

ALLEVIATION OF HEALTH PROBLEMS ASSOCIATED CHEMICAL WASTE MATERIALS IN DUMP SITES OF ACADEMIC INSTITUTIONS: A CASE STUDY OF FCE-ZARIA.

Saeed Gbolahan Adewusi

Department of Chemistry
Federal College of Education, Zaria, Kaduna State.
E-mail: saeedadewusi@yahoo.co.uk

ABSTRACT

The study on the impact of chemical waste materials from dump sites of Federal College of Education (F.C.E) Zaria is an investigative study. The study samples abound in the geographical areas of F.C.E Zaria. They include the six dump sites, the characterization of their compositions form the thrust of this work. The data gathered were centrally inferential and were from primary sources. Close survey of the areas were carried out in other to observe and measure the nature and types of waste generated in each dump site. The use of inferential statistical techniques was used in the course of analyzing the data. Dump site B is the largest and poses serious health hazards to the School of Education and School of languages i.e. both staff and students of these schools are more prone to diseases like cholera, malaria, lungs cancer e.t.c. The study finally concluded by recommending among several others, the immediate removal of dump site B and immediate mitigating measures to forestall any emergency of possible health problems.

Keywords: Chemical Waste Materials, Dump-Sites, Health Problems, Academic Environment

INTRODUCTION

Improper disposal and management of waste materials in general cause all types of pollution: air, soil and water. There is an extensive but incomplete body of scientific knowledge on the impacts of chemical and waste on human and the environmental, with particular information and gaps on the used, emission, exposure pathways. Chemicals play an important role in human life, economic development and prosperity, yet they can also have adverse impacts on the environment and human health. A recent study by the World Health Organization (WHO) (Priiss-Ustiin et al, 2011) indicated that 49 million deaths were attributable to environmental exposure to chemicals in 20-4. In many regions hazardous waste streams are mixed with municipal or solid waste and then either dumped or burned in the open air (UN-Habitat, 2010). The fourth global environment outlook (2007) indicated that it was important to evaluate the magnitude of chemical contamination and its impacts on the environment and human health. The UN secretary-General, (2011) reported on policy options for waste management to commission on sustainable development, stated that: "The barriers to effective management and minimization include lack of data, information and knowledge on waste scenarios". And the UN-Habitat report on waste management on cities stated that "waste reduction is desirable but typically, it is not monitored anywhere" (UN-habitat, 2010). Global chemical pollution is a serious threat to sustainable development and livelihoods. The problem has impacts on both humanity and ecosystems, and includes adverse effects from long-term

Saeed Gbolahan Adewusi

exposure to low or sub-lethal concentrations of single chemicals or to mixtures of chemicals currently, more than 90% of water and fish samples from aquatic environments are contaminated by pesticides. Estimates indicate that about 3% of exposed agricultural workers suffer from an episode of acute pesticide-poisoning every year, Thunuyi et al (2008). The environment includes the sound management of electronic and electrical waste (e-waste), endocrine disrupting chemicals, plastics in the environment, open burning, and manufacture and use of nonmaterial. E-waste has become one of the major environmental challenges of the 21st century: it is the fastest-growing waste stream in the world, estimated at 20-50 millions tones per year, Schwarzer et al (2005). Waste that is not properly managed, especially extra and other liquid and solid waste from households and the community, are a serious health hazard and lead to the spread of infectious disease. Normally it is the wet waste that decomposes and releases a bad odour. This leads to unhygienic conditions and thereby giving rise to health problems. Uncollected solid waste also increases risk of injury, and infection. In particular, organic domestic waste poses a serious threat, since they ferment; creating conditions favorable to the survival and growth of microbial pathogens. Direct handling of solid waste can result in various types of infections and chronic diseases with the waste workers and the rag pickers being the most vulnerable. Federal College Education is known to be one of the biggest colleges in the country this is enough to show how large the number of the staff and students. This gives anyone a fair idea of the consumption rate, one is left to imagine the amount of waste the population produces daily. While most of the liquid wastes are channeled through gutter and drainages down to rivers and other bodies, there are no generally known means of either managing the proper disposal or recycling of solid waste.

OBJECTIVES OF THE STUDY

- i. To provide platform for monitoring of chemical waste materials in dump sites of academic institutions.
- ii. To provide possible solution of these effects, so that the effect will be remediated.
- iii. To validate the degree of various types of chemical wastes and other types of waste in our environment.

STATEMENT OF THE PROBLEM

This has come into consideration of mine by the time we are receiving lectures in one of our classes, and at the same time solid waste are being burnt at one of the dump sites, that is located very close to the class. That results in the inconvenience of the lectures that we are receiving.

