Solid Waste Management: Implication for the spread of Communicable Diseases and Sustainable Development in Aba Urban

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Abstract

Background: There is high rate of environmental hazards of which poor solid waste management constitutes a major source in Nigeria. The natural environment as it where endows man with a healthy ecosystem devoid of diseases and a vital support for the sustainable existence of man on earth. However urbanization and other adverse human activities have massively altered the natural environment thereby exposing humans to multiplicity and severe burdens of diseases in Nigeria. This study thus investigated solid waste management: Implication for the spread of communicable diseases and sustainable development in Aba Urban. **Methods:** The study is a cross-sectional survey and used both quantitative and qualitative methods. The sample size was 372 Aba Urban residents aged 18 years and above who were selected using the multi-stage sampling technique made up of cluster, simple random sampling and systematic sampling techniques. Data were collected using the questionnaire schedule and the Key Informant Interview (KII) Guide. The quantitative data were analyzed with descriptive statistics, while thematic content analysis was used in analyzing the qualitative data. **Results**: The findings show that inadequate solid waste management (76.80%), indiscriminate attitude of the people to waste disposal (94.60%), and lack of waste management personnel (81%) are some of the strong factors impeding the effective and efficient solid waste management in Aba urban. **Conclusion:** Efforts should therefore be made by the government and other private investors to construct waste recycling plants, educate and sensitize the people on the need to keep their surroundings clean and intensify creation of awareness to dispel the indiscriminate attitudes of the people inhibiting effective and efficient solid waste management in Aba urban.

Keywords: *Solid waste, Waste Management, Communicable Diseases and Sustainable Development*

Introduction

We are frequently reminded of the multi – dimensional scope of global crisis; viz. the global financial crisis; crisis emanating from high pitched oil price, climate - change, varieties of natural disasters scares resulting from outbreaks of fearful diseases and international terrorism currently afflicting the planet (Davies, 2013). However, one crisis that has received only a fraction of the attention it deserves is the global sanitation and waste management crisis. This is an issue, which is rarely acknowledged nor persistently discussed, despite the fact that over 2.6 billion people – 40% of the global population are currently living without access to improved waste management facility (WHO/ UNICEF, 2010).

Wastes have been described as any substance, solid, liquid or gaseous that remains as residue or an incidental by-product of the processing of a substance and for which no use can be found by the organism or system that produces it (Ukpong, 2006). For every human endeavour, waste is created. Wastes can be generated by natural phenomena such as wind (whirlwind), erosion, precipitation, and volcanic eruptions, flooding of river banks atmospheric fallouts among others; and by human activities including domestic, commercial, industrial and agricultural practices (Eipper, 1990; Moncrief; 1970).

In recent decades, there have been concerns about sustainability of the environment and all of its ramifications. The global concern about sustainability arose as a result of increasing environmental degradation and its impact on human social development. The concern about pollution and depreciation of environmental quality has been building momentum to various environmental movements (Kapoor, 2001). The magnitude of wastes generated from human activities alone may exceed 18,000 tons per year for a developing country; this poses a major challenge of sustainability to the nation (UN-Habitat, 2003a; Onibokun, 2004). Wastes are materials that are not prime products [that is products produced for the market] for which the initial user has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose (UNDP, 2001).

In Sub-Sahara Africa alone, almost 1 billion people lack access to adequate waste disposal system. According to the World Bank (2012), globally, over 3.5 million tons of solid waste is generated on a daily basis – a tenfold increase over the past century. They estimate that this will likely double again by 2025. It could balloon to over 11 million tons per day by 2100, a tripling of present rate, with Sub-Saharan Africa said to be fueling most of the growth, these upsurges will require more resources to ensure environmental safety and sustained development (Jacquot, 2013). The mounting problems of poor waste disposal system are particularly prevalent amongst the urban poor. Although population growth, urban poverty and waste; urbanization is causing concentrated poverty rates in cities and a rapid increase in the number of urban poor (UNFPA, 2007). Today, over one billion people live in overcrowded, polluted and dangerous urban conditions, which typically lack basic services such as clean water and adequate waste disposal management scheme. The majority of wastes are dumped on the streets, discharged into rivers, water drainage and dump sites. This not only pollutes urban environment, but also has detrimental impacts on socio-economic growth and sustained development.

