

## HEALTH IMPLICATIONS OF INEFFECTIVE SOLID WASTE DISPOSAL FOR URBAN RESIDENTS: A STUDY OF AWKA TOWN, ANAMBRA STATE

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### **Abstract**

*The phenomenal rate of urbanization in Nigerian cities has led to a number of environmental problems including solid waste disposal. Improper solid waste disposal has significant impact on the health of our urban populace. The researcher adopted the survey design and sourced data by means of structured questionnaires and in-depth interview. The sample size was five hundred and seventy six (576) respondents. Data was analyzed with statistical tools especially, tables, frequency distribution and percentages. The findings revealed that poor solid waste disposal in Awka have a lot of health implications ranging from diarrhea, cholera, typhoid, asthma, bronchitis and many others. The study further discovered that several factors militate against effective waste disposal in Awka. The salient ones are rapid population growth, poor solid waste disposal culture, shortage of waste disposal personnel, inadequate resources for waste clearing and disposal and high rate of illiteracy. It was recommended among others that there should be public enlightenment campaign as well as introduction of environmental education at all levels of our educational system. This will help to alter the attitude and value system towards environmental management by making the people to be sanitation conscious. Government should strive to allocate adequate funds, and equipment for waste management and at same time help in legislating and penalizing against indiscriminate disposal of waste.*

**Keywords:** *Health, dumping sites, waste disposal, sanitation, urbanization*

### **Introduction**

Human environment needs to be kept clean. The 7<sup>th</sup> goal of the millennium development is to ensure clean environmental sustainability. The pursuit of environmental sustainability is an essential part of human well-being as identified by the United Nations environmental programme (UNEP, 2004). However, waste generation is an inevitable phenomenon as far as man is in existence. It is pertinent to know that the condition and rate of waste generation in the developed and developing countries are quite different. The level of solid waste generated in the developed countries is high when compared with the developing ones due to extraction from the manufacturing process, yet they have competent government institutions and facilities to handle their wastes. (Addo, Adei and Acheampong, 2014). The developing countries on the other hand are market oriented. They have not acquired the needed high technology to enable



them attain full grasp of coping with the huge challenges associated with effective waste disposal. This situation has led to great degradation of the environment resulting in several health problems (Busari and Olaleye, 2007).

The increasing rate of urbanization has caused most aspects of the society to suffer. Urbanization has given rise to population concentration. According to Oluranti and Omosalewa (2012) the cities of third world countries are growing at very rapid rates compared to those in the developed nations and such have implications for the provision of urban infrastructural services to prevent the proliferation of urban slum.

It is noteworthy that rapid and unplanned urban growth in Nigeria is characterized by recurring sanitation problems. Most of our Nigerian cities like Lagos, Onitsha, Kano, Ibadan, Port-Harcourt and Awka are experiencing environmental deterioration due to sanitation problems (Simon, Yayeda and Aliyu 2003). Furthermore, the consumption pattern of the urban residents is changed as result of the income level. The urban dwellers purchase packaged food and often make use of plastic wrappings, polythene bags and containers or cartons for their commodities which give rise to the expansion of disposable materials. This is contrary to what is obtainable in the rural communities where disposal of solid wastes does not pose much problem since solid wastes are given to domestic animals or deposited in the farms for manure.

Solid waste is defined by Ukpong (2006) as all the wastes arising from human activities that are normally solid and are discarded as useless and unwanted. They are referred to as unwanted or discarded materials from houses, streets, commercial, Industrial and agricultural operations and consist of various materials such as leaves, metals, paper, dust, plastics, food waste, glass, discarded clothing, pathological waste, garden wastes and construction wastes. In discussing about solid waste, Igoni (2006) stated that municipal solid waste is referred to as non-flowing type of wastes collected by private and public authorities from domestic, commercial and Industrial non-liquid and gaseous wastes. According to him, Municipal solid waste (MSW) causes a lot of environmental and health hazards. It releases toxic gases into the atmosphere and pollutes the air we breathe, contaminates ground water, produces offensive odours, causes obstruction of passages and traffic flow, blocks water ways and drain channels, elicits flooding, destroys environmental aesthetics among others. On the overall, MSW endangers public health and diminishes environmental quality.

