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Full Length Research Paper

The Population Factor in Waste Generation and Management in Onitsha Metropolis, Anambra State, Nigeria

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Abstract

We looked at the place of population growth and increase on waste generation and management in Onitsha Metropolitan area Nigeria. We utilized survey design with the instrumentality of structured questionnaires to obtain data from 381 respondents cutting across low class, middle class and high class residential areas. Data was valued in percentages and presented on tables while statistical analysis was done using Pearson product moment correlation. The result showed that the rapidly increasing population of Onitsha metropolis has resulted in a rapid increase in the generation of waste and there is a strong positive correlation between household size and waste generation. The result equally showed that the rate of waste collection and disposal are low compared to the population growth resulting in a gap and lowering of the environmental quality. This is seen as an indictment on the waste management agencies of the state. The result equally indicted the poor attitude of many Onitsha residents in indiscriminate dumping of wastes. It is therefore recommended that the waste management agency upgrade her quality of service delivery in order to ensure a more sustainable environment of the Onitsha metropolitan area.

Keywords: Population, Waste Management, Onitsha Metropolis.

INTRODUCTION

Waste in the words of Douglas (2004) is any unwanted and discarded material that arises from the activities of human beings and animals on the earth. It is equally explained to mean leftovers, used products, whether liquid or solid, having no economic value or demand and which must be disposed or thrown away (Oluwande 2002, Bartone 2000) thus, when the utility of a material turns to zero, it becomes a waste.

According to Cynthia (2002), if wastes are not properly disposed, it becomes a threat to man in various ways as well as the environment. The challenge of waste generation and management is global but quite more serious in urban centres of developing countries. Human population growth and rural-urban migration has increased through urbanization, yet the service rendered is not sizeable enough to control the high level of solid waste generated in urban areas and these have contributed to a large extent to the nuisance and damage on the urban environment (Sule 2004). In developed countries, research reveals that waste generation in less urbanized area is more than that in the city (Industry commission of Australia, 1990). The reverse is the case in developing countries. In Nigeria for instance, more waste is generated in cities than in rural areas (Eka, 2018).

The generation of waste follows the culture of

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consumerism which is directly proportional to the affluence of humans and human societies. The rich and the affluent are found in the cities and they do not practice source reduction, re-use and recycling of household wastes. They have more disposable income which they consume more than village dwellers, cities is the most efficient agent of waste generation (Adelman 1990), and there is over-responsive superiority by cities in Nigeria (Adeboju 2005). This is the consequence of the neglect of rural areas of government, causing a serious migration from the rural areas to the cities for various reasons. This swells the population of the cities. Within the last four decades, the population growth of cities in Nigeria had been geometrical (Eka 2018).

According to Eze (2014), Nigeria, which is one of the developing countries of the world and Africa's most populous country, has a population of about 140 million by 2006 population census. It is presently estimated at over 180 million. It not only has more large cities, but also is the highest urban population of all countries in sub-saharan Africa (DFID, 2002). The proportion of Nigerians living in urban areas of 20,000 persons or more was put at 38 percent in 1991 census report and an estimate of 46 percent in 2oo2, and 48 percent in 2005, a remarkable increase from 15 percent at independence in 1960 (NISER, 1997, UNDP, 2006). Urbanization in Nigeria was estimated to have grown from 5.0 percent in 1965-1986 to 5.8 in 1995–1999. Associated with this dramatic increase in urban population has been the spectacular geographical spread of these urban areas. National population commission (NPC) (1998) revealed that in 1991 population census, about 359 settlements have at least 20,000 people while estimates for year, 2000, put the number of urban areas with more than 20,000 at more than 450. Similarly, the estimate from DFID (2002) put the number of Nigerian cities with a population of over 500,000 in 2002 at 18. Also in 2005, there were more than 840 urban centers and over 10 cities with a population in excess of one million, while projections indicate that 60% of Nigerians will live in urban centers by the year 2025 (UNDP,2006). These increases, besides the natural increase could all be attributed to the massive out-flux of people from rural areas so called rural-urban migration, exercabeted by development bias in favor of urban areas.

