inhabit planet earth. A sustainable development is that that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development in Spiekermann and Wegener, 2003, Oduwaye, 2009). There is therefore a dire need for dynamic interactions between nature and society, considering both how social change influences the environment and how environmental change shapes society, Boniface et al. (2012).

In the present work, we report causes, effects and possible control of the current environmental menace in Mowe town of Ogun state, Nigeria and we also studied the inter-relationships between the variables associated with the environmental menaces facing Mowe town in a bid to provide both data and suggestions on possible solutions.

2.0 Materials and Methods

2.1 Study Area and Target Population

Mowe town (in Ogun state, Nigeria) is located along the Lagos/Ibadan expressway (one of the busiest expressway in south-west Nigeria) and as such, suffers a lot of environmental problems. Air pollution due to incessant traffic congestion, erosion menaces, poor sanitation and refuse management as well as substandard housing systems (in a bid to carter for the growing needs of accommodation for the influx of people from Lagos and other part of the country) are among the most pressing environment challenges facing the study location. We identified specific part of the city mostly affected by environmental problems and those prone to future challenges. Our target population included house owners (popularly called "landlords") and tenants but not visitors to the area. In each household, the questionnaire is given to the head of household (who may either be a man or a woman) or individuals who may not be married but were tenants responsible for the accommodation they are living in.

2.2 Sample Size and Data Collection

A total of 200 participants were interviewed in this study. A structured questionnaire was designed and administered to a randomly selected residents (who is either the head of his/her household or who is responsible for his/her accommodation) in the areas visited. The questionnaire contains comprehensive questions grossly related to the participant's demography, the type of housing systems and the nature of sanitation and environmental management practices of the residents. Furthermore, although our questionnaire was designed in English language, interpretation into local languages was done for participants who could not understand English language.

2.3 Statistical Methods and Analysis

The responses of the respondents were coded and the Statistical Package for Social Sciences (SPSS), was used to obtain tables of frequencies and percentages for the coded data. We identified two principal risk factors for environmental menaces in Mowe city-Non-Availability of drainage systems and neglect of areas by the government agencies. Using logistic regression (LR), we considered each of these risks factors as an outcome Y which is either present (Yes) or not present (No) and which depends on some selected variables $X_1, X_2, ..., X_k$. If we assume that Y takes on the values 1(Yes) and 0(No), then it is reasonable to model $\Pr(Y = 1/X_1, X_2, ..., X_k)$ as the outcome which is equal to $E(Y/X_1, X_2, ..., X_k)$ when the response (Y) is coded 0 or 1. To simplify the notation, we let the outcome of our model be

$$\pi(X) = \Pr(Y = 1/X_1, X_2, ..., X_k) = \Pr(Y = 1/X)$$

$$= \frac{\exp(\beta_o + \beta_1 X_1 + ... + \beta_k X_k)}{1 + \exp(\beta_o + \beta_1 X_1 + ... + \beta_k X_k)} = \frac{e^{\beta_o + \sum_{i=1}^{k} \beta_i X_i}}{1 + e^{\beta_o + \sum_{i=1}^{k} \beta_i X_i}} \quad 1$$

where X represents $X_1, X_2, ..., X_k$, $\pi(X)$ represents the probability of the outcome of interest and $\pi(X)/(1-\pi(X))$ is the odds of the outcome of interest for an individual with covariate X.

Furthermore, let $\ln\left[\frac{\pi(X)}{1-\pi(X)}\right]$ be the log odds or the logit transformation of the outcome of interest, then our basis for logistic regression is the equation

$$\ln\left[\frac{\pi(X)}{1-\pi(X)}\right] = \beta_o + \beta_1 X_1 ..... + \beta_k X_k \quad 2$$

Where β_o is the intercept term and $\beta_i, i = 1,2,...,k$ are the contributions of the $X_i s$ to the model.

3.0 RESULTS

3.1 The Socio-demography

Of the 200 residents interviewed, 123(61.5%) were male while 77(38.5%) were female (Table 1). Also, 47(23.5%) were under 30 years of age, as compared to 73(36.5%) that fell within the 31-40 years age group and only 22(11.0%) of the residents who participated in this study were 51 years and above.

