

Sustainable Solutions to the Effects of Solid Waste Management in Federal Polytechnic Nasarawa, Nigeria

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Abstract- *Recently, attempts are being made to make better the conventional solid waste management systems, especially used in developing countries, in order to cleanse the environment of the filths posed by these systems. The aim of this research work therefore is to highlight the present condition of solid waste management in Federal Polytechnic Nasarawa, Nigeria, establish the benefits of proper solid waste management system, and finally suggest modern waste management technologies. The approach here was basically from the analysis of interviews and photographic evidence gotten from several refuse dump sites around the polytechnic community. The lack of a proper waste management system has given chance for unhealthy lifestyles and series of discomfort to both the students and the polytechnic staff, thus a number of modern technologies focusing on Reduce, Reuse and Recycle approaches have been proffered to support and promote the current needs to adopt modern environmental policies in the polytechnic.*

Indexed Terms- *solid waste, waste management, dump sites, environmental policies*

I. INTRODUCTION

1.1 Background of Study

The reasons behind inefficient waste management practice in Nigeria have been fairly researched. For example, Agunwamba (1998) reported that there is a general lackadaisical attitude on the part of the government towards waste management. In addition, Adeyemi et al, (2001) observed that in Nigeria the management of municipal solid waste revolves mainly around open burning, open dumps, landfilling, reuse/recycling and waste conversion.

Arukwe (2012) added that the only management adopted widely throughout Nigeria involves disposal of waste on open dumps.

The solid waste management environmental organization performance has been a problem ignored in Federal Polytechnic Nasarawa. The factors responsible for not achieving social responsibilities by waste managements may be lack of awareness, lack of active agencies to enforce the laws guiding waste disposal, ineffective collection systems, etc. which could lead to waste accumulation, creating nuisance and odor problems, environmental pollution, fire hazards and generally threatening the physical well-being of the populace. In finding out problems encountered by the solid waste management in Federal Polytechnic Nasarawa, Nasarawa State.

1.2 Aim of the Study

The aim of the study is to explore the current waste management system in the Federal polytechnic Nasarawa and suggest a better alternative based on the current international standards.

1.3 Objectives of the Study

The following objectives have been formulated for the above aim to be achieved:

- i. To identify the sources and types of solid waste generated in Federal Polytechnic Nasarawa.
- ii. To examine the methods and procedures adopted in the collection of solid waste.
- iii. To examine the major problems or challenges associated with collection and disposition of solid waste in FPN.
- iv. To propose the conscious development of theoretical and practical skills needed to successfully manage the environment and waste content in Federal Polytechnic Nasarawa.

- v. To establish mechanisms for the promotion, commercialization and diffusion of locally developed technologies needed to dispose and manage waste in the FPN.

1.4 Research Questions

The following questions shall be answered in the course of this research.

1. What are the causes of improper waste disposal in the Federal Polytechnic Nasarawa?
2. What are the effects of improper waste disposal in the same environment (FPN)?
3. What is the present state of waste disposal in FPN?
4. How can the problem of improper waste disposal be solved or controlled in the FPN?
5. How can solid waste management be improved in the FPN.

1.5 Significance of Study

Environmental sanitation has been a nationwide programme that has gained an acceptance by all and sundry. The study aimed at contributing to the already existing body of knowledge about good sanitary environment and aesthetic value. This study will go a long way to expose the effectiveness and or inadequacies of Federal Polytechnic Nasarawa Waste Management Board responsibilities.

The study would equally serve as a guide to the staff of Federal polytechnic Nasarawa, health department, as well as the surrounding communities as a toll of further enlightenment to the public in order to enhance good health habit and its enforcement.

1.6 Scope and Limitations of the Study

Investigation and research would be conducted with department of waste management of the Federal polytechnic Nasarawa or Environmental Protection Agency of the Institution.

The area location of this study would be limited to Federal Polytechnic Nasarawa, Nasarawa State. Limitations encountered in the cause of the research work are the short timeline, and few data collection sources.