As Eka (2018), puts it, most immigrants to the cities to engage in odd jobs, like street trading which is a nuisance to the environment. The volume of waste generated by street trading is enormous. Besides the immigration factor, the rich city dwellers own and discard more electronics, furniture and other bulky goods than those in rural communities. The rural folks are in the practice of repairing before discarding worn out refrigerators, furniture and electronics. In cities, the rich, simply discard malfunctioned electronics, furniture and refrigerators and buy new ones which are of the latest model (Eka, 2018).

In Nigeria, Municipal Solid Waste (MSW) collections by the ministries or agencies are only done in cities. Homes, Commercial houses or industries drop their wastes at the receptacle points. Wastes are dropped into receptacles at designated points in the case of controlled receptacle centers. At the uncontrolled collection points (unofficial receptacle sites) wastes are dumped on the ground to be evacuated by government agents who dispose of the wastes in official dump sites.

The disposal of wastes from homes, commercial and industrial houses is not properly done in most cases. People dispose of wastes in such an unhygienic manner that they end up littering the ground instead of dropping them in the designated receptacles. Nigerian cities and towns are therefore currently facing serious environmental problem arising from poor waste management. The rate of waste generation has increased with rapid urbanization. Waste is generated at a rate beyond the capacity of the city authorities to maintain sustainable urban environment. This has resulted in serious environmental crisis in most Nigerian cities.

Narrowing down to Onitsha metropolis in Anambra State, which is the commercial hub of the southeast besides Aba; it is teeming with population and growing daily. Onitsha being a commercial city with different economic activities like trading, industry and transportation tends to generate a lot of waste, which, when not properly managed, pollutes and litters the environment. It is also an environment highly populated with the mixture of people with different behavioral patterns, both the educated and uneducated, different economic backgrounds, all of which contribute greatly to the increase in the volume of waste generated and the poor management system.

The population growth of Onitsha is one of the major factors of waste generation and management in the city, the population of Onitsha includes not only the city's normal population, but also people from different parts of the world who converge daily for different purposes. This paper therefore examines how the bulging population of Onitsha Metropolis impinges on her waste generation and management and its implications on her urban environment.

Research Hypothesis

The hypothesis tested in this study is:

HO: There is no significant relationship between the household size and the amount of waste generated in Onitsha Metropolis.