In Nigeria, there is a phenomenal increase in the volume and range of solid wastes generated daily. Issues often frequently mentioned with regard to the environment largely are



the problem of solid waste generation and disposal. Thus, there is rapid urban expansion without effective environmental consciousness, as such in virtually every urban centre, a substantial proportion of population is at risk from environmental hazards. Waste dumping is the common practice of waste disposal in Nigeria. Uncollected heaps of solid wastes are common while disposal sites have become environmental hazards. According to George (2004), the massive solid wastes being generated in Lagos metropolis is not unconnected with the high population growth rate and propensity for consumption being experienced in the city. About 75% of the 15 million people in Lagos live in metropolitan Lagos.

Owing to the alarming rate at which toxic and hazardous wastes are being generated and the inadequate management, the Federal Environmental Protection Agency (FEPA) was promulgated in 1988 which later gave birth to the Federal Environmental Protection Agency (FEPA). The Federal Environmental Protection Agency (FEPA) developed a national policy on environment. In 1999, a full fledged ministry was formed to deal with environmental issues (Ifesanya, 2004). In line with this, there was a formal launching of a National Sanitation Programme. The purpose being to improve the health of urban residents through environmental control and sanitation. To ensure the achievement of this objective, state governments passed environmental sanitation edicts declaring the last Saturday of every month as environmental sanitation day. With the help of the police, Environmental Task Force, Environmental Sanitation Authority Personnel drove round the streets, impounding vehicles and any equipment used for purposes other than the exercise. Not quite long the tempo abated and the urban residents returned to their environmentally degrading habits with cities retuning to their previous conditions of great filth, stench and indecency (Anozie, 1994).

Presently, in Awka which is the capital of Anambra state, the Anambra state Waste Management Agency (ASWAMA) engages in the collection and disposal of solid waste, yet it has not made any significant impact on the urban residents in terms of environmental cleanliness. It is observed that in Awka which is the study area, there is improper disposal of solid waste. Although, the waste bins are provided in all the quarters, the waste bins are inadequate to meet with the teeming population. They are only seen in strategic areas of the various quarters from the observation of the researcher; wastes are often indiscriminately dumped on open plots of land particularly along the streets in Awka. In streets where refuse containers are provided, individual households deposit waste on the ground each time the containers are filled to the brim. In the same manner, those urban residents who are not close to



the locations where the disposal bins are, deposit solid wastes on any vacant land which is converted into an unofficial dump site. It is therefore, not unusual to see full containers with refuse piled at the sides with rats, goats, chickens scavenging on the garbage heaps. We often witness nauseating scene of heaps of solid waste in many places in Awka town. A good example is the situation along Unizik junction areas and Ifite road which leads to Nnamdi Azikiwe University (UNIZIK) campus where wastes are scattered in gutters, streets and roadside. This prevailing catastrophic level of environmental degradation resulting from improper disposal of solid wastes in Awka has created adverse impacts on health of the urban residents. It is not uncommon that the health of the urban dwellers is in jeopardy due to poor sanitation. There is incidence of epidemics of unavoidable diseases like cholera, typhoid, diarrhea, malaria, bronchitis, asthma which often results from failure or delay in disposing wastes.

This is one of the major challenges Anambra state government is facing. A healthy and sustainable environment that will help to salvage this condition can be ensured if there is an adoption of preventive and remedial strategies. This will only be feasible when there is willingness and commitment from the government and the urban residents. This study therefore seeks to address health implications of ineffective solid waste disposal for urban residents in Awka town. It will have an insight into the factors that militate against effective waste disposal and at the same time proffer solutions that could checkmate and enhance solid waste management thereby reducing indiscriminate waste disposal in Awka, Anambra State and beyond.

