

Research Article

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Perceived Health Implications of Waste Disposal Practices Among Residents in Imo State, Nigeria

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Abstract

Background: Inappropriate waste management practice produces negative effects on health, and the environment; causing environmental pollution as well as spread of diseases. The aim of the study was to assess solid waste management practices among residents in Imo State, Nigeria.

Material and Methods: Cross sectional research design was used for the study. Multistage sampling technique was adopted for the study across the communities and households in the LGAs in Imo State Nigeria. A total of 1600 residents/households were selected for the study. Instrument used for data collection in this study was an adapted questionnaire titled Household Solid Waste Management Survey Questionnaire (HSWMSQ). Reliability of the instrument was established through test-retest method using Cronbach's Alpha which yielded co-efficient of 0.749. The data collected were analyzed using frequencies, percentages, mean, Standard Deviation and Chi-Square Statistics.

Results: Findings showed that majority (67.2%) of the respondents claimed that burning is the most frequently used method in disposing paper/cardboard. Malaria and cough were the two diseases mostly perceived as health implications of household disposal practices used by the majority of the respondents. Age group, community, occupation, educational level and marital status were significantly associated with the respondents' perceived negative effect of environmental pollution on the families.

Conclusion: There is need to enhance the teaching of the appropriate skills required for proper disposal of household waste. Healthcare providers should increase educational activities on proper household waste practices and management related issues to minimize both environmental and health impacts of household waste practices among the population.

Keywords: household wastes; patterns of waste management; perceived health implications

Introduction

Solid waste management includes all activities and actions; collection, transportation, processing or recycling required to manage waste from its inception to the final disposal, in an effort to reduce their adverse effect on human health [1]. The primary goal of solid waste management is reducing and eliminating adverse impacts of waste materials produced by human activities on health and environment to support economic development and superior quality of life [2]. Solid waste management is imperative because improperly stored refuse or garbage can cause serious health problems [3], as well as safety and economic problems [4]. For all solid waste management issues, community members and families should be engaged in solid waste disposal. This is because waste disposal has remained a public health concern [9]. Also, it is something that each and every household and business owners in this world need to prevent damaging the Earth's ecosystems and maintaining a high quality of life for the planet's inhabitants [4]. Improper waste disposal by one

individual affects the entire citizenry, so, as a policy, countries have tasked every individual, establishments or institutions to contribute significantly to the process of keeping their communities and environment clean [5].

Various methods of waste disposal exist which include open dumpsite, landfills, incineration, open burning, recycling of waste [6]. However, the common methods usually adopted, especially by people in developing countries are open dumpsite method and open burning [7]. Studies have shown that wastes are littered on streets, gutters, undeveloped plots or dumped into rivers and streams (8). Each method has its own disadvantages and advantages. The disposal of wastes by landfills involves the mass dumping of wastes into a designated area. Sanitary land filling is the process of dumping municipal solid wastes in a scientifically designed area spreading waste in thin layers, compacting to the smallest practicable volume and covering with soil on daily basis [9] without creating nuisances or hazards to public health or safety such as the problems of insects and the contamination of ground water [7]. Unscientific and

ordinary land filling usually results in contamination of ground water, large amounts of odor and release of methane that cause air pollution which can adversely affects the environment and can proof fatal to the lives of humans and animals [10].

On the other hand, incineration is a type of disposal method that involves the burning of household solid wastes at high temperature so as to convert them into residue and gaseous products [11]. The biggest advantage of this method is that it can reduce the volume of solid wastes and decrease the amount of space they take up, thereby, reducing the stress on landfills [6]. The problem with this method is air pollution as the materials are being released pollutants into the air [12]. There are potential risks to the environment and human health from improper handling of solid wastes. The ever-increasing consumption of resources results in huge amounts of solid waste from industrial and domestic activities, pose significant threats to human health [8]. Consequently, people have resorted to improper disposal of these wastes being generated. Improper solid waste disposal and management causes all types of pollution such as air, soil and water [13]. There by, contributing to onset of diseases, such as, respiratory diseases, irritation of the skin, eyes and nose, gastrointestinal problems, psychological disorders and allergies [10]. The most prevalent diseases in the study area which were associated with poor environmental sanitation include measles, diarrhea, malaria and typhoid fever [14].

