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Urban Slum Settlement Pattern: Implication for Sustainable Solid Waste Management in Cross River State, Nigeria

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Abstract

This study investigated urban slum settlement pattern and it's implications for sustainable solid waste management in Cross River State, Nigeria. Two null hypotheses were formulated to guide and direct the study. Literature was reviewed based on the variables of the study. The ex-post factor research design was adopted for the study. The population of the study comprised of adult male and female from 20 years and above in the study area. A sample of 573 urban slum dwellers from six urban centres was selected from the population of 270,187 using multi stage sampling techniques comprising of purposive, simple random and accidental sampling techniques. A four point modified likert type scale questionnaire titled "Urban Slum Settlement Pattern: Implication for Sustainable Waste Management in Cross River State, Nigeria" (USSPISWMCRSN) was the instrument used for data collection. The instrument was validated by two expert in Test Measurement and Evaluation in the University of Calabar, Nigeria. The instrument was personally administered by the researchers with the help of three trained research assistants. The Cronbach Alpha reliability method was employed to ascertain the reliability estimate of the instrument. The data obtained was analysed using One-Way Analysis of Variance (ANOVA). The result of the analyses revealed that indiscriminate disposal of waste by urban slum residents as well as disregards for environmental laws, rules and regulations significantly influence sustainable solid waste management in Cross River State, Nigeria. Based on the

findings, the study recommended among others that the government should provide adequate refuse dump and sewages systems for urban slum dwellers and awareness should be created to residents in slum areas on the consequences of improper solid waste disposal and management.
Keywords; urban slum, settlement pattern, solid waste, sustainable solid waste management.

Introduction

The increasing rate of urban slums the world over has become a matter of serious concern to both the town planners and environmentalists. The rising growth of urban population in recent years has been attributed to the unequal development of the cities. In developing countries like Nigeria, the urban centres remain the cynosure of attraction among the rural dwellers, pushing them in their regions in search of greener pastures. Unfortunately, the cities carrying capacities usually do not meet the infrastructural and resource needs of these new immigrants. The major consequences of this sorry state-of-affairs is the expansion and development of shanty towns or slum settlements to meet the housing needs of mostly the urban poor. Many urban dwellers who could not afford comfortable living quarters due to high cost of building their own houses, high house rent, exorbitant acquisition of urban land etc have sort refuge in slums.

Slums have also developed in some major towns of Cross River state such as Calabar Municipality, Calabar South, Ogoja, Ikom, Obudu and Ugep due to increasing urban poverty, failed government policies, globalization and urbanization. In most of these cities mentioned above there is population boom associated with urbanization which creates a greater demand for housing than the urbanized area can offer or supply (Anthony 2005).

Urban slums according to UN-HABITAT (2013) are neighborhoods or city regions that cannot provide the basic living conditions necessary for its inhabitants. It is a household that cannot provide one of the following basic characteristics;

a. Durable housing of a permanent nature that protect against extreme climate condition.
b. Sufficient living space which means no more than three sharing the same room.
c. Easy access to safe water in sufficient amounts at an affordable price.
d. Access to adequate sanitation in the form of private or public toilet shared by a reasonable number of people.
e. Security of tenure that prevents forced eviction.

The inaccessibility to one or more of the above basic living conditions results in a ‘’slum lifestyle’’.

The growth of urban settlements in Cross River state has negatively impacted on the urban landscape. Slums are located at the fringe of the cities along marginal land and water ways. This kind of settlement contributes to soil erosion, Natural disaster such as earth quakes, landslide, excessive wind or heavy rain storms, rise in epidemics and diseases, unemployment, open defecation and indiscriminate dumping of waste (Usman 2018).

The government, at different levels, environmental experts as well as town planners has made frantic effort to solve this problem but the issue seems not to be solved. The urban areas in Cross River state today faces problem of indiscriminate solid waste disposal and the waste generation keep rising steadily due to increase in population and expansion of urban slums. According to Solomon (2011), the estimate of waste generated per person in a day is 0.49kg with households accounting for 90%

urban waste. It is in the light of the above that this study seek to empirically investigate the extent to which urban slum settlement contributes to unstainable solid waste management in Cross River State, Nigeria.