Table 1: Socio-Demographic distributions of Respondents

Variable	Frequency	Percentage
Sex		
Male	123	61.5
Female	77	38.5
Age		
<30	47	23.5
31-40	73	36.5
41-50	58	29.0
≥51	22	11.0
Educational Qualification		
No Formal Education	8	4.0
Primary	20	10.0
Secondary	63	31.5
Tertiary	109	54.5
Occupation		
Farming	13	6.5
Artisan	19	9.5
Civil Servant	71	35.5
Trader	40	20.0
Others	57	28.5
Family Size		
2-5	119	59.5
6-9	74	37.0
≥10	7	3.5

Source (Authors field work, 2010)

Apart from that, we also observed in Table 1 that, the highest proportion of the residents interviewed 54.5% had tertiary education, 63(31.5%) had secondary school education, 20(10.0%) had primary education and only 8(4.0%) had no formal education. This may probably be responsible for a greater percentage of them 71(36.5%) being civil servants while 57(28.5%) were into several other kinds of occupation (such as banking, building construction, engineering, consultancy of various kind) and only 13(6.5%) of the residents interviewed were farmers. The family sizes of the respondents indicated that

119(59.5%) of them has family size of 2-5 members, 74(37.0%) has family size of 6-9 members while just 7(3.50%) of them has family with ten or more members.

3.2 Housing type and Management systems

In Table 2, it was observed that 98(49.0%) of the respondents have their building on full plot (18m x 36m) of land while 60(30.0%) live on halve plot (18 x 18m/9 x36m) and only 6(3.0%) of the respondents live on quarter plot (9x18m) of land. Unfortunately however, more than half of the respondents (114/57.0%) did not run any drainage channel along their building line.

Table 2: Systems and type of Housing

Variable	Frequency	Percentage
Size of Land		
¼ Plot 9 x 18m	6	3.0
½ Plot 18 x 18m / 9 x 36m	60	30.0
Full Plot 18 x 36m	98	49.0
Over one Plot	36	18.0
Drainage for Building		
Yes	86	43.0
No	114	57.0
Source of Drinkable water		
Well	66	33.0
Borehole	99	49.5
Bottled/Sachet Water	35	17.5
Perceived Government Neglect		
Yes	175	87.5
No	25	12.5
Ownership of dwelling Place		
Yes	116	58.0
No	84	42.0
Years of Dwelling		
1-5	146	73.0
6-10	43	21.5

11-15	4	2.0
16-20	5	2.5
≥21	2	1.0
Building Type		
Bungalow	153	76.5
Storey Building	24	12.0
Duplex	7	3.5
Others	16	8.0
Accommodation Type		
Face –to-Face	39	19.5
1-Bedroom Flat	24	12.0
2-Bedroom Flat	82	41.0
3-Bedroom Flat	46	23.0
4-Bedroom Flat and Above	9	4.5

Source (Authors field work, 2010)

Furthermore, the lack of portable water in Mowe town has made residents to look for drinkable water through other sources as we also observed that 99(49.5%) depended largely on water from the borehole, 66(33.0%) drinks well water while 35(17.5%) of the respondents live on bottled/Sachet water. In addition, while 25(12.5%) said they did not perceive any neglect of their area by the Government agencies/authority, an overwhelming 175(87.5%) of the respondents indicated that their area has been neglected by the Government in terms of provision of basic amenities and management of environmental challenges.

Apart from that, questions on the building type revealed that 153(76.5%) of the respondents are residing in bungalows, 24(12.0%) are residing in storey buildings while 7(3.5%) and 16 (8.0%) of the respondents are residing in duplexes and other types of building (Table 2). On the other hand, 39(19.5%) of the respondents are living in face-to-face (rooming) houses, 24(12.0%) and 84(41.0%) of the respondents are living in 1-bedroom flats and 2-bedroom flats respectively while 46(23.0%) are living in 3-bedroom flats and only 9(4.5%) are living in 4-bedroom flats and above.