Therefore, unsustainable waste has negatively impacted the environment through its contribution to worsening public health [15]. Longevity cannot be promoted if humans continue to increase emissions from waste disposal. Once waste affects the environment, it can cause potential threats to human health and spread diseases [16]. Through environmental contamination, one can develop diseases such as asthma, birth defects, cancer, cardiovascular disease, and more [15]. It is against this background that the researcher deemed it necessary to empirically assess solid waste management practices and their health implications among residents in Imo State, Nigeria.

Research Questions

What are the patterns of solid waste disposal practices among residents of Imo State Nigeria?

What are the perceived health implications of solid waste disposal practices among residents in Imo State, Nigeria?

Hypothesis: There is no significant association between of age group community, occupation, educational level and marital status with practice of sorting of household waste among residents in Imo State, Nigeria.

Materials and Methods

Study Design: Cross-sectional research design was used for the study.

Area of Study: This study was carried out in Imo State, South-Eastern Nigeria.

Population of Study: The study population included household heads or residents above 18years

Sample and Sampling Technique

Multi-stage sampling technique was used to select households for the study. In the first stage, simple random sampling method was used to select five LGA for the study. This technique allowed all the LGA equal chance to be selected. In the second stage, simple random sampling was used to select 5 towns/communities from each of the selected LGAs. A total of 25 communities were therefore used for the study. This technique also ensured that equal chances of being selected occurred within the communities/towns that make up the LGA. In the third stage, systematic sampling technique was used to select household for the study. To get the sampling interval or the space between each selected household, the total number of households was divided by the sample size. The sampling interval was then used to select subsequent households. In each of the selected communities, 64 households were selected for the study. So, the total numbers of households for the 25 communities were 1600 ($25 \times 64 = 1600$). Convenience sampling was then used to reach the household heads that met the criteria for the study which was 1600 that constituted the sample size.

Instrument

Instrument used for data collection in the study was a questionnaire titled Household Solid Waste Management Survey Questionnaire (HSWMSQ) adapted by the researchers from Vitharana (1998) Household Questionnaire on the importance of Solid Waste Management for Sustainable Development. HSWMSQ comprised five sections (A-E), with a total of 43 items (appendix 1). Section A of the HSWMSQ elicited information on demographic characteristics of the respondents (e.g., age, occupation/employment status etc.). This section is made up of 6 items. Section

B consisted of 8 items formulated to elicit information on types of households generated wastes (e.g. plastics, glass, paper etc.) Section C consisted of 14 items which elicited information on patterns adopted by households in disposing their wastes (e.g. burning of household waste, burying of household waste, dumping of household waste in river or on the road, recycling of household waste etc.) and sorting of household waste. Section D has 11 items which sought information on factors influencing the pattern of waste disposal among the respondents. These factors include lack of access road, proximity of dump site, amount of waste generated, willingness to participate etc. Section E contains 4 items formed to seek information on the health implications (e.g. infections like malaria, dysentery, diarrhea etc.) of poor household solid waste disposal practices. Reliability test for the instrument was 160 copies of the HSWMSQ which constituted 10% of the sample size were administered to households in five communities in Orlu LGA which did not constitute part of the sample of the study, but had similar characteristic/set up as the area of study. Test-retest method was used to measure the reliability of the instrument. The co-efficient obtained was 0.749.

Data collection

The researchers obtained ethical approval from the Health Research Ethics Committee, College of Medicine, Imo State University Owerri and obtained approval for the study. Two research assistants were recruited for in each of the 25 communities used for the study by the researcher, and they were instructed on how to assist in administration, and retrieval of the questionnaire. Thus, a total of 50 research assistants were used for the study. The research assistants were public health nurses working at the various health centers of the communities. This category of healthcare workers was used because they are familiar with the communities and the community members

recognize them as healthcare workers. To reduce bias of household selection, the visits started from the first household. To do this, numbers were assigned to the households. This ensured orderly visits to the households.