II. RESEARCH DESIGN AND METHODOLOGY

2.1 INTRODUCTION

In this research work, descriptive survey of research method would be used. This is because they are directed towards determining the nature of a situation as it exists at the time of study.

It was asserted that descriptive design method is often used in these types of research as it describes, interprets and is concerned with conditions or relationships.

2.2 Design of Study

Survey type of research design would be adopted for the purpose of this study due its relationships with the problems of solid waste management in Federal Polytechnic Nasarawa (FPN).

This design would be used to sample the opinion of the respondents on the subject matter.

2.3 Population of the Study

The population of interest to the research would be the staff of Federal Polytechnic Nasarawa waste management Board including the junior and senior staff, and other concerned persons within the polytechnic community (academic and non-academic staff, support staff, students, vendors.

2.4 Sample Size and Sampling Technique

A total number of one hundred (100) questionnaires were administered to gather information on primary source and Seventy (70) were returned. The proportion would represent the total population since it will not be possible to use the whole research population.

2.5 Methods of Data Collection

The method of data collection employed in this work to obtain primary data was mainly questionnaire administration and direct physical observation. The questionnaire form the basic method used by the researcher to collect data. It is a set of questions designed to obtain useful information from concerned individuals and management of FPN Waste Management Board.

The questionnaire would be administered using simple random techniques.

2.6 Method of Data Analysis

The data collected from the above source would be analysed with simple statistical techniques to bring out the desired results. The data will be presented through the use of table and substantial part of the data collected involves manipulation of figure which was presented in tabular form.

III. DATA PRESENTATION AND ANALYSIS

3.1 INTRODUCTION

This chapter deals with the analysis and interpretation of the data collected on the field.

These aim to process the data into information so that findings of the research could be established.

3.2 Characteristics of Respondents

3.2.1 Gender of Respondents

Table 4.1: Response from Gender

Gender	Frequency	Percentage (%)
Male	54	77
Female	16	23
Total	70	100

From the above Table and as represented in chart 1 below, 54 respondents representing 77% are male and 16 respondents representing 23% are female of the entire questionnaire retrieved.

3.2.2 Educational Qualification

Table 4.2: Qualifications of respondents

Qualification	Frequency	Percentage (%)
ND	6	8.6
HND	41	58.6
B.Sc.	16	22.9
M.Sc.	7	10
Total	70	100.0

The table above and as represented in chart1 below shows that majority of the respondents are literate which has aided us in collection of necessary information needed for the research work. 8%

representing 6 respondents are ND holder, 59% representing 41 respondents are HND holder, 23% representing 16 respondents are B.Sc. holder and 10% representing 7 respondents are M.Sc. holder respectively.

3.2.3 Occupation of respondent

Table 4.3: Respondent occupation

Occupation	Frequency	Percentage (%)
Public Worker	30	43
Student	20	29
Self employed	12	17
Unemployed	8	11
Total	70	100.0

The table above and as represented in chart 1 below, shows that majority of the respondents are public service workers as a total number of 30 respondents which represent 43% indicated. Those that are self-employed are 17% Of the respondent, 29% are students and 11% are unemployed.

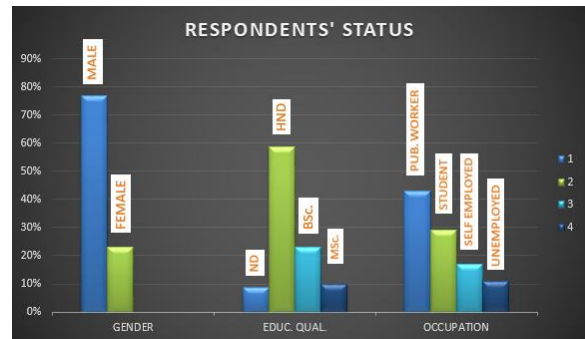


Figure 1: Respondent Status

3.3 Sources and Types of Solid Waste in FPN

3.3.1 Sources of Solid Waste

Table 4.4: Sources of Solid Waste

Items	frequency	Percentage (%)
Classes	25	36
Food Canteen	15	21
Computer Centers	20	29
Other Sources	10	14
Total	70	100