3.3 Sanitation and Environmental Management systems

From Table 3, the refuse disposal system of the study area is such that 26(13.0%) of the participants uses the incinerator while majority of them 106(53.0%) uses their backyard or compound as dump hills and 42(21.0%) uses the community dump hills. However, the sewage disposal system of the area is more organized; as a greater number/percentage 159(79.5%) of buildings have septic/soak away

systems. Nevertheless, 23(11.5%) of them use open gutter systems 11(5.5%) of the buildings have no sewage disposal systems at all and only 7(3.5%) of the residents interviewed claimed to be using other methods of sewage disposal not specified in the questionnaire.

Table 3: Sanitation and Environmental Management systems

Variable	Frequency	Percentage
Refuse Disposal System		
Incinerator	26	13.0
Backyard/Community Dump hill	106	53.0
Community Dump hills	42	21.0
Others	26	13.0
Sewage Disposal System		
Septic / Soak away Tank	159	79.5
Open Gutter	23	11.5
None Available	11	5.5
Others	7	3.5
Toilet Facilities		
Pit Toilet	20	10.0
Water Closet (Shared)	68	34.0
Water Closet (Exclusive)	112	56.0
Bathroom Facilities		
Shower (Shared)	57	28.5
Shower (Exclusive)	125	62.5
Outdoor (Shared)	15	7.5
None	3	1.5
Kitchen Facilities		
Exclusive (Within)	148	74.0
Shared (Within)	39	19.5
Outdoor (Exclusive)	5	2.5
Outdoor (Shared)	8	4.0

Source (Authors filed work, 2010)

In addition, while 20(10.0%) of the participants use pit toilets in their buildings, 68(34.0%) use shared water closets and 112(56.0%) of them use

personalized water closet systems in their dwelling units. For bathroom facilities, 57(28.5%) of the participants use shared bathrooms in their dwelling units while 125(62.5%) use exclusive bathroom and 15(7.5%) are sharing outdoor facilities for bathing. Similarly, the responses of the participants concerning their kitchen facilities indicated that majority of them (148/74.0%) have their kitchen exclusively within their dwelling units, 39(19.5%) of the participants share their kitchen facilities with other occupants within their building while 8(4.0%) of the participants shared their outdoor kitchen with other occupants in their building.

3.4 Results of the Multiple Logistic Regression Analysis

In Table 4, we observed that the odds of having a drainage system and neglect of area by the government with their respective 95% Confidence Intervals (CI) are 2.637 (1.099-6.325) and 0.357(0.067-1.890) among men.

Table 4: Logistic Regression for the association of selected variable.

Variables	Odds of having a drainage system (95%CI)	*p-value*	Odds of neglect of area by the Government (95%CI)	*p-value*
Sex				
Male	2.637 (1.099-6.325)	0.030	0.357 (0.067-1.890)	0.225
Female	-		-	
Age				
<21	0.338 (0.057-1.995)	0.231	2.007 (0.046-88.443)	0.718
31-40	0.353 (0.072-1.747)	0.202	6.319 (0.237-168.517)	0.271
41-50	0.398 (0.084-1.881)	0.245	9.070 (0.333-246.842)	0.191
≥51	-		-	
Educational Qualification				
No Formal Education	0.147 (0.009-2.385)	0.178	97.796 (0.565-16933.608)	0.081