The Concept Urban Slum

Urban slums are settlements neighborhoods or city regions that cannot provide the basic living conditions necessary for its inhabitants or slum dwellers to live in a safe and healthy environment. It is a household that cannot provide the basic living characteristics such as durable housing of a permanent nature, sufficient living space, easy access to safe water and access to adequate sanitation (UN-HABITAT 2013). According to Cunningham, Cunningham and Sergio (2005), urban slum settlement are generally legal but inadequate multifamily tenements or rooming houses built to rent to poor people or converted for other use.

The Concept of Solid Waste

According to Akpama, Anthony and Osang (2005) solid waste refers to all those unwanted, discarded and useless materials that are not liquid or gas. Solid waste are generated from different sources such as household garbage, commercial refuse, industrial waste, street sweeping, construction and demolition debris, sanitation residue, abandoned automobiles, dead bodies, paper and paperboard, food, seraps, metal glass, wood, rubber, leather, textiles, containers etc.

Solid waste could be grouped into two major categories viz; Industrial waste and municipal waste. Industrial wastes are waste material generated in the cause of manufacturing products. These include metals, scraps, waste papers, pieces of glass etc. while municipal waste is a combination of commercial and household or domestic waste. These are waste that are bye products of house activities and consumption. They include wrapping paper, vegetables, empty cans bottles, containers etc.

The Concept of Sustainable Waste Management

Waste management could be seen as the appropriate method of disposing waste safely in such a manner that makes it less harmful to man and the environment at large. It involves appropriate disposal of sewage and household refuse (Lawal 2010). Waste management could come inform of waste treatment.

Waste treatment are of different types. For primary treatment, screens are used to filter out large debris through a sedimentation tank, for the suspended solids to settle as slidge.

The secondary treatment on the other hand uses a biological process to break down wastes. The tertiary treatment requires services of specialized chemical and physical process to reduce the quantity of one or more of the pollutants remaining after primary and secondary treatment through precipitation, absorption and electron-dialysis or reverse osmosis.

Sustainable waste management aim at keeping material in use for as long as possible and minimize the amount of solid waste that is disposed of in landfill or through incineration. Waste begins even before products are manufactured, thus to manage waste sustainably we must focus on the entire life circle of the product to enable us reduce the negative environmental, social and financial impacts of consumption in the 21st century. Sustainable waste management is a systematic approach to the economic development that stand in opposition to the "take-make-waste model" and aim to separate growth from the consumption of finite resources. It helps to tackle the broader issues of a linear

consumption society but also offers more direct solutions to the many problems caused by waste. The ultimate goal of sustainable waste management is to reduce the amount of natural resources consumed, confirm that any material that is taken from nature is used as many times as possible and the waste generated is kept to a minimum. Sustainable waste management also entails using material resources effectively to cut down on the amount of waste produced or generated in a way that it will contribute to the economic, social and environmental goals of sustainable development (www.srwscorp.com 2018).

Urban Slum Settlement Pattern; Implication for Sustainable Solid Waste Management.

Urban slum settlements across the globe are no doubt associated with improper waste disposal. Solid waste materials ranging from wood, plastics, cans, rubbers, iron, paper, nylon abandoned clothing materials etc are commonly found around slum settlement areas.

According to Ekpoh (2012) one of the challenging issues with the emergence of urban slums in Nigeria is the problem of poor management of solid waste. He stressed that, with the rising urban slums there is increased environmental issues such as land degradation, wide spread erosion, pollution and environmental health hazards which is occasioned by improper waste disposal.

Most urban slum dwellers has "throw away'' habit. The ''throw away'' habit significantly affect waste management especially in the urban areas. Lawal (2010) identified six strategies that could be adopted by urban slum dwellers in managing solid waste. These include; open dumping, sanitary land-filling, secured land-filling, incineration, composting and resource recovery plant usage.