### **Health implications of ineffective solid waste disposal.**

Human development and health is high influenced by the environment in which they live. The center for disease control (CDC, 2009) reported that there was rapid urban expansion without effective environmental consciousness and that there was every tendency that virtually in every urban center, a substantial proportion of the population was at risk from natural and human induced environmental hazards. Solid wastes constituted a major source of environmental hazards. Environmental hazards accounted for an estimated 25% of the total burden of disease worldwide (World Health organization, 2009). The society for Environmental Health of Nigeria (SEHON) (2004), stated that environmental health conditions were known to contribute enormous proportion of disease burden and deaths in Nigeria. There



had been a marked increase in the number of diarrhea cases in Nigeria. Available data showed that cases of diarrhea increased from 517,309 in 2001 to 550,740 in 2002. This alone put enormous strain on our human and material resources and such, diarrhea is environmental related disease. In fact, it is a known fact that about 70% of diseases in our communities and indeed in the entire sub-Saharan countries were environmental related.

Nwofe (2014) argued that municipal solid wastes in Abakaliki generated several tons of solid waste which were left uncollected at designated and undesignated wastes dumping sites each day. The accumulated heaps of wastes lead to clogging of drains and gutter, creating breeding grounds for pest that spread diseases thereby resulting in a myriad of related health and infrastructural problems. Most often solid wastes were blown by winds or rainstorm making the environment dirty and air pollution arising from the decay of these wastes emit poisonous gases to the environment.

The World Health Organization (WHO, 2000) noted that urban residents who are living in proximity of exposed and unmanaged waste dumps are subject to more bouts of cholera, an acute intestinal infection, skin diseases, blood and eye cancer and respiratory infections 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 populations' health, which has its organic defenses in formative and creative state. The said situation produces gastrointestinal, dermatological, respiratory, genetic and several other kinds of infectious disease (Salam, 2010).

Ogunnowo & Oderinde (2003) in discussing the recurring sanitation problems in Lagos and the health risks associated with it posited that the inefficient and infective waste management culminated in ugly sight of refuse/garbage dumping sites that frequently littered most Nigerian urban centers. Of course, such refuse heaps usually emitted highly offensive stench that polluted the surrounding air, especially when they are either mixed with rain storm or sewage. This usually led to outbreak of diseases like tuberculosis and bronchitis. The result of the ineffective waste collection and poor waste management cannot be over emphasized. Uchegbu (2002) stated that in Nigeria as a result of poor solid waste collection, wastes find their way on the ground and water bodies causing pollution. Most deaths occur through the cumulative inhaling of toxic/acidic gases by humans later culminating in respiratory disorders, eye problems and cancer among others.

Similarly, Dazhu (2008) declared that municipal waste in African countries contained human excreta, animal excreta and hazardous chemical pollutants which usually facilitated the spread of disease.

### Research Methodology

The study adopted the cross sectional survey design. It covered the entire Awka Urban . Awka is made up of seven quarters as shown in the table below

**Table 1: Quarters and communities in Awka**

S/N	Quarters	Communities
1	Ayom-na Okpala	Umuayom, Umunnoke, Umuoramma and Umuokpu
2	Nkwelle	Achallaoji, Umunamoke, Agbana Umudiaba
3	Amachalla	Amachalla, Amudo, Umuzocha
4	Ifite-oka	Enu-ifite Ezinato-ifite, Agbani-Ifite
5	Amikwo	Umudiana, Okperi, Igweogige, Isiagu, Obunagu
6	Ezi-oka	Omuko, Umueri, Umuogwa, Umuogbunu, Umuogbionu, Umudioka, Umukwu
7	Agulu	Umuogbu, Umubele, Umuanaga, Umuike, Umujagwo, Umuenechi, Umuoruka

Source: Field Survey, 2017

The seven quarters are comprised of thirty three (33) communities. According to national population commission, Awka has a population of 301,657 (2006) census.

The target population for this study included persons aged 18 years and above (males and females) who are in different fields of life. Those examined in the survey included literate and non-literate individuals. Others included civil servants, university staff, students, transporters, business men and women. All individuals in Awka connected with waste management were also included. A sample size of 600 respondents was chosen for this study.

