

URBAN SPRAWL AND ITS IMPACT ON ENVIRONMENTAL HEALTH QUALITY: A COMPARATIVE STUDY OF PORT HARCOURT AND SELECTED CITIES

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Abstract

Urban sprawl refers to general increase in population and the amount of industrialization of a settlement. It includes increase in the number and extent of cities. It symbolizes the movement of people from rural to urban areas. urban sprawl happens because of the increase in the extent and density of urban areas. Due to uncontrolled urban sprawl in India, environmental degradation has been occurring very rapidly and causing many problems like land insecurity, worsening water quality, excessive air pollution, noise and the problems of waste disposal. This paper emphasizes on the effect of urban sprawl on environmental components mainly climate, biosphere, land and water resources. A case study of urban sprawl in Port Harcourt metropolitan have been carried out leading to conclude on the existing causes of damage to the environment due to urban sprawl and preventive measures to keep a check on them. Although it is impossible to restrict urban sprawl it has to be ensured that urban sprawl proceeds in the right path causing minimum influence on environment.

Keywords: *Influence, Urban, Sprawl, Environmental, Health, Quality*

INTRODUCTION

Contemporary globalization and urban sprawl is reproducing classic conditions historically associated with the emergence of infectious diseases and the periodically recurring pattern of epidemics and pandemics. The dynamics of contemporary globalization has contributed to various institutional gaps that make dealing with infectious diseases is increasing difficult and threaten concentrated human populations with potential calamity (Gibson and Gumer, 2012). Over the past few decades, there has been a rapid urban sprawl of the world's population.

According to Chilala (2015) Rapid urban sprawl has significant repercussions on migrants' health. The increasing movement of people from rural to urban areas often alters the characteristic epidemiological disease profile of the country and at the same time new diseases appear or old ones reemerges. Such is the case of HIV/AIDS, tuberculosis, malaria, and recent case of Ebola and Lassa fever. urban sprawl is also associated with changes in diet and exercise that increase the prevalence of obesity with increased risks of type II diabetes and cardiovascular disease.

Statement of Research Problem

The new federal capital city was conceived to be a befitting city, which is a sustainable city where environmental degradation, inadequate infrastructural facilities like electricity, water supply and roads e.t.c that made Lagos most unbearable at the time was addressed. In planning the city three basic principles guided the formulation of the Port Harcourt master plan namely:

The principle of beautiful *city*

The principle of *functional city*

The principle of *environmental conservation* (D PB, FCDA, 2010)

Federal Capital district plans were developed for an estimated population of 150,000/200,000/district (WRT, 2011).

The population of Port Harcourt in the last census (2006) is estimated to be 1,406,239 with an annual growth rate of 9.28% (NPC, 2006), over a 10-year period of study (1987 and 2006). This census figure has since been exceeded in the last four years. Port Harcourt is mainly experiencing an influx of urban migrants from several parts of the country due to attraction of employment opportunities, changes in seat of government e.t.c. On the 7th of September 2011 alone immigration authorities had to escort back 152 persons, trying to enter the Port Harcourt in search of greener pastures, back to their states of origin (Mukhtar, 2011).

Infrastructural development for the FCC (federal capital city) has already entered the 3rd phase but is still unable to provide basic amenities for the various on-going accelerated developments (encouraged by the federal government) to cater for the population of Port Harcourt.

Research Question

What is responsible for the rapid urban sprawl of environmental health in Port Harcourt?

What is the influence of rapid urban sprawl on environmental health in Port Harcourt? What measures are in place to mitigate rapid urban sprawl in environmental health in Port Harcourt?

Aim and Objectives

The aim of this research is to examine the influence of rapid urban sprawl on sustainable environmental health in Port Harcourt. The objectives of the study are:

1. Find out what is responsible for the rapid urban sprawl of environmental health in Port Harcourt
2. Evaluate the influence of rapid urban sprawl on environmental health in Port Harcourt.
3. Profile infrastructural facilities and services available (health, education, transportation etc), the state of utilization and challenges.
4. Proffer possible recommendations to the study.