SIGNIFICANCE OF THE STUDY

This research will educate the people on the possible harmful impact of chemical waste on the people around the environment, thus reducing the effect of this chemical waste through sensitization of the people on the environment and their knowledge about the chemical waste.

SCOPE OF THE STUDY

The scope of this study is restricted only on the geographical area of Federal College Education Zaria and in terms of the samples it will only be the type that comes from chemical waste from our dump-sites.

RESEARCH QUESTION

The purpose of this study is to identify the possible effects caused by chemical waste materials which are disposed off in the dump sites of Federal College Education Zaria based on this, the following research question were asked:

1. Are there any side effects attached to the chemical wastes in the dumpsites of Federal College Education, Zaria?
2. If there are those effects restricted to human and other animals or on plants or both two?
3. To what extent are these effects dangerous to the living beings of the area?
4. What are the possible remedies and solution to such effect?

Research Hypothesis

Based on the above mentioned research problems the following hypotheses are set up:

1. The chemical waste materials from dumpsite of F.C.E Zaria have no significant effect on the environment.
2. There is no health problem attached to the chemical waste from dump sites of F.C.E Zaria

The above hypotheses are going to be tested in the course of this research work.

RESEARCH METHODOLOGY

Sampling and Sampling Technique

The samples used for this study were reached in the six dump sites in our environment, Federal College of Education, Zaria. The various sample include chemical waste materials like plastics, paper materials, pure water nylon etc., biological include materials were also considered which include: plants materials, soil, animal materials etc. A random sample method was used to estimate the quality of each of the samples mentioned above in each of the six dump sites.

Instrumentation

The use of wind-vane was employed to ascertain the direction of wind (smoke) emanating from the burning of the dump-site. The use of meter-rule was equally employed to record the length and breadth and finally the area occupied by each of the six-dump sites.

Study Population

The population of the study includes:

The dump site 'A' located adjacent to the college central mosque.

Dump site 'B': Located between the blocks of schools of education and languages respectively.

Dump site 'C': located behind the school of arts and social science.

Saeed Gbolahan Adewusi

Dump site 'D': located behind the college consultancy unit and close to the main gate.

Dump site 'E': Located in front of the senior staff quarters inside the college

Dump site 'F': Located behind the female students hostel, and not far from the junior staff quarters of the college.

Type of Data

The data needed for this study is centrally inferential and were gathered from the primary sources, i.e the six dump sites in federal college of education Zaria. A close survey of the area was carried out in order to observe and measure the nature and type of waste generated in each of the dump site.

Data Analysis

Descriptive as well as inferential statistical techniques will be employed in the course of analyzing of the data to be gathered.

RESULTS AND DISCUSSIONS

Measurements of Dump Sites

A summary of the measurement of the six dump site are given in the table 4.1.1 below.

Table 1.0: Measurements of the Six Dump Sites

Dimensions	DS/A	DS/B	DS/C	DS/D	DS/E	DS/F
Lengths (m)	5.22	9.00	3.70	21.20	5.20	5.20
Breadth (m)	2.40	8.53	3.70	3.10	4.20	4.20
Area (m ²)	12.538	76.770	13.690	65.720	21.840	21.840

From the above table if we look of the column that talks about the area, we see that dump site "B" is the largest followed by dump site "D", then dump site "E" and "F" that has the same dimensions, then followed by dump site "C" and the smallest is dump site "A". and all these dump site are permanent non of them are mobile. Dump site "A" has the length 5.22m and breadth 2.40m that gives it the total area of 12.528 smallest. It is located at adjacent to the college central mosque. Dump site "B" has the length 9.00m and breadth of 8.53m that gives it the total area of 76.770m² the largest. It is located between blocks of education and languages respectively. Dump site "C" has the length of 3.70m and breadth of 3.70m that gives it the total area of 13.690m² second to the last in size. It is located at behind the school of arts and social science. Dump site "E" and "F" has the length of 5.20m and breadth of 4.20m which gives them total area of 21.840m². The medium in size, they have the same size because of the nature of which they are constructed. E is located at the front of senior staff quarters inside the college. While F is located at behind the female student hostel and not far away from the junior staff quarters of the college.

Composition of Waste Material in all the Dump Site

A summary of the composition of waste at all the six dump site are given in table 4.2.1 below. In the table the following abbreviation were considered; Pure

waste nylon as PWN, plastic waste material as PWM, paper waste material as PW, glass waste material as GWM, iron waste material as IWN, wood waste material as WWN, human soil as HS and finally plant material waste as PMW. (All measurement are made per square meter (m²)).

Table 2.0: Composition of Waste Materials in all the Dump Site.