Most notable is the correlation between inadequate sanitation, poverty and disease. Diarrhea causes more than 2.5 million deaths annually (WHO, 2011). Waste such as excreta and dead animal remnants that end up in water bodies negatively change the chemical composition of the water, this is called water pollution. Garbage's and other solid waste that finds its way into sewage and drainage systems, leads to water-logging which forms the breeding ground for mosquitoes that transmit plasmodium, causing malaria. Bad waste management practices can result in land and air pollution and can cause respiratory problems and other adverse health effects as contaminants are absorbed from the lungs into other parts of the body. Sub – Saharan situation of urban population and urban waste. Most Sub-Saharan African cities such as Kumasi, Accra – Ghana; Nairobi – Kenya; Freetown – Sierra Leone; Lagos, Port Harcourt and Aba – Nigeria are infamous for plastic bags filled with human waste that are dumped on the streets [www.huffpost.com]. Without waste management and sanitation systems, human excrement, dead animal carcasses from abattoirs and other garbage's accumulate in fetid ditched along roads, seeping into water supplies. The consequences are dire: it is noted by (WHO, 2011) that in Africa, more than 1.5 million children die of waterborne diseases each year, in part due to poor waste management.

Unfortunately, in almost all the cities in Nigeria, Aba inclusive, the arrangements for waste disposal are very inefficient; as less than 50% of the waste generated is collected (NEST 1997). Regrettably, not a single city in Nigeria has modern sanitary landfill. The common practice is the use of borrow pits, open plots of land, street vessels, streams and rivers where they pollute surface and ground-water, soil and air [ibid]. The deplorable situation of municipal services and urban infrastructure in Nigeria calls for urgent intervention as 66 percent of the urban population lack access to improved urban sanitation (UN – HABITAT, 2003).

Also epidemic disease associated with unsanitary waste condition such as diarrhea causes more than 2.5 million deaths annually in developing countries (WHO, 2011) – approximately 3,000 deaths per day of children under five years of age (Luthi 2011) – making it one of the highest causes of death in developing countries.

According to a data by Aba South primary health monitoring and evaluation team for first quarter of (2014), more than 2,146 persons under five years of age were diagnosed and confirmed of complicated malaria, and 2,368 persons five years and above were equally diagnosed of complicated malaria. (i) Pressure of human fecal matter. (ii) Pressure of potentially hazardous industrial waste. (iii) The decomposition of solids into constituent chemicals which contaminate air and water systems and (iv) the air pollution caused by consistently burning dumps and methane release (Cointreau 1982). Human fecal matter is present in every solid waste system in developing nations and the intensity of the problem varies with the prevalence of proper sanitary disposal systems such as municipal sewerage or non-site septic systems, outhouses, according to Lee and Jones (1994). This presents a potential health problem to waste workers, scavengers, and other users of the same urban drop-off points. Insects and rodents breeds on solid waste and can spread diseases such as cholera, diarrhea, dengue fever, Lassa fever etc (Murray, 1999). In some regions, due to uncontrolled landfill, roundworms and whipworm are commonly found, especially in those landfills located near lower-income neighborhoods and slums (Cointreau, 1982).

Theoretical Framework

The theoretical framework incorporates Human Ecological Model and Ecological Modernization to explain waste disposal management and sustainable development. These theories are adopted because on one hand, Human Ecological model deals with the ecosystem and social system as a complex system this explained the interaction between human waste and its attendant consequences affecting sustainable development such as increase in communicable diseases, flooding and other waste related challenges emanating from inadequate waste management. The model is also useful in that it points to urbanization and consumerism which are human induced activities as been the major sources of waste in the society, mostly it gives insight on the role of Abia state environmental protection Agency (ASEPA) as an adaptive mechanism that should ensure effective control of waste generated. On the other hand Ecological Modernization model is also useful, it analyze the need for a change in life style including consumerism as one of the ways to reduce waste in the

society most importantly, it explains the fact that they exist scientific mechanism that could be deployed in waste management which ensures sustainable environmental and social development, also it highlights the reality that this processes exist mostly in the Western world while developing nations are in expedient need for effective adequate waste management mechanism to ensure its sustainability.