Owusu (2010) carried out a study in sabon zongo area in Accra Ghana on social effects of poor sanitation and waste management of poor urban communities. The purpose of the study was to examine the challenges of rapid urbanization with respect to sanitation and waste management and the burden placed on poor urban residents in Sabon Zongo, a poor community in Accra. Like many other poor communities Sabonzongo residents whose poverty level would not allow them to pay for sanitation tend to package their liquid and solid waste in plastic bags and dump them indiscriminately within the community.

In a study carried out by Aniyom and Amla (2010) on the emergence of urban slums and solid waste in Akamkpa Local Government Area of Cross River state, Nigeria, ex-post factor research design was adopted and five autonomous communities were purposively selected for the study. A structural questionnaire was the instrument used for data collection and the independent t-test statistic/analysis was adopted to analyze the hypothesis. The result of the analysis revealed that, the emergence of urban slums significantly influence solid waste management in Akamkpa Local Government Area of Cross River State, Nigeria. Based on this result, it was recommended that people who live in slum areas should be sensitized on the need to properly manage solid waste in their residential areas. The study also recommended that government should provide and make waste bins available for people in their different location in other to solve the problem of indiscriminate waste disposal.

Cunningham, Cunningham and Saigo (2005) identified open dump, ocean dumping, land- fills, exporting waste, incineration, resource recovery, recycling, composting, demanufacturing, reuse and producing of less waste as various ways of managing waste. Davies (2014) decried the rise of urban slums in developing countries like Nigeria. He was particularly concerned on the rise of slums in

Lagos Nigeria. He described Lagos as the biggest node in the shanty town corridor of 70 million people that stretches from Abidjan to Ibadan and probably continuous footprint of urban poverty on earth. He decried the astronomical trajectory of urban slums over the years in Nigeria with its attendan6s negative implication on the urban landscape and the environment which call for urgent attention.

Egari (2014) stressed that municipal waste constitute one of the most crucial health and environmental problems facing cities in developing countries. This recording to him is due to the fact that even when 20-50 percent of the annual budget is allotted for solid waste management only 20-80 percent of the waste is collected. The uncollected waste which is mostly found in slum settlement areas constitute a disaster for human health and environmental degradation. He also attribute the problem of unsustainable solid waste management to population growth, urbanization, industrialization, economic growth rate, poverty and unplanned sprawling slums with narrow roads that are inaccessible for waste collection vehicles.

According to Adegoke (2019) waste collection in Nigeria is irregular and restricted to major cities while the slums are neglected. He maintain that in slum settlement areas, there is usually absence of or lack of proper refuse dumps and sewage systems. For instance the Ajegunle Ebute-Meta in (Lagos), Ibu, Kwakwa and Kanimo slum in Abuja and the Base side slum in Calabar, residents in such areas defecate in open space, inside rivers, streams and lagoons. Urban areas are also characterized with mountainous heap of refuse dump that deface the urban landscape, thereby endangering public health. The emergence of urban slums is indeed a serious threat to the achievement of environmental sustainability.

Most slums dwellers in Cross River State have poor attitude toward waste management. Waste generated and dump in such areas is worst than what is experienced in market places. Slum dwellers tend to be very careless in handling solid waste. It is not uncommon to see people dump their waste nearby bushes, roadside, gutters, abandoned building, streams, rivers etc. this ugly development could be attributed to illiteracy, ignorance, poverty, lack of awareness and enlightenment on the consequences of improper waste disposal. The slum dwellers need to acquire literacy education that would help them to think critically, change their attitude towards the environment and become conscious of the negative implication of their behaviour on the environment.

Improper solid waste disposal has become a recurring feature of urban towns and cities in Cross River State. It is no longer stories that our urban towns are inundated with challenges of uncleared solid wastes. The inability of urban towns and cities to combat solid waste generated either from industrial or commercial activities is a clear violation of sanitation laws and regulations. The urban poor and slum dwellers are characterized with lawlessness and thus disrespect environmental protection edict, rules or regulations. It is in light of the above that waste generation in slum residential areas is always increasing day by day it has become and a recurring feature of urban slums (Asuquo2020).

Dauda and Osita (2013) maintained that solid waste management is the most pressing challenge faced by urban and rural dwellers in Nigeria. Nigeria with a population of 170 million people is one of the largest producers of waste in Africa. About 32 million tons of waste is generated annually. Most of the waste according to them is generated by Local industries, household, artisans and traders.