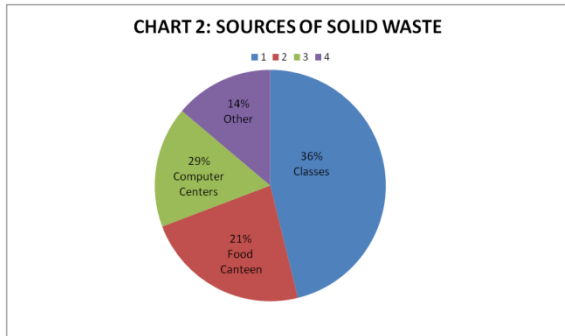


Figure 2: Sources of Solid Waste

The chart above shows that 36% of solid wastes in FPN is generated from classes and offices, 29% from computer centers, 21% from food canteens and 14% from other sources. This therefore means that the major solid waste generators are the office & classes.

3.3.2 Types of Solid waste

Table 4.5: Types of Solid Waste

Items	frequency	Percentage (%)
Paper and carton	30	43
Plastics	15	21
Food waste	11	16
Tins/Can	9	13
Others	5	7
Total	70	100

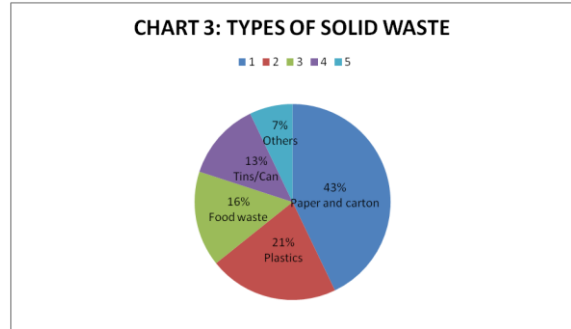


Figure 3: Types of Solid Waste

The above chart shows the major type of solid waste generated in Federal Polytechnic Nasarawa. In the polytechnic environment, papers and carton dominated by 43%, and the reason may be because it is a student environment. Plastic constitutes 21%, food wastes dominate 16%, tins/can 13% and other wastes around the Polytechnic environment takes 7%. This therefore shows that waste from stationery is the dominant waste type

3.4 Methods of Solid Waste Collection and Transportation in Federal Polytechnic Nasarawa

Table 4.6: Methods of Solid Waste Collection and Transportation in FPN

Respondents	Frequency	Percentage (%)
Waste Bins	24	34
Carton	11	16
Old bucket	5	7
Plastic Bag	4	6
Waste Van	17	24
Others	9	13
Total	70	100

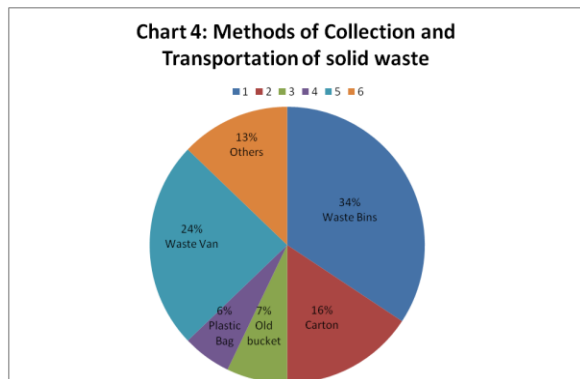


Figure4: Methods of Collection and Transportation of Solid Waste

The above chart indicates that, the majority of solid waste in federal polytechnic Nasarawa is collected in waste bins as it is the most common means of waste collection in the polytechnic environment. Most of the waste collected in the waste bin is later conveyed to the dump site using waste Van, while some are dumped directly in an open space.