Empirical nexus on indiscriminate waste disposal and communicable diseases

Human development and health is greatly influenced by the environment in which they live in, Centre for Disease Control, (CDC) (2009). Solid waste constitutes a major source of environmental hazard. Environmental hazards accounts for an estimated 25% of the total burden of disease worldwide and nearly 35% of ill-health in SSA is caused by environmental hazards (WHO, 2009). There are a number of diseases associated to poorly disposed excreta, abattoir waste and other solid waste which commonly affect people in the developing countries, these can be sub divided into communicable and non-communicable diseases (Franceys, 1992).

Communicable diseases flourish where the environment fails to provide barriers against pathogens (WHO, 2009). The United Nations Environmental Programme (UNEP) conducted a pilot study in Dandera waste dump Kenya. The study as tentative as it was, showed that links exist between poor waste management and spread of diseases. The extensive tests carried out on the soil and water around the dump site in comparison with samples from other sites as well as medical tests carried out on humans living around the dumpsite shows evidence of infections from water, land and air pollution. The leachate generated in the landfills and open dumpsites are sources of pollution which is inimical to public health (UNEP), cited in Ogunrinola and Adepegba, (2013).

The preponderance of open dumps in many developing nations has spurred the need to examine the health implication of such dumps to the surrounding residents (Ogunrinola et al., 2013). For instance, Yongbi, Hermann, Ntetu, Sietchipin, (2008) conducted a cross-sectional epidemiological study to examine the health risks of different waste disposal system in Cameron. The study found; 14% diarrhea prevalence among the respondents and a strong statistical association was found between household refuse management methods and incidence of diarrhea among the respondents. However, Abul (2010) examined the health impact of solid waste management among residents around the Mangwaneni Dump sites in Swaziland. The respondents were stratified by the distance of their homes within 200

meters' radius, while the second group live from 200 meters and beyond from the dump site in Swaziland. The study was conducted among 78 households, the findings revealed a negative relationship between the distance of residential apartments from dumpsite and been affected by the dumpsite pollutants.

In addition, a social survey carried out in 2009, of resident's perception and six months' hospital records of chemically diagnosed diseases in eighteen peri-urban communities in Ogbomoso, Nigeria. To examine the incidence, prevalence, gender and special dimension of four major communicable diseases for which secondary data were available -malaria, typhoid, cholera and diarrhea, the study revealed;

a general lack of basic infrastructural facilities and services. While houses were mainly of the bungalow type (72%) and owner occupied (63.5%), accessibility to houses was generally poor. A significant proportion of the houses (26.5%) had no toilet while, about 99 percent of the respondents did not have access to pipe-borne

water with 80 percent using nearby vacant land as refuse dumpsite. The most prevalent diseases were malaria (53.55%) and typhoid (42.2%). The only cases of cholera (2.2%) and diarrhea (2.2%) were recorded in Abaa community in Surulere local government Area. In all cases, females were more vulnerable to malaria and typhoid (56.2% and 61.2%) than their male counterparts (Adeboyejo, Abolade and Oshinowo, 2009).

Another case study on the impacts of poor waste disposal on human health most visible in the slums of Addis Ababa, Ethiopia, has associated the endemic spread of communicable diseases especially among the poor sections of the city to inadequate waste management (Elias, Trynos, Tenday; 2012). The table below depicts the trend in the spread of top ten (10) diseases mainly attributed to indiscriminate solid waste management practices in the city.

