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Waste Disposal Practices and their Impacts on Human Health in Aba Urban, South-Eastern Nigeria

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ABSTRACT

Haphazard solid waste disposal in waste dumpsites sited within urban environments has proved to be a problem to nearby residents in most developing areas of third world cities, Aba in this instance, is not an exception. Exposed waste dumps have environmental precautions as they can constitute major public health threats and environmental chaos in urban areas. Therefore, this article is a product of a feasible study carried out in Aba urban, South-Eastern Nigeria in order to determine the human health impacts of solid waste disposal at Port-Harcourt-Enugu expressway dumpsite. Data were elicited from 398 nearby dumpsite household residents (not more than 50 metres) and 233 faraway household residents (not less than 50 metres) through the use of structured self-administered questionnaires. Inter-views and personal observations were also engaged to gather some of the data. Descriptive statistics involving tables, graphs and figures were employed to collate, analyse and present the data in the form of information. The study findings indicate that both nearby residents and distant residents experienced related diseases like malaria, diarrhoea, chest pains, and cholera due to residing near the dumpsite. As a result, this study highlights the need for the Aba Urban Managers and Administrators to properly manage dumpsites health impacts by relocating the dumpsite to a safe distance from all human settlements, provide resettlement, environmental awareness creation and sensitisation programmes for living close to the dumpsite as temporary panacea.

Keywords: Contamination, dumpsite, environment, health, socio-economic, solid waste-pickers, waste, waste disposal.

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INTRODUCTION

Exposed waste dump as an approach to solid waste disposal and management is considered archaic in many parts of the world. It is often regarded as one of the weak delivery services offered by municipal authorities in developing countries, especially the third world cities, as the practice is considered unscientific, obsolete and unhygienic. Solid waste disposal sites are found both within and on the outskirts of developing urban cities. With increase in the global population and the rising demand for food and other essentials, there has been a rise in the amount of waste being generated daily by each household. This waste is ultimately thrown into municipal disposal sites and due to poor and ineffective management, the dumpsites turn to sources of human health hazards to people living in the vicinity of such dumps. One of the main aspects of concern is the contamination caused to the earth - be it land, air and water (Medrica, 2015). According to Abonema (2015) many cities in developing countries face serious environmental degradation and health risks due to the weakly developed municipal solid waste management system.

Several studies have been conducted in order to examine the health and environmental effects arising from waste dumps. Such studies showed that a link exists between the two (Altamira, 2017; Austin, 2014; Faraday, 2014). The conclusion from this and other studies has led to an increasing interest of researchers in the study relating to environmental contamination as well as its effects on plants and animals. Few of these studies examined the human health implications of solid waste disposal to people living in close proximity to the waste dumpsites (Guyenne, 2016; Enoch, 2016). The ever-increasing consumption of resources results in huge amounts of solid wastes from industrial and domestic activities, which pose significant threats to human health (Uba, 2017).

However, the ills of inappropriately disposed municipal solid wastes are quite numerous to be mentioned. Health deterioration, accidents, flood occurrences, and environmental pressures are just a few of the negative effects. In many developing countries, solid waste disposal sites are found on the outskirts of urban areas. These areas become children's sources of contamination due to the incubation and proliferation of flies, mosquitoes, and rodents. They, in turn, are disease transmitters that affect population's health, which has its organic defences in a formative and creative state. The said situation produces gastrointestinal, dermatological, respiratory, genetic, and several other kinds of infectious diseases (Covina and Rowland, 2016).

Open dumpsites in developing urban cities involve indiscriminate disposal of waste. They are uncontrolled and therefore pose major health threats which affect the land-scape of urban cities (Cater and Mark, 2017). The UNEPA (2006) stated that wastes that are not managed properly, especially solid waste from households and the community, are a serious health hazard and lead to the spread of infectious diseases. The report further stated that unattended wastes lying around attract flies, rats, and other creatures that, in turn, spread diseases. Normally, it is the wet waste that decomposes and releases a bad odour. The bad odour affects the people settled next to the dumpsite, which shows that the dumpsites have serious effects to people settled around or next to them. The group at risk from this unscientific disposal of solid waste includes the population in areas where there is no proper waste disposal method, especially the pre-school children, waste workers and workers in facilities producing toxic and infectious materials. Other high-risk group includes population living close to the waste dump (Young, 2013).