The multi stage sampling procedure was adopted for this study. Awka urban is made up of seven quarters namely Ayom na Okpalla, Nkwelle, Amachalla, Ifite Awka, Amikwo, Ezi Oka



and Agulu. The quarters were numbered from one to seven. By the application of the balloting method and the application of the simple random sampling technique, four quarters were selected. From these quarters, the communities in each quarter were numbered appropriately. Thereafter, the simple random sampling technique was further applied. In each quarter, two communities were selected. The households in the selected communities were identified and numbered accordingly. By the application of the systematic random sampling technique, every third household was selected for the study. Seventy five households were selected from each quarter. In each household, only an adult who was eighteen (18) years and above was selected.

Questionnaire was the most popular instrument used in collecting the data for the study. In dept interview was another technique used in collecting the required data for the study. Top members of the Anambra State Waste Management Agency (ASWAMA) were interviewed on the state of waste management in Awka.

To effectively analyze collected data, the Statistical Package for Social Sciences (SPSS) was used. Research questions stated in the study were analyzed using frequency distribution, tables, percentages and other non parametric statistical procedures. For data generated from the interviews, they were translated, grouped into categories and analyzed on the basis of predetermined themes.

### **Data Presentation and Analysis**

In this study, 600 questionnaires were distributed by the researcher with the help of research assistants. However, 576 (96%) of the questionnaire were correctly filled when they were returned. Consequently the quantitative analysis for this study was carried out with 576 correctly.

**Table: 2 Distribution of Respondents Socio-Demographic Characteristics**

Characteristics/Variables	Variables	No	%
Age	18-27	245	42.5
	28-37	96	16.3
	38-47	113	19.6
	48-57	84	14.6
	58-67	23	4.0
	68 and above	6	1.0
	No response	11	1.9
	Total	576	100.0
Sex	Male	301	52.3
	Female	263	45.7
	No response	12	2.1
	Total	576	100.0
Marital Status	Single	282	49.0
	Married	234	40.6
	Divorced	27	4.7
	Separated	3	.5
	Widowed	19	3.3
	No response	11	1.9
	Total	576	100.0
Level of Education attainment	No formal education	19	3.3
	FSLC	35	6.1
	WAEC/GCE/SSCE or equivalent	158	27.4
	OND/NCE	112	19.4
	HND/B.Sc or equivalent	166	28.8
	PGD/MSc or equivalent	54	9.4
	PhD	24	4.2
	No response	8	1.4
	Total	576	100.0
Family size	1-2	76	13.2
	3-4	237	41.1
	5-6	253	43.9
	No response	10	1.7
Total	576	100.0	
Income Level (Annual)	0-100,000	251	43.6
	100,0001-200,000	50	8.7
	200,001-300,000	62	10.8



	300,001-400,000	53	9.2
	400,001-500,000	51	8.9
	500,001-600,000	101	17.5
	No response	8	1.4
	Total	576	100.0
Religious Affiliation	Christianity	543	94.3
	Islam	2	.3
	Traditional Religion	22	3.8
	No response	9	1.6
	Total	576	100.0

Source: Field Survey, 2017

Table 2 shows that almost half of the respondents are between the ages of 18- 27 years. The table also shows that 52.3% of the respondents are males while 45.7% of them are females. It could be seen from the table that 49% of the respondents are single while 40% of them are married. Furthermore, 27.4%, 19.4% and 28.8% of the respondents are holders of WAEC/SSCE, OND/NCE and HND/B.Sc. respectively. It is shown in the table that 43.9% of the respondents have family size of 3-4 while 41.1% of the respondents have 5-6 people in their families. The income distribution of the respondents shows that almost half of the respondents earn between 0-100,000 naira per annum. Finally, almost all the respondents in this study are Christians.