Table 1: Solid Waste Related Disease and Morbidity in Addis Ababa, Ethiopia

Solid Waste Related Diseases	1997	1998	1999
Parasitic infection	57.887	36827	36845
Bronchitis	38100	28849	28;780
Skin	34426	27111	27047
Broncho pneumonia	30219	25744	25158
Dysentory	20782	13596	14630
Bronchial asthma and allergic conditions	11607	7677	6291
All other respiratory diseases	7932	3845	7532
Typhoid	6596	3622	4046
Influenza	3593	1905	1858
Trachoma	1619	1015	1346

Source: (Annual Morbidity Report of Addis Ababa 1997-1999)

Table 2: Distribution of respondents by socio-demographic characteristics Source: Field survey, 2014

Group	Demographic	Frequency (n=353)	Percentage %
Sex	Male	199	56.4
	Female	154	43.6
Age	18 – 27	185	52.4
	28 – 37	100	28.3
	38 – 47	35	9.9
	48 – 57	22	6.2
	58 and Above	11	3.1
Marital Status	Single	210	59.5
	Married	137	38.8
	Separated	1	.3
	Divorced	2	.6
	Widowed	3	.8
Educational Qualification	No schooling	7	2.0
	primary school	52	14.7
	SSCE/ WAEC	103	29.2
	GCE/A Level/OND	111	31.4
	First Degree/HND	68	19.3
	Higher degree	12	3.4
Religious Affiliation	Christianity	341	96.6
	Islam	12	3.4
Occupation	Traders	91	25.8
	Civil servants /self	43	12.2
	Bus/Tricycle driver	60	17.0
	Student /unemployed	72	20.4
	Artisan / Farmers	50	14.2
	Health workers	37	10.5

Figure 1: Distribution of respondents by their opinion on the current state of solid waste management strategy in Aba urban.

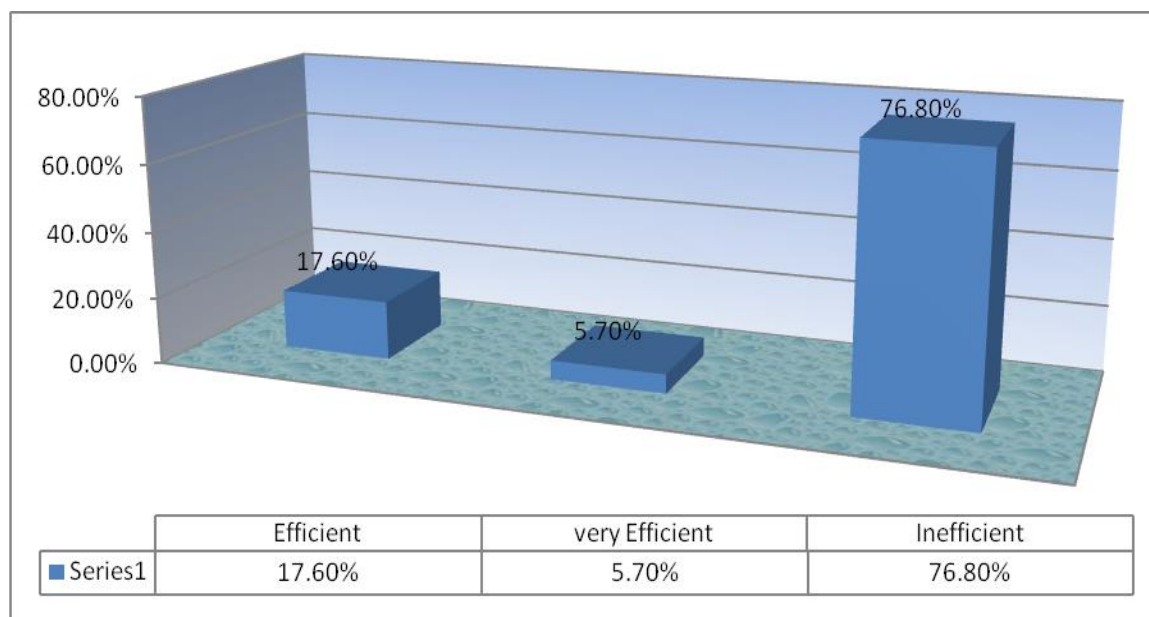|	Efficient	very Efficient	Inefficient
■Series1	17.60%	5.70%	76.80%