In particular, organic domestic waste poses a serious threat, since they ferment, creating conditions favourable to the survival and growth of microbial pathogens. Direct handling of solid waste can result in various types of infectious and chronic diseases with the waste workers and rag pickers being the most vulnerable (Sydney, 2017; Uba, 2017). Studies conducted by Young (2013) and Sched (2014) show that exposure to hazardous waste in dumpsites can affect human health, children being the most vulnerable to these pollutants. Direct exposure can lead to diseases through chemical exposure as the release of chemical waste into the environment leads to chemical poisoning. Medrica (2015) in his study to establish a connection between health and hazardous waste showed that waste from agriculture and industries can also cause serious health risks.

Other than this, co-disposal of industrial waste with municipal waste can expose people to chemical and radioactive hazards. Healthcare waste and other medical waste disposed in dumpsites, mixed with domestic waste, increase the risk of infection with Hepatitis B and HIV, and other related diseases (World Bank (2015). Open dumpsites are a major problem to the environment especially to the air that we inhale. Dumpsites emit obnoxious odours and smoke that cause illness to people living in, around, or closer to them (Guyenne, 2016). According to Medrica (2015) and Altamira (2017), contamination, a major environmental effect of dumpsites, is not directly transferred from land to people, except in the case of dusts and direct contact with toxic materials. Pollutants deposited on land usually enter the human body through the medium of contaminated crops, animals, food products, or water. Also, the dumpsite has smelly and unsightly conditions. These conditions are worse in the summer because of extreme temperatures, which speed up the rate of bacterial action on biodegradable organic material.

Disposal sites can also create health hazards for neighbourhood (Mbagwu, 2017; Godfrey and Godwin, 2017). Elena and Godfrey (2017) highlighted that in a number of health surveys a wide range of health problems, including respiratory systems, irritation of the skin, eyes and nose, gastrointestinal problems, psychological disorders, and allergies, have been discovered. In addition, dumpsites closer to residential areas are always feeding places for dogs and cats (Covina and Rowland, 2016; Bodhi and Ketene, 2017; Austin, 2014). These pets, together with rodents, carry diseases with them to nearby homesteads. This study therefore sought to determine the human health impact of solid waste disposal at Port-Harcourt-Enugu expressway dumpsite in Aba Municipality in Nigeria. The study suggested fresh thoughts in the dumpsite management in order to reduce the high prevalence rate of malaria and other diseases in the city. The findings adduced could be of pertinence to several urban area managers and environmental scientists.

MATERIALS AND METHODS

The study area, Aba, was selected because of its being the most populated city in Abia State, besides its being regarded as one of the dirtiest cities in Nigeria. Aba is located on coordinates 5.12°N and 7.37°W with a total

area of 19,000 square miles (7,400 square kilometres) in the western area of the country. The climate of Nigeria is tropical (hot and humid); with the raining season lasting from early late March to October and the dry season from November to early March, and rainfall along the coast can reach 375 cm a year with Aba having the highest amount of rainfall, greater than 22500 millilitres (Mbagwu, 2017). According to 2006 population census report, it has a population of 931,900 (FGN 2015; Mbagwu, 2017; Faraday, 2014). The city is the economic, financial and cultural centre of Abia State, Nigeria. The city's economy revolves largely around trade and commerce with many small-scale industries and few large-scale industries.

This study was constrained to Port-Harcourt-Enugu expressway dumpsite in Aba, Nigeria. The study targets to determine the human health impact of solid waste disposal on the human settlements around the specified dumpsite. The researchers elicited data for this study from primary and secondary sources to indicate the results on the human health impacts caused by solid waste disposal at the Port-Harcourt-Enugu expressway dumpsite in Aba, Nigeria. Initially, the research team involved a literature search within which solid waste related documents and records linking with appropriate sources of data - books, journals, newspapers, and scholarly articles - published and unpublished were harnessed to enrich the background to the study. Next, the researchers stayed at the dumpsite where a few people involved in scavenging and agricultural gardening were observed and questioned intermittently. Household residents found at the time of the study area, were as well interviewed. The questions designed were aimed at deriving information on human health impacts caused by solid waste disposal at Port-Harcourt-Enugu expressway dumpsite in Aba and ways to alleviate the problem. Information thus obtained was applied to appraise the data collected during literature review. next, the research team administered structured questionnaires (both closed- and open-ended designed questions) to 971 households to obtain solid information. The first section of the questionnaire obtained data on socio-economic characteristics such as educational level and employment status while the last part obtained information on residents' views on the location of the dumpsite and their surroundings, disposal methods used by residents, and the repercussions of the dumpsite to the health of the urban residents'.