Lang (2017) attributes the rise of urban slums and improper waste management to urbanization. He maintained that the genesis of urban development in Nigeria witnessed increase in population growth which has posed a serious challenge to town planners and the government. Urbanization according to him is associated with urban poverty and the growth of slums and shanty settlements.

Statement of the Problem

Solid waste management is the most pressing problem facing humanity today. Nigeria with a population of about 170 million inhabitant is one of the largest producer of solid waste. The volume of solid waste generated in Cross River state is alarming. This ugly situation could be attributed to increase in population growth, urbanization, industrialization increase in consumption rate, negative attitude of urban residents towards waste generation and emergence of urban slums. This development has become a threat to the aesthetic value of the environment and human health. The government of Cross River State through its agencies has enacted law, rules and regulations to solve the problem of improper waste management. The government through the waste management agency has also provided waste bin to households and dustbins strategically located for the public to dispose their waste. Despite all effort made by the government and its agencies, urban dwellers especially residents still dump their waste in gutter, roadside, bushes, streams, rivers and even in public place. The problem of this study is therefore to empirically investigate whether the emergence of urban slum is principally responsible for the problem of solid waste management in Cross River State Nigeria.

Purpose of the Study

The purpose of this study is to investigate the extent to which urban slum settlement pattern influence sustainable solid waste management in Cross River State, Nigeria. The study specifically seek to investigate the extent to which

1. Indiscriminate disposal of solid waste by urban slum residents influence solid waste management.
2. Disregard for environmental laws, rules and regulations by urban slum residents influence solid waste manage in Cross River State.

Statement of hypotheses

The following null hypotheses were formulated to guide and direct this study:

1. Indiscriminate disposal of solid waste by urban slum residents do not significantly influence solid waste management in Cross River state, Nigeria.
2. Disregard for environmental laws, rules and regulations by urban slum residents do not significantly influence sustainable waste management in Cross River state, Nigeria.

Research *Methodology*

The ex-post factor research design was adopted in this study. According to Isangedighi, Joshua, Asim and Ekuri (2014) the ex-post factor research design basically studies phenomena that has already recurred. The study covers the entire Cross River state, Nigeria. The area is comprised of eighteen Local Government Area viz: Abi, Akamkpa, Akpabuyo, Bakassi, Bekwara, Biase, Calabar Municipal,

Calabar South, Etung, Ikom, Obanliku, Obubra, Obudu, Ogoja, Yakur and Yala Local Government Areas. A sample of 573 urban slum dwellers from six urban centres was drawn from the population of 270,187 using the multi stage sampling procedure comprising of purposive, simple random and accidental sampling techniques. The population of the study consisted of adults male and female from 20 years and above. The questionnaire titled ‘’urban slum settlement pattern: implication for sustainable solid waste management in Cross River State, Nigeria’’ (USSPISSWMCRSN) was used for data collection. The instrument was validated by two experts in the Department of Test Measurement and Evaluation Faculty of Education University of Calabar, Nigeria. Cronbach Alpha reliability was employed to ascertain the reliability estimate of the instrument. The questionnaire was personally administered by the researchers with the help of three trained research assistants. The data obtained was analyzed using one-way analysis of variants.

Results

Hypothesis one

Hypothesis one states that indiscriminate disposal of waste by slum residents do not significantly influence solid waste management in Cross River State.

The independent variable is indiscriminate disposal of disposal of solid waste by urban slum residents while the dependent variable is sustainable solid waste management. One-way analysis of variance was the statistical tool used to test this hypothesis. The result of the analysis is presented in table 1

Table 1

One-way Analysis of variance of the influence of indiscriminate waste disposal by urban slum resident and sustainable waste management.

(N=573)

Level of solid waste disposed by slum residents	N	Mean	SD
Low	58	27.22	3.79
Moderate	434	26.20	3.24
High	81	24.58	2.89
Total	573	26.07	3.32

Source of Variance	Sum of squares	df	Mean square	f-ratio	p-level
Between groups	264.148	2	132.079	12.491*	000
Within groups	6026.773	570	10.573		
total	6290.921	572			

* significant at .05 alpha level; p<.05

Table 2

Fisher LSD post Hoc test on indiscriminate disposal of waste by urban slum residents and sustainable management of solid wastes.