Materials

1. Two land sat ETM (30M resolution) satellite data images covering Port Harcourt settlement for the years 2001 and 2011. They will be obtained from a Global Land Cover Facility: University of Maryland, USA
2. GIS software (ERDAS IMAGINE 8.6) was used for data processing and analysis.
3. Census data, migration and sentinel surveys and demographic Data from National

Population Commission (NPC)

4. Enumeration reports and baseline data reports from the Millennium Development Goals, Project support unit and the department of Urban and Regional planning, FCDA.
5. Field observations and questionnaire

Data Collection

Utilizing Satellite Imagery

Using the satellite imagery for the years 2001 and 2011 data will be collected for built up land cover change detection analysis. Data to be collected will include: - Area coverage of land cover types Categories of land cover types -Rate of change of built-up area Analysis of all these data will be used in evaluating spatial and temporal changes that have occurred within the time frame chosen. This will enable the evaluation of the influence of rapid urban sprawl on the Port Harcourt environment.

Questionnaire

Questionnaire was employed for gathering requisite data The questionnaire is a major tool for gathering data and it was divided into 2 sections: Section one will cover demographic data of the respondents; section two will provide information on housing, socio-economic infrastructure facilities available, the influence of population increase on sustainable living and known measures in place to curb the rise in urban slums and the role of government.

Questionnaire administration was by stratified random sampling relative to the residential status of the residents. The first strata will include respondents residing within permanent structures, while the second strata will include respondents of semi-permanent/makeshift residential status. 35 questionnaires each was administered in each of the six zones in Port Harcourt; 20 of the questionnaires were administered to residents residing in permanent structures while 15 to those residing within semi-permanent/makeshift structures.

A total of 200 questionnaires were distributed out of which a total of 148 were recovered.

Sampling Method

Sampling method will be employed in order to collect population data relative to demography, housing, socio-economic and infrastructural facilities; so as to profile infrastructural facilities and services available (health, education, transportation etc), the state of utilization and challenges and also to find out what is responsible for the rapid urban sprawl of Port Harcourt. The stratified random sampling will be most appropriate for this study; this is in order to have a higher statistical precision compared to simple random sampling. This also requires a small sample size which can save a lot of time money and effort. The population of the study will be stratified according to residential status. Statistically, recommended sampling size is a minimum of 5% of the total sample population which will be over a thousand sample population. Sampling a population of this magnitude will require high manpower and financial input and cannot be handled within the realms of this project; hence, as recommended by Meekyah (1992), a sampling size of 200 was employed for this research.

Secondary sources

Secondary sources of data will be studies to obtain data on government demography and sustainable urban development strategies in order to find out what is responsible for the rapid urban sprawl of Port Harcourt and to aid in proffering possible recommendations to the study.

These secondary sources include:

1. Millennium Development Goals Baseline Data Report and Urban and Regional
2. Planning Department Enumeration reports on Port Harcourt.
3. **Nigeria census** data of 1991 and 2006 will be analyzed for comparative population data analysis.
4. The Port Harcourt master plan as prepared by the Urban and Regional Planning Department of FCDA.
5. Health and educational facilities data obtained from the Department Of Fiscal Policy And Implementation, FCDA and FCDA Health Services Department.

Data Analysis

Satellite Data Imagery

Data imagery was classified into land cover types adapting the Anderson classification system and change detection carried out using the post classification comparison algorithm. Classified images of the 2 selected years were cross referenced and results of change detection will be used for change detection analysis.

Software used: ArcGIS Desktop 9.3 and Idrisi Andeas were the main software used for this analysis.

Data source: The Landsat imageries were downloaded from the official website of Global Land Cover Data Facility (GLCF). The GLCF is hosted by the University of Maryland, USA. The Global Land Cover Facility (GLCF) provides earth science data and products to help everyone to better understand global environmental systems. In particular, the GLCF develops and distributes remotely sensed satellite data and products that explain land cover from the local to global scales. Primary data and products available at the GLCF are free to anyone via FTP. Online datasets may be accessed through the Earth Science Data Interface (ESDI).

Data description: Landsat TM imagery is recorded in seven spectral bands at a spatial resolution of 30 m except band 6, which has a spatial resolution of 120m. The newest satellite in the series is Landsat 7 launched on April 15, 1999(Landsat 6 failed soon after launch). Carried on board was a new sensor called Enhanced TM Plus (ETM). It has a few improvements over its predecessors, such as a panchromatic band (band 8) at a spatial resolution of 15 m. Besides, the spatial resolution of the TIR band (band 6) was refined from 120 to 60 m. The ground area covered per scene still stays at 185 km². Landsat 7 ETM data are available to the general public at two levels, 0Rp and 1G. Level 0Rp data are raw data that have not been corrected for radiometric and geometric distortions except that scan lines are reversed and nominally aligned. Level 1G data have been corrected for systematic distortions, such as radiometric calibration and geometric transformation to a user-specified projection. Such geometrically corrected images have a typical accuracy of <250m in low-relief areas.