Sample size

The investigators administered questionnaires to two categories of surveyed population: nearby household living near the dumpsite (not more than 50 metres) and household residing some distance away from the dumpsite (not less than 50 metres). The study area consisted of 971 households determined by engaging Taro Yamane sample size technique. Out of the 971 households, 631 (65%) consisting of 398 nearby residents and 233 faraway residents were selected to be part of the study in order to determine the impacts of waste disposal practices on people living both near and far away. 65% sample size was the representative population which was easy to manage (Carter and Mark, 2017). This method makes sure that there was no bias in the choice of the population who were part of the sample. This was the case because in order to determine the effects of the dumpsite it is fundamental to have two layers (strata) of residents residing close to, and residents living far away from the dumpsite. Also, through stratified simple random sampling, every member of the study area had an equal probability of being selected to be part of the study. The households were selected using simple random sampling methods. The choice on the use of questionnaires as a key data collection instrument in this study was the authors' wish so as to secure data that could help actualise the study objectives.

Prior to the commencement of the main study, the research team conducted a pilot survey on Enugu-Port-Harcourt and Ariaria-Express Waste Dump Site to ensure that Surveyed population felt comfortable with the questions and that they understood them. In addition, it allowed the researchers to focus on particular areas that may have been unclear previously and to test procedures, equipment and estimate the length of time a respondent would take to complete the questionnaire. The length of time invested in the pilot study can be valuable and enriching for later phases of the study. We selected a group of ten different people to conduct the pilot study. The ten different people did not participate in the full study but they were comparable to the Surveyed population in the full study. The questionnaire took approximately twenty minutes to be completed. Some revisions to the scales were made to take account of the level of education of the Surveyed population. The researchers employed descriptive statistics which involved the use of tables or figures to analyse and illustrate the data.

RESULTS AND DISCUSSION

The study concentrated more on two socio-economic characteristics of the survey population - employment status and educational level of surveyed population since other research conducted reflected business and ancillary services and more so, as employment (being a source of income in the area) is dependent on the level of education as corroborated by the findings of Mbagwu, (2017) which stated that income level in Kano is highly associated with level of education. Majority of the surveyed population were unemployed (54%) (Figure 1), thus, making life so challenging for the urban residents.

Some of the residents embark on small-scale agricultural production gardening on the marshy area by the fringes of the Port-Harcourt-Enugu expressway dumpsite as a source of income and livelihood. These urban peasant farmers as supported by the findings of Elena and Godfrey