3.4 Methods of Solid Waste Disposal in Federal Polytechnic Nasarawa

Table 4.7: Methods of Solid Waste Disposal in Federal Polytechnic Nasarawa

Respondents	Frequency	Percentage (%)
Dumped on an open space	21	30
Dumped at public waste depots	8	11
Dumped in a dug hole/pit in the dump site	18	26
Dumped on the streets	15	21
Dumped in an itinerant waste van	6	9
Others	2	3
Total	70	100

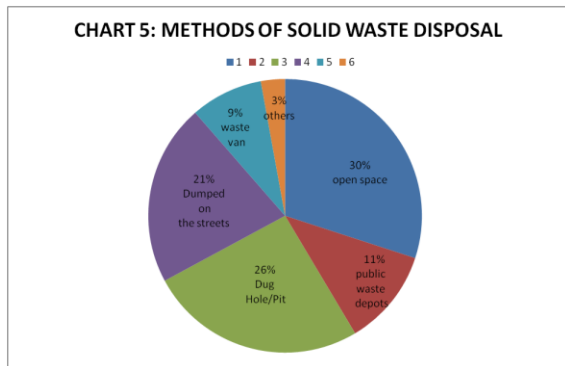


Figure 5: Methods of Solid Waste Disposal

The above chart indicates that, the majority of solid waste in federal polytechnic Nasarawa is dumped in an open space as it is most common means of disposing waste in the polytechnic environment. Most of the waste disposed in an open space may

remain there for a long time and will have impacted so much on the environment before being cleared.

IV. CONCLUSION AND RECOMMENDATION

4.1 CONCLUSIONS

The institution has done a bit fairly in terms of solid waste management, however a number of reasons has almost rendered this effort unappreciated:

- Lack of knowledge of the effects of poor waste habits.
- Little or no orientation on the importance of reduce, reuse and recycling approach.
- Laxity on the part of the authorities to punish environmental saboteurs.
- Absence of modern waste management technology in the institution.

The issue of waste management cannot be over emphasized, because waste production is now a daily routine. Waste management can be done in a hierarchical order which involves; reducing the amount of waste produced, reusing some or all the waste produced, recovering the waste (recycling, composting or converting waste to energy), and finally landfill.

4.2 RECOMMENDATIONS

There is the need to create awareness in the society on the relevance of proper waste management and its long term benefits. Therefore, the following recommendations have been put down;

1. Encourage relevant stakeholders to teach students and staff the meaning and importance of proper waste disposal attitudes.
2. Enlighten the community on the effects of their waste disposal attitudes on the environment and their health.
3. The government should develop appropriate and effective waste management systems that would be a standard for individuals and the private sector to follow.
4. Encourage science and technology interventions that promote environmentally sustainable development.
5. Encourage the integration of environmental factors with standard national accounts/asset to

- improve environmental monitoring systems.
6. Build the critical mass of highly skilled manpower to transfer technology.
 7. Establish Technology Transfer Offices in the Institution.
 8. Conduct periodic monitoring and evaluation and establish a feedback mechanism for environmental standard maintenance.
 9. Adopt the concept of the solid waste management hierarchy also known as the 3Rs: Reduce, Reuse and Recycle, which offers viable solutions to the sustainable management of the wastes and at the same time meets goals towards achieving almost zero waste discharges.

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APPENDIX

Appendix 1-6: Photos of various dumpsites within the polytechnic community



Makama-Dogo Boys Hostel Dump site FPN (Photo by Kolawole Olawole-2022)



Makama-Dogo Girls Hostel Dump site FPN (photo by Christopher John 2022)



Poly Staff School Dump site FPN (Photo by NuhuEnesiAbdulsamad 2022)



School of Engineering Dump site FPN (photo by Umar Yahaya 2022)



School Clinic Dump Site FPN (Photo by YakubuAyaka 2022)



School of Environmental Dump site FPN (photo by Samuel Emeotu 2022)