Sampled Data Analysis

Data obtained from the questionnaire will be analyzed statistically; in order to evaluate the degree of implementation of the Port Harcourt master plan and also in assessing its influence on the sustainable living of the population according to the United Nations' Human Development Index.

The mean and percentages will be employed as measures of central tendency for samples collected. The mean will be classified by adding all observations and dividing it by the number of observations relevant in a certain variable

DISCUSSION

Questionnaires were distributed among respondents residing within Port Harcourt in order to find out what is responsible for the rapid urban sprawl of Port Harcourt and evaluate its influence.

The questionnaire was divided into 2 sections: Section one covered demographic data of the respondents while section two provided information on housing, socio-economic infrastructure facilities available, the influence of population increase on sustainable living and known measures in place to curb the rise in urban slums and the role of government.

1 Respondents' Age

Table .1

Options	Responses	percentage
20-30	73	49.32%
30 above	75	50.68%
Total	48	100.00

Sources: Author, 2012

From table .1, it shows that 73 respondents are aged between 20-30 years which represent 49.32% of the population sample. While 75 respondents which represent 50.68% of the sample size are of 30 years and above. This indicates that a larger population of Port Harcourt is working class.

2. Respondents Educational Background

Table .2

Options	Responses	percentage
Illiterate	14	9.46%
Primary	17	11.49%

Secondary	38	25.68%
College	49	33.11%
Postgraduate	30	20.27%
Total	148	100%

Sources: Author, 2012

Above shows that 14 respondent are illiterate which represent 9.46% of the total population sample. 17 respondents attended primary school, which represent 11.49%, 38 respondents attended secondary school 25.68%. Also 49 respondents attended college, this represent 33.11% of the total population sample and 30 respondents attended postgraduate which represents 20.27% of the sample size.

3 Respondents Marital Status

Table .3

Options	Responses rate	percentage
Married	76	51.35%
Single	60	40.54%
Divorces	7	4.73%
Widow/widower	5	3.38%
Total	148	100.00%

Sources: Author, 2012

Table 3 above shows that 76 respondents are married which represent 51.35% of the total population sample. This indicates that, more than half the population of Port Harcourt are married men. Also 60 respondents of the sample size are single this represent 40.54% which 7and 5 are divorces and widow/widower, this represent 4.73% and 3.38% respectively.

4 Migration to Port Harcourt

Table .4

Options	Responses Rate	Percentage
2000-2011	108	72.97%

1990-2000	40	27.03%
Total	148	100%

Sources: Author, 2012

From table .4, it can be surmised that 108 respondents moved to Port Harcourt between 2000-2011 representing 72.97% of the total population sample of which 40 respondents, which represent 27.03%, moved to Port Harcourt between the periods of 1990-2000

5 Reason for Moving to Port Harcourt

Table .5

Options	Responses Rate	percentage
Seeking employment	28	18.92%
Obtained work	12	8.11%
Work transfer	28	18.92%
Health reason	6	4.05%
Family reason	50	33.78%
Private Business	24	16.22%
Total	148	100.00%

Sources: Author, 2012

28 respondents which represent 18.92% of the total population sample said, the reason for moving to Port Harcourt was to seek employment opportunity, 12 respondents obtained work, this represent 8.11%, also 6 respondents moved for health reasons, this represent 4.05% of the sample size, 50 respondents which represent 33.78% say family reason. Finally 24 respondents moved to start a private business.

6 Current Source of Living

Table .6

Options	Responses rate	percentage
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Public servant	35	23.65%
Self employed	44	29.73%
Private sector &NGO	32	21.62%
Others	37	25%
Total	148	100%

Sources: Author, 2012

The table .6 above shows that 35 respondents, which represent 23.65% are public servants while 44respondents, which represent 29.73% are self employed in the various fields of work. 32 respondents work with private sector and NGO representing 21.62% of the total population sample. Finally 37 respondents out of 148 samples representing 25% did not belong to the above categories.