**Table 3: Influence of population growth on solid waste generation and disposal**

S/N	Variable	Strongly Agree	Agree	Strongly disagree	Disagree
8	The massive solid waste generated in Awka is due to high population growth	302 (52.4%)	194 (33.7%)	34 (5.9%)	45 (7.8%)
9	Rapid growth in population affects the agency responsible for disposal of waste in Awka	118 (20.5%)	260 (45.1%)	72 (12.5%)	124 (21.5%)
10	Overcrowding leads to dirty environment	225 (39.1%)	226 (39.2%)	62 (10.8%)	54 (9.4%)
11	High concentration of people makes the urban residents not to maintain good sanitary habit	118 (20.5%)	259 (45.0%)	78 (13.5%)	118 (20.5%)

Source: Field Survey, 2017

Since those respondents who agreed with the statement (86.1%) far outweighed those that disagreed (13.7%), we conclude that massive solid waste generated in Awka is due to high population growth. The respondents who agreed with the statement (65.6%) outweighed those who disagreed (34.0%) we conclude that rapid growth in population affects the agency responsible for disposal of waste in Awka. Respondents who agreed with the statement (78.3%) far outweighed those that disagreed (20.2%) we conclude that overcrowding leads to dirty environment. In table 3, a majority of the respondents (65.5%) agreed with the statement and they are more than those who disagreed (34.0%), we conclude that high concentration of people makes the urban residents not to maintain good sanitary habit.

Data gathered from in depth interview showed that population growth has serious influence on solid waste generation and disposal in Awka town. An elderly female management staff of Anambra State Waste Management Agency (ASWAMA) stated that “the quantity of solid waste generated in Awka is as a result of the high population in the town. Very many people are now living in Awka in search of greener pasture”. Another female management staff of the agency maintained that;

Population explosion in Awka is responsible for the increase in solid waste generated in the town. There is a very dense population in Awka town which is increasingly making the collection of solid waste difficult and ineffective. The massive solid waste dumps in Awka made the town to look dirty and is polluting the environment.

However, a 67 year old male opinion leader from quarter one in Awka confirmed that solid waste has seriously affected the quarter. According to him;

Many people live in the quarter with very limited waste disposal facilities. The shortage of waste disposal facilities coupled with very large population affected the collection and disposal of solid waste in the quarter. Most often people dump solid waste along drainages and even on the major roads thereby creating problems which have very serious health implication on the people in the quarter.

Another male opinion leader who is 62 years old from Awka quarter two stated that “population growth has influenced the accumulation of massive solid waste in the quarter”. He continued that “population growth has made the town to look very dirty and infested with different kinds of diseases.”

**Table 4: Health implications of solid waste disposal system towards urban residents in Awka.**

S/N	Variable	Strongly Agree	Agree	Strongly disagree	Disagree
12	Urban residents are infested with diseases like cholera, malaria, typhoid, asthma, bronchitis etc as a result of poor waste disposal	247 (42.9%)	233 (40.5%)	49 (8.5%)	44 (7.6%)
13	The presence of rodents and flies on solid wastes can be a menace on the health of urban dwellers	259 (45.0%)	257 (44.6%)	21 (3.6%)	38 (6.6%)
14	Uncollected wastes can cause disease or sickness	302 (52.4%)	221 (38.4%)	28 (4.9%)	23 (4.0%)
15	Some urban dwellers defecate in nearby bush or river which can affect the health of the people	273 (47.4%)	246 (42.7%)	16 (2.8%)	29 (5.0%)

Source: Field Survey, 2017

Since those who agreed with the statement (83.4%) far outweighed those that disagreed (16.1%), we conclude that urban residents are infested with diseases like cholera, malaria, typhoid, asthma, bronchitis etc as a result of poor waste disposal. Furthermore, respondents who agreed with the statement (89.6%) far outweighed those who disagreed (10.2%), we conclude that the presence of rodents and flies on solid wastes can be a menace on the health of urban dwellers. Respondents who agreed with the statement (90.8%) far outnumbered those who disagreed (8.9%), we conclude that uncollected waste can cause disease or sickness. Finally, those who agreed with the statement (90.1%) far outweighed those who disagreed (7.8%), we conclude that some urban dwellers defecate in nearby bush or river which can affect the health of the people. Those who agreed were 90.1% which outnumbered those who disagreed 10.8%.