MATERIALS AND METHODS

Study Area

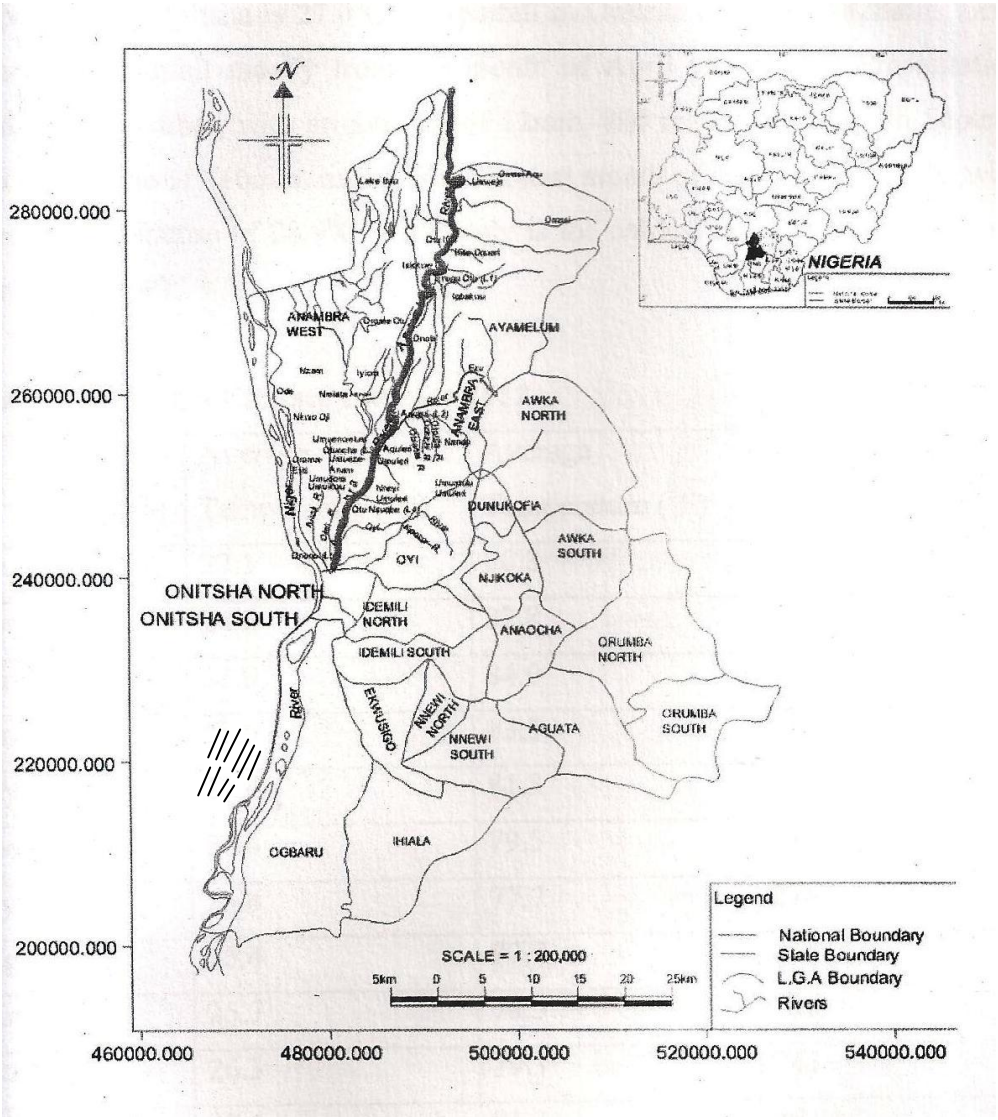

Fig 1: Map of Anambra State showing the study area (Onitsha North and Onitsha South).
Source: Wikipedia

Onitsha is located at latitude 6.14130N and 6.80290E in the southeastern part of Nigeria (Fig 1). It has a total area of about 43,978km2. Onitsha is one of the most densely populated areas in southeastern Nigeria. Her population trend has been that of continuous increase. 1991 census puts her population at 361,574 and 2006 census recorded her population as 1,318,660 respectively.

Onitsha is a rapidly urbanizing region, known as the centre of commercial activities in the southeastern part of Nigeria. There are many markets existing in her and the availability of these markets and transportation links led to the trading activities and location of industries in her. The people of Onitsha Metropolis are equally engaged in administrative, transportation, institutional and industrial activities.

These various activities carried out in Onitsha have resulted to rapidly increasing population and hence also the rapid generation of wastes from those activities ranging from the production of goods and services to the final consumers. Onitsha Metropolis is therefore suitable and preferred for this study.

METHODOLOGY

Sample Size and Selection

The population of Onitsha Metropolis was estimated at 1,318,660; to determine the appropriate sample size, Taro Yamane formulae were employed.

The Taro Yamane's formula is thus:

$$n = \frac{N}{1+N\,(e)^2} \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad 1$$

Where n = Sample size
N = Total population under study
e = Significance level (0.05)

Using this formula, a sample size of four hundred was adopted.

A multi-stage sampling technique was used in selecting the respondents for the study. Firstly, cluster sampling technique was used by the researchers to categorize the metropolis into six zones based on the subdivision of the Residential Areas of Anambra State Environmental Protection Agency (ANSEPA). The zones are as follows: Odoakpu, Fegge, Housing-Estate, Iweka, Inland Town and Government Residential Area. Three areas, namely: Iweka, Fegge and Government Residential Area were purposefully selected for fair representation, cutting across low, middle and high class residential areas. Systematic sampling technique was used in choosing the houses from the selected areas. Thus, every second house was selected, starting with the second house at the starting point of the selected area. Respondents from the age of 18 and above, especially females were selected. This is because most of the house chores that generate waste were majorly done by the females.

Data Collection

Structured questionnaire was designed and used to collect primary data from the respondents bothering on waste generation, collection frequency, household size, types and disposal methods and sites. The interview was conducted on waste management staffers. Of the 400 questionnaires, distributed, 381 were returned of which 264 were female and 117 were male respondents respectively.