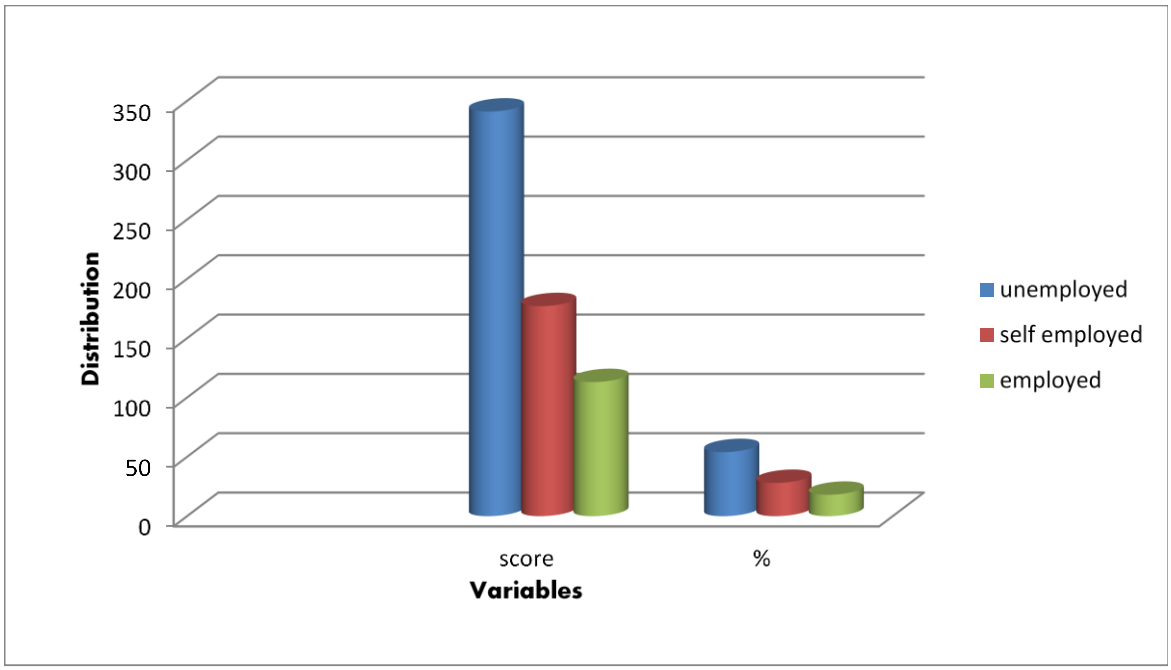

Figure 1. Employment status of the surveyed population.

Table 1. Educational levels of surveyed population.

	Frequency			
Educational level	**Nearby Residents**	**Far Away Residents**	**Total**	**Percentage**
Not educated	40	55	95	15.05
Primary education	100	80	180	41.83
Secondary Education	203	69	272	43.11
Tertiary education	55	29	84	13.31
Total	398	233	631	100

(2017) in Nsukka, produce such agricultural goods like garden egg, peanuts, cucumber, watermelon, legumes etc. They also use nearby stream for washing their clothes and bathing their children. These activities expose these residents to solid waste particularly hazardous chemical wastes and substances, which can lead to various diseases.

A preponderance of nearby residents and far away residents are not educated above secondary 272 (43.11%) and primary education 180 (41.83%) (Table1). Equally, a small percentage 84 (13.31%) indicated that they attained tertiary education, and often resort to waste picking as a make up to their meagre income. They recycle solid waste items through the collection of cans, metallic objects, plastics and other products in order to sell them and make their living. Direct handling of solid waste, especially healthcare waste mixed with domestic waste can lead to increased risk of infection on waste-pickers.

Relationship between socio-economic characteristics of the surveyed population

Two socio-economic variables of the surveyed population in this study (employment status and educational level of surveyed population) were surveyed. This was influenced by the fact that employment (as a source of income) could depend on education level. Most of the surveyed population were not employed (54%), and this makes life very challenging for them (Note: other sources of income were not investigated as a result of extensive studies already carried out on them, and to avoid repetition, the researchers concentrated on employment and education since they are the most neglected in terms of research in the study area). As a result, they engage on small-scale agricultural gardening on the swampy area by the fringes of the Port-Harcourt-Enugu expressway dumpsite as a means of income and livelihood. They also indulge in

Table 2. Disposal methods used by the survey population.

Educational Level	Far Away Residents (<50 m)		Nearby Residents (>50 m)	
	Score	%	Score	%
Street bins	62	16	30	13
Dumpsite	35	9	23	10
Bury & burn in pits and gutters	117	29	70	30
In bags from ASEPA	56	14	25	11
In drains & streets	128	32	85	36
Total	398	100	233	100

Table 3. Health impacts of having a dumpsite in a nearby community.

	Nearby Residents		Far Away Residents	
Diseases	Score	%	Score	%
Malaria	100	32	60	36
Cholera	100	20	55	30
Irritation of the eyes	28	7	25	11
Irritation of the nose	17	4	15	6
Irritation of the Skin	56	14	25	11
Chest pain	35	9	23	10
Diarrhoea	62	16	30	13
Total	398	100	233	100

waste picking as a family business in order to have both ends meet – these activities expose the children to health complications that could mar their lives which agrees with the report of Sydney (2017) on the account that waste handling affects in complex health impairments in Beijing, China. The adults, as well, are prone to waste-related diseases fundamentally contacted through chemical exposure.

Residents' perception on the dumpsite location and immediate environment

Household residents, particularly people who lives near the dumpsite are uncomfortable about the dumpsite located within their neighbourhood. Moreover, they protested that the waste dumpsite is quite close to their residents, thereby triggering off sicknesses and diseases. Likewise, they reasoned that their surroundings are malodorous and dirty with leachates dripping through their surroundings. In addition, some of the dumpsite items overlaps their buildings, resulting to environmental contamination.