Figure 2: Distribution of respondents by their view on whether attitude of indiscriminate dumping of refuse by the people affects waste management.
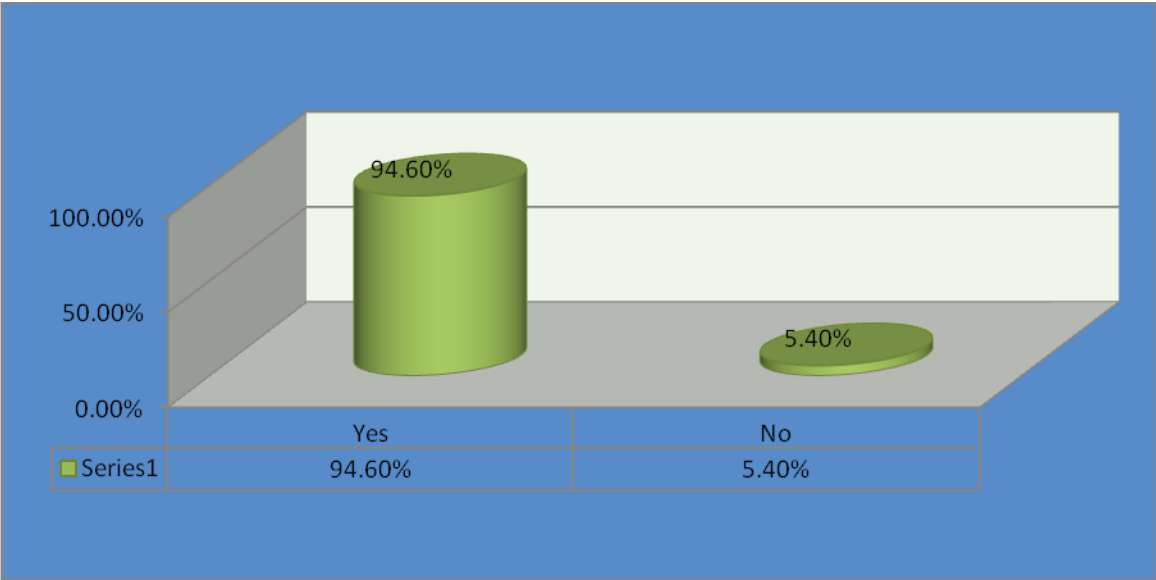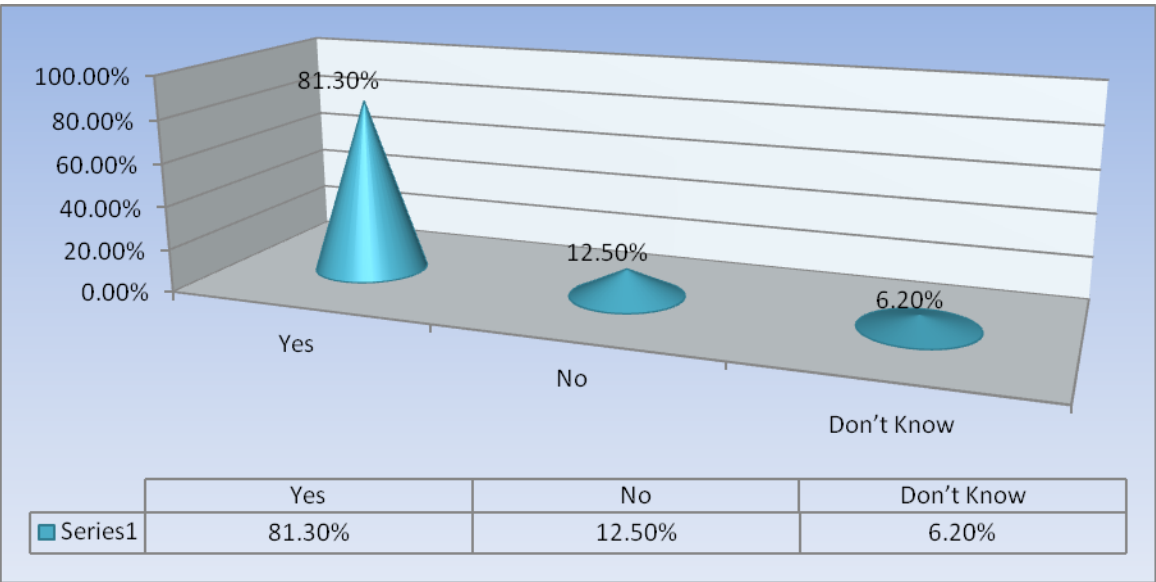