Available household heads were allowed to participate. Thus, the selection of the household heads was based on their accessibility and proximity to the researchers. Within the households, household heads or an adult above 18 years in the absence of head of household that met the inclusion criteria were interviewed based on their willingness to participate. The respondents were briefed on the purpose of the study and items in the instrument explained to them prior to the administration of the instruments. The interview was conducted on one-to-one basis.

Houses where the researchers were not met at the time of the visits were revisited later. The researchers used eight weeks for collection of data. The completed copies of the questionnaire were retrieved on the spot. A total of 1586 copies of the questionnaire were returned. The return rate was 99.125% ($1586/1600 \times 100/1\%$).

Data Analysis

Data collected were coded for statistical analysis. Descriptive statistics of frequencies, percentages, means and standard deviation were used to analyze the demographic data and answer the research questions (e.g., patterns of household solid waste practices, types of solid wastes generated in households). Chi Square was used in determining the association between age group community, occupation, educational level and marital status with practice of sorting of household waste among participants. Hypotheses were tested at 0.05 level of significance. Statistical Package for Social Science (SPSS) software, version 18.0 was used in the analysis.

Results

Socio Demographic and household characteristics of the Respondents.

Variable	Frequency	Percent	Mean/SD
Age	1586	100	34.8089/13.382
Community			
Ehime Mbano	309	23.3	-
Mbaise	259	16.3	-
Ideato	302	19.0	-
Orlu	363	22.9	-
Ngor Okpala	293	18.3	-
Total	1586	100	-

Occupation			
Cleaner/attendant	47	3.0	-
Artisan	174	11.0	-
Famer	83	5.3	-
Civil servant	194	12.3	-
Clergyman	3	0.2	-
House wife	19	1.2	-
Banker	30	1.9	-
Businessmen/ Entrepreneur	407	25.8	-
Professionals	78	4.9	-
Senior citizen	14	0.9	-
Students	514	32.6	-
Driver	13	0.8	-
Total	1586	100	-
Education			
No Formal Education	46	2.9	-
Primary	140	8.9	-
Secondary	519	33.2	-
Tertiary	860	55.0	-
Total	1586	100	-
Marital Status			
Single	641	40.5	-
Married	784	49.5	-
Divorced	62	3.9	-
Widowed	97	6.1	-
Total	1586	100	-

Table 1 shows that the mean age of the respondents was 34.8089 with Standard Deviation of 13.38276. The largest number of respondents from the communities were from Orlu LGA with 363(22.9%) while the least were from the communities in Mbaise LGA with 259(16.3%). 47(3.0%) respondents were Cleaners/Attendants, 174(11%) were Artisan, 83(5.3%) were Farmers, 194(12.3%) were Civil Servants, 3(0.2%) were Clergy men, 19(1.2%) were Housewives, 30(1.9%) were Bankers, 407(25.8%) were Businessmen/ Entrepreneurs 78(4.9%) were

Professionals, 14(0.9%) were Senior Citizens, 514(32.6%) were Students and 13(0.8%) were Drivers. 46(2.9%) respondents had no formal education, 140(8.9%) respondents had primary education, 519(33.2%) respondents had secondary education and 860(55.0%) respondents had tertiary education. 641(40.5%) respondents were single, 784(49.5%) respondents were married, 62(3.9%) respondents were divorced and 97(6.1%) respondents were widowed.

To assess the patterns of solid waste disposal practices among residents in Imo State, Nigeria

Table 2: Most Frequently Used Methods to Disposing Domestic Waste.