7 Work Place Location

Table 4.7

Options	Responses rate	percentage
Port Harcourt	32	21.62%
Anantigha	35	23.65%
Etta Agbo	25	16.89%
Port Harcourt city	56	37.84%
Total	148	100.00%

Sources: Author, 2012

The table .7 above shows that 32 respondents work in Port Harcourt which represents 21.62%, while 25 respondents representing 23.65%, work in Anantigha. Respondents work in Etta-Agbo which represents 16.89%. The majority of people living in Port Harcourt work in Port Harcourt city, this represents 37.84% of the total population sample.

8 Mode of Transportation to Work

Table .8

Options	Responses rate	percentage
Privately owned vehicle	40	27.03%
Mass transit us	44	29.73%
Ten seater bus	30	20.27%
Taxi	13	8.78%

Work	21	14.19%
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Total	148	100.00%
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Sources: Author, 2012

From the analysis above, 40 people go to work with their privately owned vehicles which represent 27.03%, while 44 go to work with mass transit bus which accounted for 29.73% of the total population sample. Respondents travelling by ten seater bus are 30 representing 20.27% of sample size; while 13 respondents use taxi to their various working places accounting for 14.19%. t 21 respondents trek on foot to their various working places, representing 14.19%. Table .8

10 Type of Structure Respondents Are Residing Table 10

Options	Responses Rate	percentage
Permanent	89	60.14%
Semi permanent	59	39.84%
Total 148	100.00%	25.68%

Sources: Author, 2012

From table .10 above, it is evident that 89 respondents are living in a permanent structure, which represent 60.14% of the total population sample while, 59 live in semi-permanent structures representing 39.84% of the total sample size.

11 Residence Status

Table .11

Options	Responses Rate	percentage
Owner occupier	26	17.57%
Paying rent	90	60.81%
Living with friends & family	32	21.62%
Total	148	100.00%

Sources: Author, 2012.

Data shown in table .11 reveals that 26 respondent are owner-occupiers where they reside, which represent 17.57% while majority of the people living in Port Harcourt do not have houses of their own, they are renting, this represent 90 respondents which is 60.81% of the total population sample. 32 respondents live with their friends & family representing 21.62% of the sample size, **12 Building**

Documentation

Table .12

Options	Responses Rate	percentage
yes	86	58.11%
No	62	41.89%
Total	148	100.00%

Sources: Author, 2012

Table .12 above shows that 86 respondents live in buildings with proper documentation, which represent 58.11%. 62 respondents are residing within buildings that do not have proper documentation, representing 41.89% of respondents sample size.

13 Access to Waste Management Facilities Table

.13

Options	Responses rate	percentage
Yes	33	22.30%
No	115	77.70%
Total	148	100.00%

Sources: Author, 2012.

From the above 13, it shows that about 33 respondents in Port Harcourt environment have access to waste management facilities which represent 22.30%, while 115 respondents do not have access to waste management facilities representing 77.70% of the total population sample.

14 Domestic Waste Disposal

Table .14

Options	Responses rate	percentage
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Burn it	26	17.57%
Throw it In The Street	34	22.97%
Put it in AEPB bins	29	19.59%
Keep it for touts to collect	59	39.86%
Total	148	100.00%

Sources: Author, 2012.

The table .14 above shows that 26 respondents, which represent 17.57% burn their domestic waste, while 34 respondent say they throw it in the street which represent respondent 22.97%. 29 respondents put it in AEPB bins which represent 19.59% finally and 59 respondents say they keep it for touts to collect, this represent 39.86% of population sample

15 Type of Medical Ailment Experienced By Respondents Recently Table .15

Options	Responses rate	percentage
Physiological ailment	65	43.9%
Sanitary related ailment	75	50.6%
Not sure	8	5.4%
Total	148	100.00%

Sources: Author, 2012

65 respondents were recently treated for a physiological ailment, which represent 43.9% of the total population sample; while 75 respondents attended a health care facility due to a sanitary related ailment, representing 50.6% of population sample. 8 of these respondents say they cannot remember when last they were sick or why, representing 5.4% of respondent sample. Table .15

16 Type of Primary Health Care Facility Attended By Respondents Table .16

Options	Responses rate	percentage
Govt. Hospital	85	57.43%
Private clinic	41	27.70%
Pharmacy	22	14.86%
Total	148	100.00%

Sources: Author, 2012

85 respondents go to a government hospital when they are sick, which represent 57.43% of the total population sample; while 41 respondents attend private clinics representing 27.70% of population sample.