The collected data were analyzed using simple percentages and Pearson's product moment correlation whose formulae is thus:

$$Y = \frac{Exy \quad - \frac{(Ex)\,(Ey)}{n}}{\sqrt{(Ex^2) - (Ex^2) \quad (Ey^2) - \frac{(Ey^2)}{n}}} \quad - \quad - \quad - \quad - \quad - \quad 2$$

Where r = Product Moment Correlation
x and y represent the variable
n – Number of values

RESULTS OF THE STUDY

Table 1: Components of Waste Generated by Households in Onitsha Metropolis

S/N	Components	Frequency	Percentage %
1	Food	191	50.13
2	Metal	9	2.36
3	Glass	1	0.26
4	Papers and polythene bags	92	24.14
5	Plastic	43	11.28
6	Other	45	11.81
	Total	381	100

Source: Researchers' field work (2017)

From the table above, food waste constitutes the highest amount of household waste generated – 50.3% followed by papers and polythene – 24.14% and plastics constitute 11.28% while other constitute 11.81%, metal and glass components constitute 2.36% and 0.26% respectively.

Table 2: Distribution of household size and the amount of waste generated daily

S/N	Household size	Amount of generated waste (kg)
1	2	0.10
2	3	0.37
3	4	0.51
4	5	0.72
5	8	0.92
6	11	1.39
7	13	1.77
Total	46	5.78

Source: Researchers' fieldwork (2017).

Table 2 above shows some selected household, their sizes and the amount of waste generated, it is evident that the higher the size of household, the more the amount of waste generated.

Table 3: Population Growth and Waste Generation Rate in Onitsha Metropolis

S/N	Year	Population	Volume of waste generated tons
1	1997	609010	304505
2	1998	635260	317640
3	1999	654592	327145
4	2000	673894	336946
5	2001	694139	347064
6	2002	714963	357481
7	2003	730412	370706

Sources: Anambra Environmental Protection Agency, (2004)

Table 3 above is data from the archive of the Anambra Environmental Protection Agency which shows population growth of Onitsha Metropolis and the volume of waste generated by the population of the city from the year 1997 – 2003. This shows that the volume of waste generated in Onitsha Metropolis increases as population size increases buttressing further the direct field data depicted in table 2. Thus the population growth rate of Onitsha Metropolis influences directly on the waste generation rate of the city.

Table 4: Methods of household waste disposal

S/N	Method of disposal	Frequency	Percentage
1	Skip	143	37.5
2	Dumpsite	93	24.4
3	Dustbin	72	18.8
4	Along the street	54	14.1
5	Burning	12	3.1
6	gutters	7	1.8
	Total	381	100

Source: Researchers' fieldwork (2017)

Table 4 shows that the most common method of disposal is the skip which has the score of 37.5%, followed by dumpsite (24.4%). Dustbin (18.8%), along the street (14.1%) burning (3.1%) and Gutters (1.8%). It was observed that the frequency of these methods varied across the area; for instance, the skip method was observed mainly in the low class zone (Iweka) and in some of the middle class area (Fegge). The high class area (GRA) was observed to use big dustbins which were kept in front of every compound's gate for waste collection. About 199 of the respondents use other methods as burning, dumping inside the gutters and along the streets for disposal. This result in poor waste management, littering and pollution which all decrease the standards of the environment.

Table 5: Regularity of waste collection in Onitsha Metropolis

S/N	Method of disposal	Frequency	Percentage
1	Daily	3	0.7
2	Once a week	169	44.3
3	Twice a week	201	52.7
4	Monthly	8	2.0
	Total	381	100

Source: Researchers' fieldwork (2017)

From the table 5 above, only 0.7% of the respondents indicated that wastes were collected daily, once in a week collection was indicated by 44.3% of the respondents, 52.7% indicated that waste were collected twice in a week while 2.0% showed that theirs were collected monthly. This data shows that the regularity of waste collection was not the same in all the areas of the metropolis – thus some areas were observed to be more littered with waste than others. Generally there is also a gap between the rate of waste generation and collection and population growth with the former trailing behind the later, thus creating a tendency for a dirtier environment.