Item	Burn	Bury	Gully	Water drainage	Bush	Dump site	Garbage truck	Reuse	Compost	Others
	n (%)	n (%)	n (%)	n (%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
Food wastes	154(10.2)	117(7.7)	26(1.7)	88(5.8)	173(11.4)	427(28.2)	211(13.9)	26(1.7)	290(19.2)	1(0.1)
Plant trimming	351(23.8)	152(10.3)	16(1.1)	27(1.8)	220(14.9)	319(21.6)	73(4.7)	3(0.2)	315(21.3)	1(0.1)
Paper/cardboard	1001(67.2)	43(2.9)	15(1.0)	15(1.0)	62(4.2)	257(17.2)	75(5.0)	14(0.9)	7(0.5)	1(0.1)
Plastics	727(48.9)	99(6.7)	13(0.9)	10(0.7)	90(6.0)	312(21.0)	89(6)	137(9.2)	10(0.7)	1(0.1)
Metals	81(5.6)	198(13.6)	42(2.9)	20(1.4)	219(15.1)	406(28.0)	210(14.5)	165(11.4)	9(0.6)	101(7.0)
Glass	49(3.4)	267(18.5)	55(3.8)	19(1.3)	204(14.1)	435(30.1)	343(23.7)	67(4.6)	5(0.3)	1(0.1)

Results from table 2 showed various domestic wastes and the methods used in most frequently in disposing them. For disposing food wastes, 154(10.2%) did

burning, 117(7.7%) bury, 26(1.7%) dispose in the gully, 88(5.8%) use water drainage, 173(11.4%) dispose in the bush, 427(28.2%) use the dump site,

211(13.9%) use the garbage truck, 26(1.7%) reuse food wastes, 290(19.2%) use food waste for compost and 1 (0.1%) indicated other methods they used in disposing food waste.

For disposing of plant trimming, 351(23.8%) use burning method frequently. 152(10.3%) use burying method frequently, 16(1.1%) dispose in the gully, 27(1.8%) use water drainage, 220(14.9%) dispose in the bush, 319(21.6%) use the dump site, 73(4.7%) use the garbage truck, 3(0.2%) reuse plant trimmings, 315(21.3%) use food waste for compost and 1(0.1%) indicated other methods they used in disposing plant trimmings.

In assessing the most frequently used methods to disposing paper/cardboard, 1001(67.2%) burn, 43(2.9%) bury, 15(1.0%) dispose in the gully, 15(1.0%) use water drainage, 62(4.2%) dispose in the bush, 257(17.2%) use the dump site, 75(5.0%) use the garbage truck, 14(0.9%) reuse paper/cardboard, 7(0.5%) use paper/cardboard for compost and 1(0.1%) indicated other methods they used in disposing paper/cardboard.

For disposing of plastics, 727(48.9%) use burning method frequently, 99(6.7%) use burying method

frequently, 13(0.9%) dispose in the gully, 10(0.7%) use water drainage, 90(6.0%) dispose in the bush, 312(21.0%) use the dump site, 89 (6.0%) use the garbage truck, 137(9.2%) reuse plastics, 10(0.7%) use plastics for compost and 1(0.1%) indicated other methods they used in disposing plastics.

In assessing the most frequently used methods to disposing metals, 81(5.6%) burn, 198(13.6%) bury, 42(2.9%) dispose in the gully, 20(1.4%) use water drainage, 219(15.1%) dispose in the bush, 406(28.0%) use the dump site, 210(14.5%) use the garbage truck, 165(11.4%) reuse metals, 9(0.6%) use metals for compost and 101(7.0%) indicated other methods they used in disposing metals.

Assessing the most frequently used methods to disposing glass result showed that, 49(3.4%) burn, 267(18.5%) bury, 55(3.8%) dispose in the gully, 19(1.3%) use water drainage, 204(14.1%) dispose in the bush, 435(30.1%) use the dump site, 343(23.7%) use the garbage truck, 67(4.6%) reuse glass, 5(0.3%) use glass for compost and 1(0.1%) indicated other methods they used in disposing glass.

To determine the perceived health implications of waste disposal practices among residents in Imo State, Nigeria

Table 3: perceived health implications of waste disposal practices among respondents.