22 of these respondents say they go to a nearby pharmacy for treatment representing 14.86% of respondent sample. Table .16

CONCLUSION

a. Two land sat ETM (30M resolution) satellite data images covering the Port Harcourt and focusing on Port Harcourt settlement for the years 2001 and 2011 which were analyzed for change detection based on the following categories: -Area coverage of land cover types -Categories of land cover types -Rate of change of built-up area

b. Millennium Development Goals Baseline Data Report and Urban and Regional Planning Department Enumeration reports on Port Harcourt.

c. **Nigeria census** data of 1991 and 2006 will be analyzed for comparative population data analysis.

d. The Port Harcourt master plan as prepared by the Urban and Regional Planning Department of FCDA.

e. Health and educational facilities data obtained from the Department Of Fiscal Policy And Implementation, FCDA and FCDA Health Services Department.

From the result of the studies, the following observations were made.

a. There has been a steady rise in the population documented by the national population commission. This rise has led to a high rate of population change (72.03%) with an annual growth rate of 14.6% The Port Harcourt master plan has been fully implemented, but has undergone several violations owing to increase in population over the last two decades. In this regard the Port Harcourt administration is considering a report which proposes complete demolition and relocation of Port Harcourt labour camp.

1 There are eleven (11) fully registered hospitals that serve the populace of Port Harcourt, including the Port Harcourt general hospital. From the response obtained from the questionnaire over 60% of respondents attend to their primary medical care in Port Harcourt. This lead to the conclusion that primary healthcare facilities are basically adequate though there is the need to improve on secondary health care.

2. Sixteen (16) educational facilities are located in Port Harcourt, nine (9) of which teach up to secondary education level. 50% of respondents who are with children have them attending school at Port Harcourt.

3. Considerable change has taken place in the land use of Port Harcourt within the last decade, with the highest rate of change occurring within the transition and new development (bare ground) land category with a percentage rate of change of 26.28%.

4. As evident from the response of the questionnaires received from respondents, over 50% of respondents are aged between 20 – 30years (youths) with over 72% of this population migrating to Port Harcourt within the last decade. A greater percentage of this population (34%) moved to Port Harcourt without any concrete evidence of earning a living (family reasons).

This phenomenon will have a negative effect on all aspects of sustainable living within Port Harcourt.

The results of the questionnaires also indicate that of the 60% of respondents living within permanent structures analyzed only 17.5% are owner occupier within their residence. Results also indicate the level of inadequacy of waste management facilities and its administration within the metropolis; access to electric power supply and the World Wide Web which enhance sustainable living are also at very low percentages.

RECOMMENDATIONS

It is evident from conclusions drawn, owing to this research process that urban and regional planning and maintenance processes have not been updated to take the current population boom experienced in Port Harcourt, (especially within the last decade), into cognizance. The following recommendations are proffered as a road map to sustainable development of Port Harcourt. In its bid for the urban renewal of Port Harcourt, the government of the Port Harcourt should not demolish the entire labour camp; rather Port Harcourt Administration, the departments of Fiscal Planning, Department of Development Control, Urban and Regional Planning department (FCDA), National Population Commission and Port Harcourt Geographical Information Systems (AGIS); should work in conjunction to design and implement an urban renewal plan that will address the challenges of adequate roads, pipe borne water, waste management facilities, green areas and environmental checks such as storm drainage and access for firefighting equipment's. This plan should also check and correct all violations evident in the mushrooming of semi-permanent structures around the Port Harcourt environs.

While there seems to be an adequacy of educational facilities within Port Harcourt and its environs, there is the need for at least one more government run secondary healthcare facility to cater for the populace.

Waste management seems to be a major concern, as is evident from physical observations and respondent data from the questionnaires, (77.7% of respondents do not have access to waste management facilities, while 62.83% of these respondents either keep it for touts to collect or throw it on the streets). All sorts of waste when disposed of without recourse to the environment, not only poses a danger for it, but also to safety and health of the living population.

4. Waste separations should be easy to practice with the proper government policy in place.

The government through the AEPB should then sensitize the populaces and the relevant officials should be on site to implement and enforce the policy.

Incineration is also another method of waste management that could also be used to generate power. The government should then provide sufficient landfill and waste management facilities to implement proper disposal.

Government of the Port Harcourt should also create and sustain a land policy that will address the issue of housing for the lower income earners and squatters, towards the outskirts of Port Harcourt. This policy could be implemented, using incentives. When implemented it will not only solve the overpopulation issue of Port Harcourt but also provide much needed revenue for the Federal Capital Territory.

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