	Yes	No
Series1	94.60%	5.40%

Figure 3: Distribution of Respondents by their view on whether Lack Of Equipment and Personnel Affects ASEPA's Efforts.

	Yes	No	Don't Know
Series1	81.30%	12.50%	6.20%

As can be seen from the table above, the number of cases and their frequencies over the three years was too high for city of 3 million (in 1999) relative to other cities in developing countries. Tuberculosis, bronchitis, asthma, pneumonia, dysentery, parasites, and malnutrition are the most common diseases among waste pickers based on health studies, of waste pickers conducted in Bangalore, Manohar, and New Delhi in India (Huisman, 1994). About 180 waste pickers at the Calcutta, India open dumps were studied in 1995. During the course of one year, 40% had chronic cough, and 37% had jaundice. The average quarterly incidence of diarrhea was 85%, of fever was 72%, of coughs and colds was 63%. Eye soreness or redness occurred quarterly in 15% and skin ulcers in 29%., with nearly all rates higher at the largest dump site than these averages (Direct Initiative for Social & Health Action, 1994). A comparative study of waste pickers working at Calcutta's Dhapa dump in the 1980's and nearby farmers who use organic solid waste as fertilizer, showed that pickers reported higher prevalence of respiratory diseases (pickers: 71% vs. farmers: 34%), diarrhea (pickers: 55% vs. farmers: 28%) and protozoal and helminthic infestation (32% vs. 12%) Puri, and kates, (2008)

Methodology

The study is located in Aba urban Abia State, Nigeria, in 2015. It adopted a cross sectional survey design. According to 2006 National Population figure, the area covering Aba has a total population of 1,310,609. The distribution of the population by gender is as follows male 656,274 and female 654,335 giving a total of 1,310,609. However, the target population of the study is the population of Aba South and Aba North Local Government Area's (LGA). The population for Aba South is 214,926 male and 208,926 female, while that of Aba North is 55,744 male and 51,744 female, giving a total of 531,340. The target population for this study were adults aged 18 years and above. The multi – stage sampling technique made up of cluster, simple random sampling, and systematic sampling techniques were adopted in selecting the sample for the study. First Abia state was clustered into three senatorial districts. Then using the random sampling technique, Abia central senatorial district was selected. The LGAs in the selected cluster were numbered and then with the application of the simple random sampling technique, two LGAs were selected namely Aba North and Aba South. This was done by first numbering all the elements in the sampling frame out of which the above two were selected through the balloting method. Furthermore, the communities in Aba North and Aba South were numbered and through the aid of the balloting method of simple random sampling technique, two communities were selected from

namely Ogbor – Hill and Ngwa Road from Aba North LGA and Ariaria and Eziama from Aba South LGA. Then the streets in the selected four communities were numbered and through the balloting method of the simple random sampling technique one street was selected from each of the four communities namely; Ukaegbu, Ndoki, Nwankpa and Kamalu Street respectively. Finally, compounds in the selected streets were numbered and the systematic sampling technique was employed to select every K^{th} household in the sampling frame from which an adult was selected as a respondent for the study. The sequence continued until a total of three hundred and seventy-two were drawn from the streets. However, only persons of 18 years and above were allowed to participate.

