

SOLID WASTE MANAGEMENT AND DISPOSAL SYSTEM IN ABA METROPOLIS IN ABIA STATE

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Abstract: *The state of solid waste management and disposal system in Aba metropolis in Abia state is poor and has reached an alarming proportion; this problem is compounded by the rapid urbanization and population growth that has led to the generation of enormous quantities of solid waste. These wastes are frequently dumped along the streets, in the gutters and informal waste dumps, which has been linked to several environmental safety and public health problem which include the blockage of gutters, nuisance odours, and health problem on the life of the residents. The generation, collection and disposal methods for wastes was investigated and found to be faulty. Based on findings, recommendations were made to remedy the situation which involves the Abia State Environmental Protection Agency stepping up its effort in the collection, transportation and disposal of solid wastes. Refuse disposal equipment should be provided, the need for public enlightenment and the reduction, reuse and recycling principle should be applied.*

KEYWORDS:: Aba, Sanitation, Waste Disposal, Waste Management

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I INTRODUCTION

Solid waste management is one of the environment and sanitation problems in Nigeria. This problem is compounded by the rapid urbanization and population growth which has led to the generation of enormous quantities of solid wastes (Chandrappa and Brown, 2012). These solid wastes are then discarded indiscriminately along major roads and at street corners in cities and urban areas (George and Frank, 2012). These waste dumps may contain a generation of wastes and toxic wastes, infectious or radio-active wastes and are susceptible to burning and exposure to scavengers. These are major risk of these indiscriminate dumping of waste on human health and on the environment (Matthew, 1994). The air pollution that arises from the open burning, due to emission of greenhouse gases such as methane and carbon dioxide, the mission of greenhouse gases, flies and rat's infestation and nuisance effects are among the health and environmental impacts of poor solid waste management (Richard, 1995). The odour emanating due to the degradation of the waste in the dumpsite has health effects and decreases the social and economic value in our various cities. The world health organization has estimated that half of the diseases faced by Africans today are because of poor waste disposal and management (Kofoworola, 2007).

Solid waste management is a major problem faced in Aba metropolis; this problem has manifested due to the indiscriminate dumping of solid waste along major roads in Aba metropolis. There are number of major risk and impact of the dumpsite on health of the residents within the environment. Scattering of wastes by wind and scavenging by birds, animals and waste pickers creates nuisance within Aba metropolis and this causes blockage in the drainage system that in turn results to flooding and unsanitary condition. The poor management of solid waste also causes air pollution that bring about climate change and other environmental problem such as greenhouse effect that leads to global warming management (Anvanwu and Envinnia, 2013). In a quest to address the problem and provide possible solution to the problem of waste collection, disposal and management system in Aba metropolis brings about this research work "Solid Waste Disposal and Management.

A. Objective of Study

The objective of this project is to investigate and find out the different ways, methods and processes involved in the effective management of solid wastes in Aba metropolis. In addition, to help suggest the methods of controlling the effects of the hazard to human's life and his environment.

II. RESEARCH METHODOLOGY

The study is based on waste management and its disposal in Aba metropolis, which is between Aba north local government, Aba south local government and Osisioma Ngwa Local Government Areas.

The principal methods adopted in research are classified into two namely:

- a. Primary collection of data
- b. Secondary collection of data

The primary collections of data are,

- 1) Critical observation method
- 2) Questionnaire method
- 3) Interview

Observation Method

This method involves the physical presence of persons as researchers at the area of study to ensue or observe physical aspect of study. From personal observation will come to the researcher's interview with people, neighbours, friends, and colleagues.

Questionnaire Method

Questionnaires were mapped out and as well administered to the respondents in the field area of study using the multi-stage sample method in order to obtain some relevant information for the study

III. RESULTS AND DISCUSSION

Questionnaire and data obtained from Aba North, Aba South, and Osisioma Ngwa Local Government that make up the Aba metropolis were analysed. The problems encountered by Aba metropolis waste management workers of ASEPA (Abia State Environmental Protection Agency) in the management of waste in Aba south, Aba north and Osisioma local government areas during and after environmental sanitation exercises were also examined.

Data Presentation and Analysis

The observed and collected data are presented as follows

Types of diseases encountered

Table 1 shows the diseases that were encountered in the study area due to the presents of wastes that are discarded indiscriminately.

Table 1: Diseases found in study area

Types of Diseases	Percentage of People Affected
Dysentery	30
Cholera	28
Malaria	80
Chicken pox	5

From Table 1, it was observed that due to the presents of wastes that are discarded indiscriminately, 30 people from Aba South, Aba North and Osisioma local government area were affected by dysentery, 28 people were affected by cholera, 80 people were affected by malaria and 5 people were affected chicken pox. The information is in Figure1.