Items	Yes		No	
	Frequency	Percent	Frequency	Percent
Do you consider that environmental pollution has negative effect on your family?	1154	88.2	155	11.8
Has anyone in your household suffered from any of the following?				
Diarrhea	889	68.6	407	31.4
Dysentery	426	38.2	688	61.8
Typhoid	1142	79.9	288	20.1
Ringworm	575	44.4	720	55.6
Scabies	288	25.0	862	75.0
Cholera	462	39.0	722	61.0
Malaria	1301	88.3	172	11.7
Cough	1293	88.1	175	11.9
Skin Disease	720	56.6	553	43.4
Others	-	-	-	-
Which of the following methods of waste disposal can cause any of the above diseases?				
Waste being disposed in the Sewage line	865	71.9	338	28.12
Waste being disposed in the drain	967	79.3	252	20.7
Waste being disposed on the road	1024	79.9	257	20.1
Odour emitting from dump wastes	1094	87.3	159	12.7
mosquitoes / flies from the dump wastes	1307	92.3	109	7.7
Unattended and improper handling of principal solid waste	1198	89.3	143	40.7

Table 3 shows the perceived health implications of waste disposal practices among the respondents. In answering the question “Do you consider that environmental pollution has negative effect on your

family? 1154 (88.2%) respondents said yes while 155(11.85%) said no. On the other hand, 1210(92.7%) said yes, they think that how they dispose their household waste would affect their

health while 95(7.3%) said their health will not be affected how they dispose their household waste. On the issue of having suffered any of the listed diseases, 889(68.6%) reported suffering diarrhea while 407(31.4%) reported not suffering diarrhea, 426(38.2%) reported suffering Dysentery while 688(61.8%) reported not suffering Dysentery, 1142(79.9.6%) reported suffering Typhoid while 288(20.1%) reported not suffering Typhoid, 575(44.4%) reported suffering Ringworm while 720(55.6%) reported not suffering Ringworm, 288(25.0%) reported suffering Scabies while 862(75.0%) reported not suffering Scabies, 462(39.0%) reported suffering Cholera while 722(61.0%) reported not suffering Cholera, 1301(88.3%) reported suffering Malaria while 172(11.7%) reported not suffering malaria, 1293(88.1%) reported suffering Cough while 175(11.9%) reported not suffering Cough, 720(56.6%) reported suffering Skin diseases while 553(43.4%) reported not suffering Skin diseases.

Concerning the question on which of the following methods of disposal can cause any of the above disease, 889(68.6%) reported waste being disposed in the Sewage line and 407(31.4%) said no, 967(79.3%) said waste being disposed in the drain and 252(20.7%) said no, 1024(79.6%) reported waste being disposed on the road while 257(20.1%) said no, 1094(87.3%) agreed odour emitting from dump wastes while 159(12.7%) disagreed, 1307(92.3%) said mosquitoes/flies from the dump wastes and 109(7.7%) said no, and 119(89.3%) answered unattended and improper handling of principal solid waste while 143(10.7%) answered no.

Hypothesis: There is no significant association between age group, community occupation, education level and marital status with perceived negative effect of environmental pollution on family.

Table 4: Association of age group, community occupation, education level and marital status with perceived negative effect of environmental pollution on family.

Variables	Chi Square	P. value
Age group	61.967	0.000*
Community	31.440	0.000*
Occupation	51.936	0.000*
Education	14.375	0.003*
Marital status	75.344	0.000*

*=Significant at $P=0.05$.

Table 4 shows that for age group ($X^2=61.967$, p -value=0.000; for community, ($X^2=31.440$, p -value=0.000; for occupation ($X^2=51.936$, p -value=0.000. Education had ($X^2=14.375$, p -value=0.003, while marital status had ($X^2=75.344$ with p -value=0.000). The null hypothesis was rejected because there were significant associations between age group, community, occupation, educational level and marital status of the respondents with their perceived negative effects of environmental pollution on the family.