Dump site	PWN	PWM	PW	GWM	IWN	WWN	HS	PMW
A	2	2	1	1	1	1	2	1
B	12	13	10	6	8	11	13	3
C	1	1	3	1	2	1	2	1
D	8	12	10	4	2	6	13	10
E	5	3	2	1	4	1	3	2
F	3	2	4	3	2	2	1	4

As we can see it we take dump site "A" the composition of chemical to organic waste material from the above table is 6:5 if we classified PWN, PWM, GWM and IWN as chemical waste and PW, WWN, HS and PMW as organic waste. Dump site "B" here in this dumpsite the composition will be 39:37 if we take the same classification as that of dumpsite "A". Dumpsite "C" in this the composition will be 5:7 this shows how great the amount of organic waste meter are here then the chemical waste. Dumpsite "D" the composition will be 26:39 that shows the quality of organic waste material are much more than that of chemical and maybe it is because of bush area of the place.

Dumpsite "E" when we look at this dumpsite the composition will be 13:7, here the chemical waste the nature f the place that the dumpsite was located close to the senior staff quarters. Dumpsite "F" the composition of chemical to organic waste material here is 10:9 this shows more great difference between the classified waste materials.

Percentage Composition of Waste Materials

A summary of the percentage composition of waste materials is given in table 4.3.1 below.

Table 3.0: Percentage Composition of Waste Materials in all Dump Sites.

D/S	PWN%	PWM%	PW%	GWM%	IWN%	WWN%	HS%	PMW%
A	6.45	6.06	3.33	6.25	5.26	4.54	5.88	4.76
B	38.71	39.39	33.33	37.50	42.10	50.00	38.23	14.28
C	3.22	3.03	10.00	6.25	10.52	4.54	5.88	4.76
D	25.18	36.36	33.33	25.00	10.52	27.27	38.23	47.61
E	16.12	9.09	6.66	6.25	21.05	4.54	8.82	9.52
F	6.67	6.06	13.33	18.75	10.52	9.09	2.94	19.04

From the above table as we can see dump site "A" has the percentage of 6.45 of PWN, dump site "B" has 38.71 as the greats percentage, dump site "C" has of 3.22 as the smallest percentage. Dump site "D" has of 25.81 as the second largest, dump site "E" has of 16.12 as the third to the largest while dump site "F" 9.67 third of the smallest percentage. And if we look at PWN dump site "A" has the percentage of 6.06, dump site "B" 39.39 as the greatest percentage, dump site "C" 3.03 as the least, dump site "D" 36.36 as the second largest

Saeed Gbolahan Adewusi

percentage, dump site "E" 9.09 percent while dump site "F" 6.06 percent as the second least percent. And PW, dump site "A" has the percentage of 3.33 as the smallest, dump site "B" 33.33 as the largest, dump site "C" 10.00, dump site "D" 33.33, dump site "E" 6.66 while dump site "F" 13.33 percent. GWM if we can see here dump site "A" has 6.25 as the least percent, dump site "B" has 37.50 has the highest, dump site "C" has 6.25 that is the same as that of "A", dump site "D" has 25.00 second highest, dump site "E" 6.25 while dump site "F" 18.75 as the third highest in percentage. IWN when we look at this dump site "A" has 5.26 as the last percent of all, dump site "B" 42.10 as the great in percentage while dump site "C", "D" and "F" has the percentage of 10.25 as the third highest and dump site "E" has the percentage of 21.05 as the second highest. WWM if we look here we can see that dump site "A", "C" and "E" has the same percentage as 4.54 and it is the smallest, dump site "B" 50.00 percentage and it is the greatest of all the percentage in the table while dump site "D" has the percentage of 2.7.27 second to the highest and dump site "F" has the percent of 9.09 as the third highest. HS here dump site "A" and "C" has 5.88, dump site "B" and "D" has 38.23 respectively, dump site "E" has 8.82 while dump site "F" 2.94 as the lest percentage. Finally, PWN, dump site "A" and "C" has the percentage of 4.76 as the least, dump site "B" 14.28, dump site "D" 47.61 as the highest, dump site "E" 9.32 while dump site "F" 19.04.

Distance of Dumpsite from Close Building

A summary of the distance of the dumpsites from adjacent/close buildings are given in table 4.0.