Level of indiscriminate waste disposal by urban slum residents	N	Mean	Mean difference	p-level
Low	58	27.22	1.03*	.024
Moderate	434	26.20		
Low	58	27.22	2.64*	.000
High	81	24.58		
Moderate	434	26.20	1.62*	.000
High	81	24.58		

*significant at .05 level; p<.05.

The result in table 1 revealed that the mean score of 27.22 obtained by 58 respondents who are low in their opinion on the level of indiscriminate waste disposal is greater than the mean score of 26.20 obtained from 434 respondents who are moderate in their opinion on the level of slum residents and this is also greater than the mean score of 24.58 obtained by the 81 respondents who are high in their opinion on urban slum residents. This result therefore implies that the higher the level of indiscriminate waste disposal by urban slum residents the lesser the sustainable solid waste management.

The result further revealed that the calculated f-ratio of 12.491 obtained with a p-value of .000 at 0.5 level of significant with 2 and 570 degree of freedom is statistically significant since the p-level is less than .05. This implies that the null hypothesis which states that indiscriminate disposal of waste by urban slum residents do not significantly influence sustainable solid waste management is rejected. Since indiscriminate disposal of solid waste emanated from urban slum residents, the Fisher Least Significant Difference (LSD) Post Hoc Test multiple comparison was carried out to check the source of the difference and the result is presented in table 2

The result of the Fisher LSD Post Hoc Test analysis presented in table2 revealed that the respondents who holds low opinion on the level of indiscriminate waste disposal had significant higher mean score in sustainable solid waste management when compared with the mean score of those who are moderate in their opinion of indiscriminate waste disposal (MD=1.03; P<.05) and when compared with the mean score of those who are high in their opinion of indiscriminate waste disposal (MD=2.64; P<.05). The result finally revealed that respondents who are moderate in their opinion on indiscriminate waste disposal had significant higher mean score in sustainable solid waste management

compared with the mean score of those who are high in their opinion on indiscriminate waste disposal (MD=1.62; P<0.5).

Hypothesis two

Hypothesis two state that disregard for environmental laws, rules and regulations by urban slum residents do not significantly influence sustainable solid waste management in Cross River State, Nigeria. The independent variable in this hypothesis is disregard for laws, rules and regulations. While the dependent variable is sustainable solid waste management. One-way analysis of variance was the statistical tool used to test this hypothesis. The result is presented in table 3

Table 3

One-way analysis of variance on urban slum disregard for laws, rules and regulation and sustainable solid waste management.

Level of disregard for laws, rules and regulations	N	Mean	SD
Low	20	29.05	3.73
Moderate	344	26.59	3.11
High	709	24.94	3.23
Total	573	26.07	3.32

Source of variables	Sum of squares	df	Mean square	f-ratio	p-level
Between groups	535.277	2	267.638	26.505*	.000
Within groups	5755.645	570	10.018		
Total	6290.921	572			

*significant at .05 alpha level; p< .05

Table 4
Fisher LSD Post Hoc on urban slum disregard for laws, rules and regulation and sustainable solid waste management.

Level of disregard for laws, rules and regulations	N	Mean	Mean difference	p-level
Low	20	29.05	2.46*	.001
Moderate	344	26.59		
Low	20	29.05	4.11*	.000
High	209	24.94		
Moderate	344	26.59	1.65*	.000
High	209	24.74		

*significant at .05 level; p<.05

The result in table three revealed that the mean score of 29.05 obtained by 20 respondents who indicated that the level of disregard for laws, rules and regulations on solid waste disposal is low is greater than the mean score of 26.59 obtained by 344 respondents who indicated that the level of disregard for laws, rules and regulation on waste disposal of their area is moderate and this is also greater than the mean score of 24.94 obtained by 209 respondents who were of the view that disregard for environmental laws, rules and regulations is high. This implies that the higher the disregard for laws, rules and regulations in the area, the lesser the sustainable solid waste management.