The in depth interview showed that there are numerous health implications caused by improperly disposed solid waste in Awka town. For instance, one of the elderly male management personnel of ASWAMA confirmed that “when solid wastes are not collected on time, they increase the spread of communicable diseases in the area”. Similarly, another male personnel of the agency stated that;

Uncollected and not properly disposed solid wastes can lead to very serious health consequences. Solid wastes pollute water supply especially from streams and rivers. When solid wastes remain uncollected or improperly disposed off

for a long time, they become potential destructive components in the area and may lead to spread of outbreak of epidemics and deaths.

It was gathered from a 55 year old female opinion leader from Awka quarter 3 that health implications of solid waste disposal are very numerous. She stressed that;

Not properly disposed solid wastes in the quarter have caused very many health problems in the area. Some of the people in the quarter lost their little children to vomiting and diarrhea which was attributed to improperly disposed and uncollected solid wastes in the quarter. Mosquitoes found breeding sites when solid wastes litter the environment and rodents, flies and other disease carrying vectors multiplied due to improperly disposed and collected solid wastes in the quarter.

**Table 5: Effect of ineffective means of solid waste disposal on the environment**

S/N	Variable	Strongly Agree	Agree	Strongly disagree	Disagree
22	Sanitary conditions in which solid wastes are collected and disposed can contribute to environmental degradation in Awka	116 (20.1%)	259 (45.0%)	78 (13.5%)	110 (19.1%)
23	Ineffective solid waste disposal constitutes danger to the beauty of the environment	250 (43.4%)	259 (45.0%)	49 (8.5%)	14 (2.4%)
24	Solid waste heaps lead to environmental pollution	283 (49.1%)	189 (32.8%)	57 (9.9%)	43 (7.5%)

25	Blocking of drainages due to indiscriminate dumping can lead to flooding of roads	308 (53.5%)	199 (34.5%)	41 (7.1%)	25 (4.3%)
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Source: Field Survey, 2017

Having observed that respondents who agreed with the statement (65.1%) are greater than those who disagreed (32.6%), we conclude that sanitary conditions in which solid wastes are collected and disposed can contribute to environmental degradation in Awka. Since those who agreed with the statement (88.4%) far outweighed those who disagreed (10.9%), we conclude that ineffective solid waste disposal constitutes danger to the beauty of the environment. Respondents who agreed with the statement (81.9%) are greater than those who disagreed (17.4%), we conclude that solid waste heaps lead to environmental pollution. Furthermore, since the respondents who agreed with the statement (88%) far outweighed those who disagreed (11.4%), we conclude that blocking of drainages due to indiscriminate dumping can lead to flooding of roads.

Data collected from the in depth interview showed that ineffective solid waste disposal affect the physical environment in many ways. For instance, the elderly female management staff of the agency argued that “ineffective solid waste disposal system can affect the physical environment in ways that could best be described as catastrophic destruction of the environment”. Another participant in the in depth interview, a 52 year old female opinion leader from Awka quarter 4, stressed that ineffective solid waste disposal affect the environment in different forms. According to her;

Ineffective solid wastes disposal affect the beauty of the environment and lead to environmental degradation. When solid wastes are not properly disposed of they become nuisance to the society and constitute very terrible hazardous problems which may eventually lead to spreading of diseases and ultimately untimely deaths of people in the area.