Primary Education	0.478 (0.086-2.667)	0.400	1.983 (0.075-52.217)	0.682
Secondary Education	0.864 (0.326-2.288)	0.769	1.309 (0.171-10.005)	0.795
Tertiary Education	-		-	
Occupation				
Farming	17.949 (1.087-296.491)	0.044	54.468 (0.768-3862.855)	0.066
Artisan	2.232 (0.438-11.383)	0.334	1.777 (0.035-90.534)	0.774
Civil Servant	6.950 (2.264-21.331)	0.001	3.274 (0.250-42.797)	0.366
Trader	5.511 (1.275-23.833)	0.022	6.682 (0.471-94.756)	0.160
Others	-		-	
Source of Drinkable water				
Well	3.539 (1.006-12.446)	0.049	0.310 (0.007-14.473)	0.550
Borehole	3.452 (1.108-10.758)	0.033	5.655 (0.135-236.001)	0.363
Bottled/Sachet Water	-		-	
Accommodation Type				
Face –to-Face	0.243 (0.022-2.733)	0.252	0.044 (0.001-3.336)	0.157
1-Bedroom Flat	1.293 (0.127-13.113)	0.828	0.060 (0.001-3.785)	0.184
2-Bedroom Flat	1.667 (0.218-12.737)	0.622	0.023 (0.001-0.772)	0.035
3-Bedroom Flat	0.386 (0.049-3.039)	0.366	0.076 (0.002-2.342)	0.141
4-Bedroom Flat and Above	-		-	
Refuse Disposal System				
Incinerator	0.742 (0.157-3.506)	0.707	0.298 (0.022-4.085)	0.365
Backyard/Community Dump hill	3.796 (0.882-16.338)	0.073	0.015 (0.001-0.255)	0.004

Community Dump hills	1.159 (0.262-5.134)	0.846	0.142 (0.013-1.555)	0.110
Others	-		-	
Sewage Disposal System				
Septic / Soak away Tank	0.134 (0.008-2.298)	0.165	0.302 (0.001-79.836)	0.674
Open Gutter	0.117 (0.005-2.560)	0.173	3.451 (0.009-1357.700)	0.685
None Available	0.423 (0.014-12.585)	0.619	3.230 (0.004-2347.452)	0.727
Others	-		-	
Toilet Facilities				
Pit Toilet	3.034 (0.419-21.958)	0.272	2.119 (0.074-60.404)	0.660
Water Closet (Shared)	1.110 (0.348-3.546)	0.860	9.060 (0.602-136.320)	0.111
Water Closet (Exclusive)	-		-	
Bathroom Facilities				
Shower (Shared)	0.980 (0.015-63.492)	0.993	0.001 (0.000-0.393)	0.025
Shower (Exclusive)	3.747 (0.063-224.365)	0.527	0.008 (0.000-4.118)	0.129
Outdoor (Shared)	1.165 (0.019-72.700)	0.942	0.000 (0.000-0.279)	0.020
None	-		-	
Kitchen Facilities				
Exclusive (Within)	2.172 (0.264-17.877)	0.471	0.085 (0.002-4.459)	0.222
Shared (Within)	11.345 (1.173-109.766)	0.036	0.688 (0.013-35.917)	0.853
Outdoor (Exclusive)	12.105 (0.395-371.173)	0.153	0.001 (0.000-4.452)	0.104
Outdoor (Shared)	-		-	

Source (Authors field work, 2010)

Also, the odds of having a drainage system and neglect of area by the government with their respective 95% Confidence Intervals (CI) are 0.147(0.009-2.385) and 97.796(0.565-16933.608); 3.452(1.108-10.758) and 5.655(0.135-236.001); 1.59(0.262-5.134) and 0.142(0.013-1.555) among people with no formal education, those whose primary source of drinking water is Borehole and those whose refuse disposal system is a community dump hill respectively while among participants who use open gutter for sewage disposal, the observed odds ratio with the 95% Confidence Intervals for having a drainage system and neglect of area by the government are 0.117(0.005-2.560) and 3.451(0.009-1357.700) respectively.

4. Discussions:

This study sought to analyse the current factors associated with environmental sustainability challenges in Mowe, a baseline of descriptive information on residents' attitudes and practices concerning environmental issues. The findings of the present study have made it abundantly clear that several factors are responsible for the environmental menaces facing people living in Mowe town and these factors are in fact related to what is prevalent in other cities in Nigeria as evident from other authors (Zubairu, 2004; Jimoh, 2008; Omofoworan and Osa-Edoh, 2008; Babanyara et al, 2010; Ajewole and Oni, 2010; Ifegbesan, 2010; Jiboye, 2011). In particular, Babanyara, et al (2010) reported that the environmental problems experienced in Nigeria are very diverse; ranging from soil degradation, rapid deforestation, urban air and water pollution, desertification, loss of arable land, pollution of water, air, and soil from oil spills etc. Each of these has notable costs and implications for social, economic and environmental sustainability and consequently poses great threat to sustainable development in Nigerian cities.