The result further revealed that, the calculated F-ratio of 26.505 0btained with a p-value of .000 at .05 level of significance with 2 and 570 degrees of freedom is statistically significant since the p-level is less than .05. This implies that the hypothesis which state that disregard for environmental laws, rules and regulations by urban slum residents do not significantly influence sustainable solid waste management was rejected. Since management of solid waste is greatly influenced by disregard for laws, rules and regulations, the Fisher Least Significant Difference (LSD) Post Hoc Test multiple comparism was carried out to check for the source of the difference and the result is presented in table 4.

The result of the Fisher LSO Post Hoc Test analysis presented in table 4 revealed that the subject who were of the opinion that disregard for environmental laws, rules and regulation is low had significantly higher score in sustainable solid waste management when compared with the mean score of those who indicated disregard for laws, rules and regulation of their area is moderate (MD= 2.46 < .05) and when compared with the mean score of those who were of the view that disregard for laws, rules and regulations in their area is high (MD = 4.11; P < .05). The result finally revealed that respondents who held the view that disregard for environmental laws, rules and regulations of their areas is moderate had significant higher mean score in sustainable management of solid waste when compared with the mean score of those indicated that disregard for environmental laws, rules and regulations of their area is high (MD=1.65;P<.05).

Discussion of Findings

The result of the first hypothesis revealed that indiscriminate disposal of waste by urban slum residents significantly influence sustainable solid waste management in Cross River State, Nigeria. The findings is in agreement with the views of Adogoke (2019) who opined that in slum settlement areas, there is usually absence of a lack of proper refuse dumps and sewage systems. He identified some urban slum residents such as Ebute-Meta, Ajegunle in Lagos, Base side in Calabar, Kwakwa and Kanimo slums in Abuja where residents defecate in open space, inside rivers, streams and Lagoons.

In Cross River state waste generated and dumped in slum areas is worst than what is experienced in market places. It is not uncommon to see people dump waste in nearby bushes, roadsides gutters, abandoned buildings, streams, rivers etc. Ekpoh (2012) maintained that one of the challenging issues with the emergence of urban slums in Nigeria is the problem of poor management of solid waste. He stressed that with the rising urban slums there is increased environmental issues such as land degradation, pollution, environmental health hazards, wide spread erosion which occasioned by improper waste disposal.

The result of the second hypothesis revealed that disregard for environmental laws, rules and regulations significantly influence sustainable solid waste management in Cross River State, Nigeria. The findings of this hypothesis is in agreement with the view of Asuquo (2020) who maintained that, it is no longer story that our urban towns are inundated with the challenges of uncleared solid wastes. He attributes the inability of urban towns to combat waste generated either from industrial or commercial activities to a clear violation. He said that the urban poor are characterized with lawlessness and disrespect for environmental protection edicts, rules and regulations. According to him, there is continuous increase of waste generation in urban slum areas due to disrespect of sanitation laws.

Conclusion

The increasing rate of heaps of solid waste disposed in urban slum settlement areas in Cross River State today has become a worrisome contemporary environment issues of grave concern that need urgent attention. The rise of urban slum settlement has negatively impacted on the urban landscape with its attendant effects such as Land-Slide, rise in epidemic and diseases, open defecation and indiscriminate dumping of solid waste. Despite the concerted effort made by government agencies, non-governmental organizations and spirited individuals to solve this problem, the issue remain unabated. This could be attributed to the illiteracy level of slum dwellers, poverty, poor government policies, lack of enforcement powers by the agencies and poor attitude of urban slum dwellers toward environmental sanitation. It is therefore incumbent on all and sundry to put their hands on deck and not to sit on the fence in order to ensure that waste generated in such shanty areas are properly disposed and managed.

Recommendations

Based on the findings of this study, the following recommendations were made

1. The government should provide adequate refuse dumps and sewage systems for urban slum dwellers.
2. The government should come up with policies that will put an end to improper waste disposal in urban slums settlement areas.

3. The polluter's pay principle should be employed to check-mate indiscriminate dumping of waste in such settlement areas.
4. Awareness should be created to residents in slum areas on the consequences of improper disposal of waste.

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