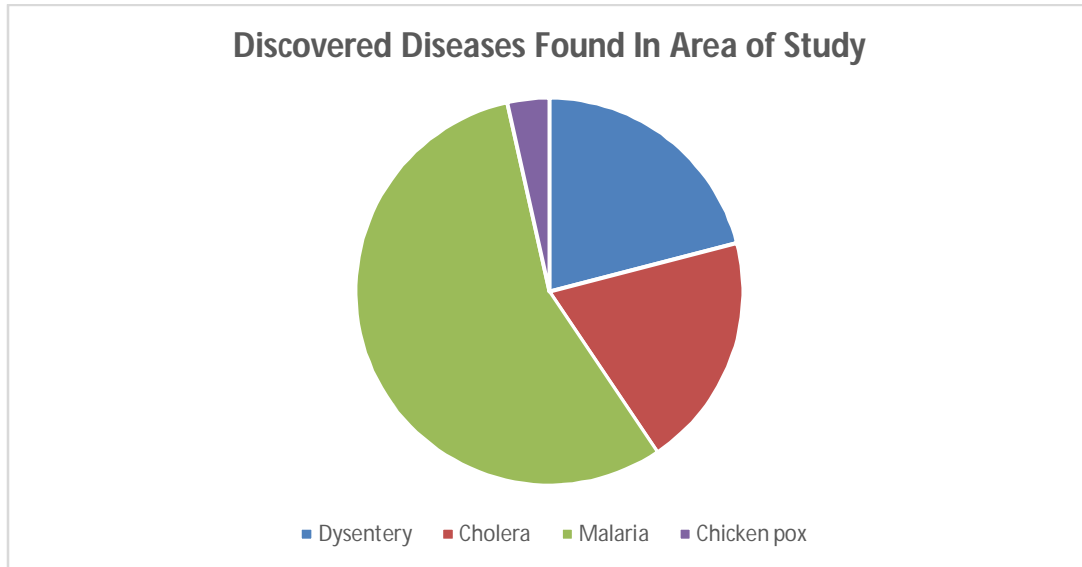


Fig.1: Diseases found in study area

Number of Waste Containers

The number of waste containers provided by the government of Abia State at the various assigned dumping sites of Aba North, Aba South and Osisioma environs presented in Table 2.

Table 2: Number of waste containers in the study area

Locations	No of Waste Containers
(1) Asa Road	
By market road	1
By Eli road	1
By Jubilee	1
By Hospital road	1
By St. Michael road	1
(2) Park Road	
By Millerton	1
(3) Port-Harcourt Road	

Ngwa road/cemetery junction	1
Ecu	1
Uratta	1
Crastal park junction	1
Coca-Cola	1
(4) Abayo	
Ngwa High School	1
MCC Junction	1
Umuiomo	1
Umugasi Market	2
(5) Faulks Road	
BTC	1
Ariaria market junction	1
(6) Ogbor Hill	
Dear John	1
Ukagbu road	1
NTA	1
Tbore Junction	1
Eziurwu Junction	1
Ofigwe Junction	1
Aba South	1
Aba North Local Govt. Area	1
Ngwa Road Market	2
OruAhabiam Market	2
Over-Raol Market	1
Total	31

The data presented in Table 2 shows that the government of Abia State provided waste containers at various assigned dumping sites in the area of study in order to ensure efficient and effective sanitation of the environment by environmental works and other authorities involved. The waste containers were distributed according to the details of such location.

Methods of Waste Reduction

Waste generation methods and ways of reduction are presented in Table 3.

Table 3: Suggested methods of waste reduction

Method of Reducing Waste	No of Times Per Month
Landfill	8
Recycling	3
Reuse	2
Composition	4
Incineration	5

Table 3 depicts how the generation of waste can be reduced. It shows that composition was recommended to be done 4 times per month to ensure rapid impartial decomposition of moist solid waste generated.

Storage Facilities/ Waste collection systems

The type of storage facilities/containers for solid waste is a component of solid waste management and disposal. It facilities easy collection before transporting it to designated depots/collection points. Waste collection systems used in Aba is presented in Table 4.

Table 4: Waste collection systems

Types	Frequency	Percentage (%)
Central Collection	80	30.2
House to House	25	7.20
Street Collection	50	22.5
Metal Container	10	47.8
Back door Pick up	10	2.5
Total	295	110.2

From the Table 4, metal container waste collection system has the highest percentage of 47.8%, house to house has 7.20%, back door pick up has 2.5%, central collection has 30.2% and street collection has 22.5%.

Evaluation of Solid Waste Generation Sources in Aba

After a close assessment of the generation source of waste produces in Aba metropolis at dumpsites and different waste collection points, the waste generation in Aba south, Aba North, and Osisioma Ngwa and their percentages (%) is presented in Table 5.

Table 5: Waste generation in Aba metropolis

Type of Waste Generated	Percentage (%)
Domestic	42.8
Agriculture	13.5
Commercial	20.7
Construction	19.5

From the Table 5, waste generated in Aba South, Aba north and Osisioma Ngwa area consist of domestic, agricultural, commercial and construction sources. The data also revealed that waste generated in the area is mainly constituted by the indiscriminate disposal by the inhabitants of the area. This can be corrected by providing waste bin containers at every strategic point in the area and the sanitization of inhabitants about the benefits of neat environment and proper disposal of waste in other to minimize health threats constituted by the improper disposal of waste. It can also be corrected by the provision of effective and efficient environmental service in the area.