Table 4.0: Distance of Dump Site from Adjacent Building

Direction	DS/A	DS/B	DS/ C	DS/D	DS/E	DS/F
North	60.35	Large distance	4.65	19.73	2.0	9.45
South	32.10	1.10	2.52	Large distance	1.2	11.40
East	4.00	1.00	21. 35	31.20	Large distance	20.50
West	1.50	1.14	9.85	13.3	Largest	6.82

Dumpsite "A" from the direction in this dumpsite at north is the central mosque which is too far to it that means people here will not effect much from the flow of the smoke when it was burn like wise to south their will be no much effect to the east they will suffer much even due it is fence but the people behind it will have the effect and to west which is toilet their will be great effect that can even present the use of the place if it was seen burn. Dumpsite "B" if we take a look at this dumpsite in all direction the effect will be the same since in both direction the distance is not in more consideration that wants they will be the same amount of effect in all direction even due to the north is fence both people behind it will suffer the effect. Dumpsite "C" likewise in this dumpsite the distance in all direction is not in more consideration to the dumpsite that means effect will be all over the place. Dumpsite "D" here in this

dumpsite we can see that distance to is not that per so the effect to the people around it will be equal in all direction only those in spotting direction will not experience much effect since it per to the sport. Dumpsite "E" in this one too the distance is not that great consideration but to the east and west there will be no much effect but those in the north and south direction will feel the effect since it is closed to the sport. Dumpsite "F" in this one all in the direction will suffer the same effect most especially those in the west direction and those in the north direction when the site is on fire.

CONCLUSION

Based on the data collected and analysis of results, Dumpsite B is the largest dumpsite and closest to school building. It also has the highest composition of the different types of waste materials. People who are living or staying around dumpsite B area are more prone to dangers than all other people. This is because the area has the largest dumpsite which is most close to living areas. Due to the fact that it contains high composition of different types of waste, there will be release of high amounts of poisonous gases and bad odour; and also the environment will look somewhat filthy. As a result of this, people living in this area are more prone to diseases like cholera, malaria, typhoid, lung cancer etc. People living in area around dumpsite A are also faced with the same problem, even though the dumpsite is the smallest but due to its closeness to living area, it will have same effect.

RECOMMENDATIONS

Based on this research work conducted, and data collected and analysed, I am here by recommending that:

- In setting any settlement, there should be a provision for refuse dump site.
- The dump site should be far away from living area and preferable away from human settlement.
- State government or local authority of the area (F.C.E management) should provide a proper waste disposal method.
- People should be enlightened on the dangers of indiscriminate refuse disposal.
- Dumpsites A and B should be moved to other areas far away from school buildings.
- The F.C.E management should employ experts on refuse management who will be taking care of the college refuses.

REFERENCES

- Dermbach, H.K.D (1987) Purification for Landfill Gas Utilization in Cogeneration Modules Resource Conserve 14:273-82
- Hammer G.Z (1986): Aerobic Thermophilic Hyginisation-a Supplement to Anaerobic Mesophilic Waste Sludge Digestion. Chem. Eng Res Des B64:417-24.
- IAEA (2009a). classification of Radioactive Waste General Safety Guide. Series No. GSG-1. International Atomic Energy Agency, Vienna.
- IAEA (2008b). Estimation of Global Inventories of Radioactive Waste and Other Radioactive Material. TECDOC-1591. International Atomic Energy Agency, Vienna. IPCC International Panel on Chemical Pollution, Zurich..
- Jarup L. and Akesson, A. (2009). Current Status of Cadmium as an Environmental Health

**Alleviation of Health Problems Associated Chemical Waste Materials
in Dump Sites of Academic Institutions: A Case Study of FCE-Zaria.**

Saeed Gbolahan Adewusi

- Problem Toxicology and Applied Pharmacology 238, 201-208.
- Kinman (RN), Nutini (DL), Walsh (JJ), Vogt (W.G), Stamm J, Rickabaugh J. Gas (1987) Enhancement Techniques in Landfill Simulators. Waste Res 13-25
- US Environmental Protection Agency Royal Commission on Environmental Pollution (1984). 10th Report Tackling Pollution-Experience and Prospects London: HMSO
- Speight, J.G. (1996), Environmental Technology Handbook: Applied Energy Technology Series. Taylor and Francis. 302pp
- Taras. J.M (1998) Aspects of Environmental Impact Assessment of Solid Waste Disposal Site in Ibadan. M.P.H. Dissertation, University of Ibadan. 59-63.
- USEPA (1992). Community Water and Wastewater Treatment. Office of Research and Development Washington, D.C. USEPA, 5-38.
- Waite, R. (1995) Households Waste Recycling. EARTHSCAN Publications Limited, London. 174. Method and National Regulatory Standard in Nigeria.
- <http://edugreen.teri.res.in/explore/slowaste/health.htm>
- <http://www.epa.gov/epawaste/nonhax.htm>

Reference to this paper should be made as follows: Saeed Gbolahan Adewusi. (2015), Alleviation of Health Problems Associated Chemical Waste Materials in Dump Sites of Academic Institutions: A Case Study of FCE-Zaria. *J. of Environmental Sciences and Resource Management*, Vol. 7, No. 2, Pp. 107 – 114.