Result of Statistical Analysis

As a reminder, there is one working hypothesis for this research, namely:

HO: There is no significant relationship between the household size and the amount of waste generated.

The Pearson's Produce Moment correlation was used to determine the degree of relationship between the two variables (household size and amount of generated waste) in relation to the hypothesis. The result showed an r value of 0.99 which shows a very strong positive correlation indicating that an increase in one variable (x) leads to an increase in the other (y). This therefore implies that an increase in household size (increase in population) leads to increase in the amount of waste generated in Onitsha Metropolis. Using the student t-test to test the significance of the correlation, a t-value of 15.69 resulted with a critical value of 2.02, thus the correlation is statistically significant. This then means that the null hypothesis is rejected and alternate accepted implying that there is a significant relationship between the household size and the amount of waste generated, thus an increase in the population size of the household leads to increase in the volume of waste generated and vice versa.

DISCUSSION OF RESULTS

Abiodun (2001), maintain that population pressure is the rate at which population has started affecting people in that country. Chandan (2012) made it clear that with increased population growth, the generation of waste has increased many times, they also stated that population growth does create long term pressure on a society's resources which needs to be taken care of. For Sule (2004), human population and rural urban migration has increased through urbanization, yet the service rendered is not sizeable enough to control the high level of solid waste generated in urban areas and these have contributed to a large extent to the nuisance and the damaging effect of the urban environment. This scenario pointed is true of Onitsha Metropolis where this study found that waste generation is positively correlated with population growth and that population growth is running far ahead of waste collected and disposal. This then means that waste is generated at a rate beyond the capacity of the city authorities to maintain a sustainable urban environment which has resulted in serious environmental threat.

This study equally found that many of the residents of Onitsha Metropolis dump their waste along the street, gutters, burning, the skip method, etc. especially lower class and middle class residential areas. This encourages a dirty environment. According to Dennis and Raphael (2017), the role of people in solid waste management in Onitsha is crucial; the waste disposal habit of the people goes a long way to determine the extent to which the environment is clean. The sanitary state of an area is largely influenced by the handling practices of the residents and the measures in place to safe waste evacuation and disposal (Chukwuemeka E, Igwebe D and Ugwu J, 2012). This indiscriminate dumping of wastes has been blamed on the government for failing to provide enough waste skips and receptacles for dumping of refuse. It is also partly blamed on the residents who insist on dumping their refuse at their convenient sports irrespective of government efforts at provision of receptacles.

The study equally found the rate of waste collection in the Metropolis to be low, especially in the low class areas in the face of a rapidly increasing urban population. This has further exacerbated the waste management problem, making the metropolis more vulnerable to indiscriminate dumping and the follow up of environmental degradation. In sum, wastes are generated daily in Onitsha metropolis,

the problem of indiscriminate dumping; irregular collection and inadequate resources for proper waste management under the challenge of rapidly increasing population are the main issues of waste management in the Metropolis.

CONCLUSION

With increasing population as observed in Onitsha Metropolis, and increasing industrial, commercial and institutional activities, the generation of waste has increased many times without an equal increase in the rate and quality of collection and disposal. Thus, waste is generated at a rate beyond the capacity of the city authorities to maintain sustainable urban environment. This is the situation in Onitsha Metropolis where the population is rapidly, increasing engendering rapid increase in the amount of waste generated also, but the rate and quality of waste collection is slow and of low quality resulting to poor environmental quality. This is made worse by the inability of waste management agencies of the state to render effective service for the entire population plus the improper attitude of many Onitsha residents in indiscriminate waste dumping. It is therefore recommended that government upgrade the quality of service delivery by providing adequate skip and dustbins that can serve the entire population, not just the high class residential areas and equally speed up the regularity of waste collection and disposal in addition to investing on public awareness to enlighten the people on the dangers of indiscriminate dumping of wastes. Adherence to these recommendations besides others will lead to a more sustainable environment of the Onitsha Metropolitan area of Anambra State in particular and other urban areas of Nigeria in general.

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