Population a Major Factor in Solid Waste Generation

The population increase in Aba metropolis contributed to the generation and indiscriminate disposal of waste in the area. This was determined by the analysis of the questionnaires and interview sections conducted in the area. The results obtained were presented in a tabular form as shown in Table 6.

Table 6: Result of Questionnaires and Interviews Section Conducted

Respondent	Frequency	Percentage (%)
Yes	80	28.5
No	30	10.8
Total	110	39.3

From Table 6, the number of people that ticked "YES" that population is a major factor in solid waste generation was 28.5% as against 10.8% of those that ticked "NO" in the questionnaire distributed. Therefore, we can conclude from the analysed data presented in a tabular form above that population is a major factor in solid waste generation in Aba metropolis.

Evaluation of waste management by the inhabitants of Aba North, Aba South and Osisioma Ngwa area are presented in the tabular form as shown in Table 7.

Table 7: Waste Management Evaluation by the inhabitants of Aba North

Rating	Frequency	Percentage (%)
Very good	23	6.5
Good	25	9.38
Average	150	50.35
Poor	80	23.8
Total	278	90.03

From the analysed questionnaire presented in a tabular form above, waste management in Aba metropolis is average. This assessment calls for more improvement in the sanitation and waste management facilities already provided in the area.

Population Projection

Projection of the possible population of the habitants of aba will be done using arithmetic method and it is given as follows,

$$P_n = P_o (1 + i)^n \quad \text{Equation 1}$$

Where P_n = Projected population

P_o = base population

i = constant growth rate

n = number of year to projection

Years of project = (2023 – 2014) = 9

$$P_n = 534,265 (1 + 0.028)^9$$

$$534,265 (1.028)^9 = 534,265 (1.282)$$

$$P_n = 684,927.73$$

therefore population (2023) is 684,928

Projection for 2043 (20 years from now)

Future projection using Arithmetic method.

$$P_n = \frac{(t_n - t_2)(P_2 - P_1)}{(t_2 - t_1)} + P_2 \quad \text{Equation 2}$$

P_n = population at time (n)

t_n = time

t_2 = The of last census

t_1 = The time of last pematimate census

$P_2 =$ Population at last census

$P_1 =$ Population at pematimate census

Using Equation 2

$$P_n = \frac{(t_n - t_2)(P_2 - P_1)}{(t_2 - t_1)} + P_2$$

$$P_{2043} = \frac{(2043 - 2023)(684,928 - 534,265)}{(2023 - 2014)} + 684,928$$

$$P_{2043} = 1,019,734.67$$

So therefore population in the next 20 years is 1,019,735

From the population projection, it can be seen that there is a reasonable increment in the population of the people in Aba metropolis. This will in turn increase the waste generated in the area

IV. CONCLUSION AND RECOMMENDATIONS

A. Conclusion

Based on the results obtained from this research work, the following conclusions are made:

- a. The presence of indiscriminate disposal of solid waste can cause diseases such as dysentery, cholera, malaria, chicken pox, etc.
- b. The residents of Aba metropolis have little knowledge of solid waste management based on the level of sensitization.
- c. Central collection and street collection are the most used methods of waste collection in Aba metropolis. While other methods have been of low usage.
- d. Waste generated in Aba metropolis is more of domestic waste and commercial waste.
- e. The population increase of the people in Aba metropolis is high. Hence, more waste will be generated.

B. Recommendations

From the research work carried out on this project in Aba south, Aba North, Osisioma Ngwa in Aba metropolis, improper dumping of waste has become a problem in the area which constitute environmental nuisance to the people of such area, since recommendation can be made to provide solution to eliminate the rate of hazardous waste in our environment, so as to improve the health and of people living that area, this method of waste disposal discussed in our previous chapter can be effectively used when their application is preceded by environmental impact assessment.

- a. Rules and regulation should be made as to guide the inhabitant in that area on disposal of the waste.
- b. Government should encourage environmental sanitation on monthly basis to enhance cleanness in environment to promote healthiness to the inhabitants.
- c. Government should provide law enforcement agency that will help in the proper participation by the inhabitants living in the area.
- d. Lastly, waste container should be made available to guide the people area no method of disposal of waste.

References

- Anvanwu S.C. and Envinnia Chibundu (2013). Lecture note on Engineering Waste Management and Disposal, Federal Polytechnic Nekede.
- ChandrappaRarnesha, Brown. Jeff, (2012). Solid Waste Management Practice Springer science and business media copyright.
- George Tehobanoglous, Frank Kreith (2012). Handbook on Solid Waste Management, 2nd edition, MCG RAW-HILL Ne. York, Chicago. San Francisco.
- Kofoworola O. F (2007). Municipal Household Solid Waste Selection, Strategies in an African Mega City Analysis of Public Management Private Partnership Performance vol. 27 Issue 9-page 101-1272.
- Matthew Gandy (1994). Recycling and the Politics of Urban Waste Management, First Edition, Taylor and Francise, London.
- Richard Morgan (1995). Environmental Engineering New York. Springer Science and Business Media.