Discussion

The finding of this study showed that burning is the most frequently used method in disposing household wastes (Table 2). Backyard burning is common in many areas of the country [18], People burn trash for various reasons either because it is easier than hauling it to the local disposal site or avoid paying for regular waste collection [18]. Household wastes typically burnt can include paper, cardboard, food scraps, nylon/plastics and yard trimmings. This observation is not unexpected considering the fact that paper/cardboard could be identified as one of the major wastes generated by majority of the respondents in the present study, based on the increase in the use of paper in packaging of items in the present-day society. Thus, they burn their wastes either because it is easier for them or they do not want to haul the bulky wastes to dump sites. This result of this study is not in line with the finding of the study conducted in urban Accra [5], which showed that majority of the household respondents disposed of their wastes at community bins or had their wastes picked up at their homes by private contractors. The discrepancies in these studies could be attributed to the location/area of these studies. Urban Accra could have a well-organized system of solid waste management practices unlike the area of the present study where there was no provision for picking wastes in the homes of the respondents by private contractors or designated areas mapped out for this purpose.

Similarly, studies have indicated that most of the respondents in their study used communal bins as a method of household waste collection and dustbins to store their household waste at source of generation [18]. The differences in this study and the present study could be related to the type of waste generated. Researchers have noted that patterns of household waste disposal depend on the kind and type of waste generated [18]. Despite the fact that majority of the

respondents in this study were students and educated (Table 1), they still burn their household wastes. This still can be attributed to lack of proper waste management practice available for the people. If there was adequate waste management practices the respondents would not hesitate to make use of them. This further strengthened the need for the introduction of private contractors to be encouraged to participate in household waste management.

Findings of the study on perceived health implications of household disposal practices used by majority of the respondents revealed that malaria and cough were the two most common illnesses usually suffered by the majority of the respondents (Table 3). Cough being among the top two is not an unexpected finding since burning is used by majority of the respondents. The burning of large, open piles of trash emits dangerous levels of carbon-dioxide, a greenhouse gas that is heating up the planet [15]. added that the more emissions of carbon-dioxide that are produced from burnt wastes the more they negatively affect the health of humans the long run; one can develop diseases such as asthma, birth defects, chronic obstructive pulmonary disease (COPD), etc. The study conducted [17] revealed that methods of solid waste disposal and improper solid waste management from households and communities were of serious health hazards and led to the spread of diseases. Similarly, in his study in the peri-urban Area of Colombo, [17] observed that all the respondents were aware of the environmental hazards caused by improper waste management. More than half of the households in this study used burning to dispose papers and cardboard. Also, the findings in Anambra [4] revealed that waste management practice has a significant impact on environmental sustainability in Anambra State. Furthermore, [18] concluded in his study that there is an urgent need for both government and individuals to adopt holistic and sustainable waste management strategies in order to safeguard public/environment health. This implies that all hands must be on deck to protect the health of individuals and the environment.

The findings of the study revealed that a vast majority of the respondents acknowledged that mosquitoes/fly from dump sites were responsible for the infection (Table 3). They perceived mosquitoes/fly from dump sites as negative health implication of the household disposal practices. According to Clean Management Environmental Group, [16], unprocessed waste is a breeding ground

for major diseases. This concurred with the findings of [8] that inappropriate disposal of wastes attracts stray dogs, other animals like birds, thus leading to the spread of diseases. Also, this finding is in agreement with the statement that unsanitary environment could lead to poor health and diseases [19]. Furthermore, in the study area in Akure, Nigeria [14] showed that the most prevalent diseases were associated with poor environmental sanitation include measles, diarrhea, malaria and typhoid fever.

Conclusion

Plastics and nylon constituted major household wastes among the residents in Imo State Nigeria. Healthcare providers need to create awareness to the public on the dangers of improper disposal (e.g., burning) of plastics and nylon on human health. Nylons and plastics contain chemicals that can enter the body and settle into the system, increasing the toxic load in the body and triggering stress. Emphasis should be place on recycling and reuse of these products in order to minimize their negative impact on human health. Similarly, the importance of sorting of household wastes will help in reducing household wastes generation.

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