As part of the motivation for the current study, the authors have observed that erosion and other environmental problems have been posing regular threat to the study area. In this study for instance, we observed that only few of the respondents had drainage channel along their building line while majority did not consider proper drainage channels a priority. This attitude of residents in Nigerian town is not peculiar to those in Mowe alone. In a study conducted at Ilorin, a town in the North Central Nigeria, only 41% of the studied population emphasized proper drainage channels as solution to erosion problems (Jimoh, 2008).

Furthermore, we observed that Mowe has great potential for rapid population growth due to influx of people into the area form Lagos and other towns, while communal facilities (such as clean piped water, constant electricity supply, good roads, waste management facilities etc) in the study area remained unattended to. A clear evidence is the fact that due to low cost of land in Mowe town (as compared to the neighbouring cities) majority of the residents (respondents) have their building on full plot 18m x

36m size of land (Table 2); this on the long run, is conceived to spell critical situations in managing the limited and already deteriorating social amenities in the town. Omofonmwan and Osa-Edoh, (2008) observed that environmental conditions in Nigerian cities have gradually deteriorated due to the rapid growth of the cities and the attendance inability of social services and infrastructures to keep pace with the rate of growth.

We also noted that, whereas in a couple of decades ago, Mowe town use to be an agrarian city of aged farmers, the town has metamorphosed to an elite community of individuals strongly committed to their respective business activities and civic obligations. For instance, we found that the highest proportion of the residents interviewed had tertiary education while less than 10% were farmers (Table 1). While it is expected that this metamorphosis should have improved the environmental situations of the town, unfortunately, the imbalance between population surge and the limited facilities has prevented such synergy.

In addition, we also found that the sanitation and environmental management system of the study area equally calls for greater concerns. Many of the residence dispose their refuses and other solid wastes within the backyard of their compound while others go to other adjoining community dump hill for their refuse disposal. Our careful observation of the study area revealed that Mowe as at the time of this study has no clearly defined community refuse or waste disposal system. Thus, residents use any seemingly available vacant plots within their area as waste dumping site, a practice which has encouraged serious environmental pollution and flooding both in the city and along the highway (as the available drainages are being blocked by the indiscriminate refuse disposal). In a similar study conducted at Abeokuta, the Ogun state Capital, although the level of awareness of the resident was fare, their overall waste management attitude was poor (Babayemi and Dauda, 2009).

5. Conclusions

As part of our recommendations, there is an urgent need for the government to focus on these environmental challenges in Mowe town. Aggressive Environmental education with an emphasis on the techniques for managing drainage systems as suggested by Jimoh and Ajibade, (1995) should be adopted by the local government within the area. Although efforts have been put in place to ensure that managers of private estate in Mowe adhere to the aforementioned, more is still expected in terms of teaming together to handle problems related to some of the major drainage channels within the locality in order to ensure proper sustainable development.

In relation to the availability of drainage channels and perception of neglect of the area by the Government, we found that Male residents rather than the Female are more likely to have drainage around their building while younger residents are

more likely to perceive neglect of their areas by the government agency. Also, residents with no formal education are more likely to perceive neglect of their area than those with tertiary education. This is expected as most educated people could afford to make up for whatever lapses from the government and therefore may tend to understand the difficulties faced by the government in developing their area but those with no formal education may lack considerations for such realities.

The need to create and maintain a sustainable environment should as a matter of urgency become the focal issue in the national development programs. Also, and in addition to proper waste and drainage management culture, more awareness campaign should be given on urban environmental greening and its effectiveness at creating a pollution screened and beautiful environment. With these properly articulated, an enduring and livable urban environment in our cities is inevitable.

Nevertheless, although this study provides an elucidating evaluation of the environmental sustainability challenges in Mowe town, some limitations to the study are obvious. For instance, a larger sample size would have provided more robust statistical inferences that could be generalized outside the location of this study. Also, some questionnaires for the purpose of this study were not returned. In the future, an extended study could be conducted involving relatively larger sample size and other sub communities in the area.

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