A sample size of (372) was selected using the Fishers, Laing, Stockel, and Townsend (1998) statistical formula and was used for the study and the major instrument for collecting data was questionnaire. A uniform set of questionnaires validated were administered to all the respondents. The In-depth interview guide (IDI) was used to complement data generated from the questionnaire. Four IDI's were conducted with two males and two females purposively selected based on their knowledge of the subject matter; namely a primary health worker from Aba South and North health centers; Ngwa Road Market chairman; Ahiaoru Market chairman. Care was taking to maintain gender balance in the selection of interviewees who participated in the survey. Out of the (372) questionnaires distributed, (353) were correctly filled and returned, giving a response rate of 96 percent.

Results

Socio-demographic Attributes of Respondents

This section of the analysis deals with the personal data of the respondents and these include gender, age, marital status, educational attainment, religious affiliation and occupation.

Demographic Characteristics

The socio-demographic characteristics of the respondents are summarized in Table 2. Table 2 shows the frequency distribution of respondents by gender, age, marital status, educational attainment, religious affiliation and occupation. The table shows clearly that there are more males (56.4%) than females (43.6%) amongst the study population. The higher number of men observed from the population is as a result of the professional strata which are mostly male dominated occupational group. The table further indicates the presence of a largely youthful population in the study area, as respondents ages 18-22 and ages 23-27

constitute the majority with (52.4%) and (28.3%) respectively. A look at the marital status of the respondents shows that majority (59.5%) of the respondents are single (never married). It further shows that (38.8%) of the respondents are married and living together, while the least (.8%) of the respondents are widowed. The data suggest that the population is dominated by youths who are not married. Table 1 further shows that most of the respondents (31.4%) have attained the GCE A level education. This is followed by respondents who have completed secondary education (29.2%). However, respondents with no educational qualification are of the minority with (2.0%). It then follows that the GCE A level holders dominate the area of study.

In terms of religious affiliation, respondents affiliated to Christian religion were of the majority (96.6%). The data suggest that Christianity is the dominant religion within the study area. Finally, most of the respondents, representing (29.8%) are traders, while the least (10.5%) of the respondents are health workers. The finding implies that majority of the respondents engage in trading activity as their occupation.

Figure 1 indicates the frequency distribution of respondents on current state of solid waste management strategy in Aba. Majority of the respondents 271 representing (76.8%) said it is inefficient, while a few 20(5.7%) said it is very efficient. The data suggest that the current waste management strategy in the study area is inefficient and needs to be improved upon.

According to the response of one of the IDI respondents:

Let me give you a picture of the current state of waste management strategy. If you are entering Aba from Port Harcourt in between Enyimba and Osisioma you will see a huge waste dump that emits offensive odor; coming from Ikot Ekpene at Ogbo – hill axis a waste dump that smells as though there is an open pit toilet has just emerged. We don't even know between ASEPA and the people who are to be blamed; the simple truth is that waste management strategy in Aba is pathetic. If it were effective will you see that dump of waste right before us? (He pointed at uncollected waste on the street). When it rains all the roads in Aba will be flooded because the drainage systems are filled with dirt. It is sad that waste welcomes visitors into our city. None of these wastes dumps existed few years ago. I don't want to tell you about the streets, because I don't know the one without a waste dump. We compete for space with increasing waste in this Aba. You reside in Aba as well have you not observed that waste dumps are now part of our life's (laughs) (Male, Civil servant, Age 36).

Figure 2 shows the frequency distribution of respondents on whether attitude of indiscriminate dumping of waste by the people affects waste management in the study area. Overwhelming majority (334) respondents representing (94.6%) said yes, while 19(5.4%) said no. The data shows that dumping of waste indiscriminately affects waste management strategy in Aba urban. It follows that residents should dump their waste at designated locations so as to ensure sustained and efficient waste management in Aba urban.