Disposal methods used by residents

The waste disposal methods used by the local residents – in drains and streets - were very unacceptable (Table 2). Although the high population of the sampled community are educated, the level of education is not in consonant with the appropriateness of the disposal method adopted. It is obvious from the Table 2 that most of the people who throw refuse on open land and drains are uneducated or 'half-baked' educated. Those who keep waste in bins or burn it are most likely those with higher education. In general, majority of the surveyed population either throw their waste on land/drains/streets, or bury and burn waste items in pits and gutters. Likewise, only a small proportion (24%) of the surveyed population deposits their waste in bins and bags from Abia State Environmental Protection Agency (ASEPA) where they can be transferred to the designated collection points for ultimate disposal into the designated dumpsites.

Health implications of having a dumpsite located close to a neighbourhood

Locating dumpsites close to a neighbourhood or community has many consequences. Table 3 contains various impacts as indicated by the surveyed population during the field survey. Majority of both nearby and far away residents specified that the waste dumpsite projects a breeding ground for disease vectors like malaria, cholera, eyes irritation, nose irritation, skin irritation, chest pain, and diarrhoea. However, the location of the dumpsite has considerably made the residents to suffer from various diseases such as malaria, and Cholera, besides coping with offensive odour emanating from such handling and other body injuries associated with solid waste practices

Table 4. Measures to protect urban residents.

Variables	Score	%
No Measure	597	95
Government Intervention	1	0
Individual Safety	20	3
Communal Effort	13	2
Total	631	100

(Table 3). This implies that the diseases identified by the sample population are the most reoccurring, although, other diseases not identified such as nasal bleeding and tracheal issues could be associated with this.

Protective measures engaged as preventives to the dumpsite effects

The surveyed population complained that government has shown no serious concern for the health, welfare and well-being of her citizenry. Feasible efforts were made by individuals and the community (Table 4). Lack of protection from dumpsite related effects was worst because of poor knowledge on the impacts of waste contaminants. Majority of both nearby residents and far away residents indicated that they are ignorant. A small percentage of them indicated that contamination causes sickness. Therefore, the residents suggested that among many other options, the dumpsite should be relocated as an interim measure. This is because the only source of information on contamination available to them is the media with its characteristic shortcomings such as affordability, frequent blackouts etc. Table 4 shows that measures taken to salvage the situation were not in place, as most of the sampled population (597) unanimously affirmed that no measure was taken (95%). In fact, government assistance to ameliorate the sufferings of the populace in the form of free medical treatment, distribution of free safety materials like hand gloves and nose makes were completely absent (0%).

However, the resident sampled population in an effort to help themselves stay alive (3%) resort to boiling and filtering water before consumption, in addition to wearing sandals and slippers to protect themselves.

The community (2%) seeing the individual efforts, provided a joint task force for surveillance (in the form of arresting and fining offenders – people who dump waste items indiscriminately within their neighbourhoods). Besides joint waste evacuation, some donated their trucks for onward disposal of waste items to the closest 'landfill' (dump) sites

Conclusion

The study examined the human health impacts of households living around (nearby) and away (far away) from the Port-Harcourt-Enugu expressway dumpsite in Aba, Nigeria. Results from the data analysis revealed that both nearby and far away residents suffered the same fate (related diseases) due to the location of the dumpsite nearer their neighbourhoods, and possible carriage of such by lachaets to farther residents. It was discovered that people residing less than 50 m from the dumpsite are affected, but people leaving far away from the dumpsite are most affected (Table 3).

Therefore, comparing diseases sustained by people leaving nearby and far away from the dumpsites, the following were obtained: Malaria (36% vs 32%), Irritation of the eyes (11% vs 7%), Irritation of the nose (6% vs 4%), Chest pain (10% vs 9%). Hence, the researchers conclude that the sampled population were mostly victims of malaria, cholera, eyes irritation, nose irritation, skin irritation, chest pain, and diarrhoea. The human health state of the surveyed population can be associated with waste dumpsite contamination. From interview conducted, it was noted that the extent of air and water contamination is worse in the raining season as a result of offensive and disease-carrying odour, as well as groundwater contamination. In the dry season, the smoke from the incineration of the dumpsite is an important source of air contamination for people living far away from the dumpsite. They therefore complained about chest pains.

The study therefore concludes that the dumpsite should be properly located and managed to minimize its effects on the environment. For improved health status of the population living less than fifty metres away from the dumpsite, it is a matter of must for the Aba City Council to either resettle victims to a safer place or relocate the dumpsites to appropriate location. In the long term, efforts to provide low-cost houses situated in a clean environment is a priority that the City Council must pursue vigorously to enable the poor to live in affordable yet clean environment. There is the need for the creation of public awareness and sensitization on the human and health effects of living close to waste dumpsites

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