An IDI interviewee stated thus;

Most of the residents are not environmental friendly; their attitude towards the environment is sad and disheartening. The people prefer to blame ASEPA for everything. ASEPA didn't amass the garbage waste you're seeing there on the road (pointing at a mound of waste heaped at the road opposite central post office). How can I be satisfied with such attitude, our people drop sachets of water (pure water) that letters our streets, our people also dump garbage waste in drainages, no I can't be satisfied with such attitude. (Male, ASEPA staff, Age 28)

Figure 3 is a bar chart showing distribution of respondents on whether lack of equipment and personnel affects ASEPA in delivering on their responsibility. Majority of the respondents 287 representing (81.3%) affirmed that lack of equipment and personnel are some of the problems confronting ASEPA, 44(12.5%) disapprove the assertion that ASEPA is confronted with the challenge of lack of equipment and personal. The conclusion is therefore amongst other challenges confronting ASEPA, the prime problem militating against the agency from performing efficiently is lack of equipment and personnel. Most of the equipments used by ASEPA are outdated.

An IDI interviewee stated thus;

Let me be honest with you, ASEPA is trying to clean this town, the problem is mostly escalated by their lack of efficient and effective equipments. Most of their trucks are old rickety vans that can't even start most times, do they even have compactor. Those people are trying will they use their hands to pack all this waste. (Female, Trader, Age 28)

Discussion

It was found in the study that the current state of waste management is grossly ineffective because of the visibility of uncollected waste dumped virtually all around Aba urban as 94.6% of the respondents reported a high rate of uncollected waste in the city. This is consistent with the view of Onibokun, (2004)

who stated that most Sub-Saharan African cities such as Kumasi, Accra – Ghana; Nairobi – Kenya; Freetown – Sierra Leone; Lagos, Port Harcourt and Aba – Nigeria are infamous for plastic bags filled with human waste that are dumped on the streets. The study also found that the strategy used by the state waste management authority is perceived as outdated this was the response of 182 out of 353 respondents. This contradicts the postulation of the ecological modernization theory which posits that modernized scientific strategies have been used to ameliorate the challenges inherent in waste management.

The study also found that the attitude of the people contributes to poor waste management in Aba urban. A KII respondent succinctly asserts "How can I be satisfied with the peoples attitude, our people drop sachets of water (pure water) that letters our streets, our people also dump garbage waste in drainages, no I can't be satisfied with such attitude." Abrokwah (1998) similarly observed that ignorance, negligence, lack of law to punish sanitary offenders, and low level of technology in waste management are the major causes of waste management problems in Kumasi. He suggested that awareness should be created among residents to manage household refuse and educate them on hazards that ill-disposed waste could pose to the environment and humans.

Finally it was found that lack of equipments and personnel are also major factors contributing to poor waste management this was found consistent with a study by Fei-Baffoe, Nyankson and Gorkeh-Miah (2014) in Sekondi-Takordi district of Ghana which identified certain factors ranging from financial constraints, inadequate personnel, inappropriate technologies and equipments as having acted in concert to militate against effective waste management.

Conclusions

The study has succeeded in revealing some of the factors perceived to have constrained solid waste management with its associated consequences on communicable diseases and sustainable development of Aba urban. Aba urban has been described as a city with escalating waste management crisis as the high volume of waste generated by the residents are not adequately attended to by the waste management authorities (ASEPA). Inefficient waste management strategy has therefore made uncollected waste to constitute a serious socio-economic and health problem. This is despites the fact that waste can actually be converted into energy known as bio gas. This could ameliorate the acute scarcity of energy supply besetting the city. Based on the findings the researcher concludes that:

1. The current situation of waste management strategy in Aba urban has deteriorated to the extent that uncollected wastes compete for space with humans.
2. Factors such as inadequate modern equipments, lack of personnel, unfortunate attitude of the people are some of the reasons inhabiting effective waste management in Aba urban.
3. The current waste management strategy has posed a serious health challenge to the residents of Aba urban as the spread of communicable disease is now a common phenomenon.

Recommendations

Based on the findings of this study, the following recommendations were made:

➢ The government should educate the public and ASEPA on solid waste and its related issues. Basically, hygiene practices should be taught especially on radios, televisions, in news papers, and in schools to educate people on proper ways of handling solid waste and keeping the surrounding clean.
➢ The government must endeavor to provide modern equipments such as modern incinerator, waste recycling plant, tractors compactors etc to enhance the activities of ASEPA.

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