**Table 6: Factors militating against effective means of solid wastes disposal v system in Awka**

S/N	Variable	Strongly Agree	Agree	Strongly disagree	Disagree
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27	Problem of solid waste disposal in Awka is caused by high rate of illiteracy among urban dwellers	162 (28.1%)	175 (30.4%)	139 (24.1%)	94 (16.3%)
28	High rate of illiteracy makes people to dump wastes indiscriminately	161 (28.0%)	183 (31.8%)	108 (18.8%)	124 (21.5%)
29	Lack of education makes people not to know the effects of improperly disposed waste	165 (28.6%)	270 (46.9%)	56 (9.7%)	85 (14.8%)
30	People's ways of life affect their action towards environmental sanitation	168 (29.2%)	262 (45.5%)	95 (16.5%)	40 (6.9%)

Source: Field Survey, 2017

Since those who agreed with the statement (58.5%) are greater than those who disagreed (40.4%), we therefore conclude that problem of solid waste disposal in Awka is caused by high rate of illiteracy among urban dwellers. Having observed that those who agreed (59.8%) outnumbered those who disagreed (40.3%), we conclude that high rate of illiteracy makes people to dump wastes indiscriminately. A majority of the respondents (75.5%) agreed with the statement whereas (24.5%) disagreed, we conclude that lack of education makes people not to know the effects of improperly disposed waste. Since those who agreed with the statement (74.7%) far outweighed those who disagreed (23.4%), we conclude that people's way of life affect their action towards environmental sanitation.

Several factors were adduced as being responsible for why solid wastes are not properly disposed of in Awka. The elderly male management personnel of ASWAMA said that;

Several factors are actually working against the effectiveness of the agency in the disposal of solid waste. One of the factors is the attitude of people toward disposal of solid wastes. People tend to disregard safety measures when they are disposing their solid wastes. This is more evident among the non literate and not so endowed members of the society. They fail to understand that people's environment will give back to them what they gave to it.

Similarly, another participant in the in depth interview, the 62 year old opinion leader from Awka quarter two stressed that,

The environment will relate to the people the way the people relate to it. When people choose to dump waste indiscriminately, then they will face the ensuing consequence that will follow. People tend to appear ignorant of the effects of their actions. When people decide to dispose solid waste as they like, then there is no way the problem of solid waste could be halted in the society.

**Table 7: Distribution of the respondents on type of solid waste disposal method they use**

Responses	Frequency	Percent
Landfill-dumping of wastes by making it small and then cover it with soil	73	12.7
Incineration- burning of waste	309	53.6
Composting- sorting out metals, glasses and other materials that cannot decay from the ones that can decay. The ones that can decay will be converted to fertilizer	98	17.0
Recycling- converting of wastes into new products or materials	81	14.1
No response	15	2.6
<b>Total</b>	<b>576</b>	<b>100.0</b>

Source: Field Survey, 2017

In table 7, (53.6%) of the respondents stressed that they incinerate (burning of waste) their solid waste, (17%) of them said they sort the waste and compost the ones that can decay while (14.1%) of them stated that they recycle their wastes. The table also shows that (12.7%) of the respondents use landfill method. However, (2.6%) of the respondents did not respond to the question. Data from the in depth interview did not differ significantly from the one from the quantitative instrument. The elderly female management staff of ASWAMA averred that people use several methods for disposing their solid wastes. According to her, “people sometimes burn their solid wastes when they have dumped them for sometime in a dumpsite”. She continued that “the agency frowns at the habit of burning solid wastes because it pollutes the environment and makes it hazardous for people to living in the area”. The elderly male management personnel of ASWAMA maintained that;

the agency (ASWAMA) does not burn nor does it permit people to burn their solid wastes instead the agency arrests and prosecute people who burn their solid waste. What the agency does is to collect the solid wastes from the different areas they are kept and then dispose them in a very big valley or erosion site. The wastes are used for controlling erosion by dumping them in very deep erosion sites scattered all over the state. The wastes are not being recycled for now due to the inability of the agency to acquire the facility which will recycle the waste.

In a related development, the 67 year old male opinion leader from Awka quarter one stated that;

The people in the quarter use several means to dispose their solid wastes. Some of the people burn their solid wastes when the wastes have accumulated large enough to be burnt. However, some people come around to pick items they believe are useful for recycling from the refuse dumps in the quarter. Some of the people look for metallic wastes for recycling in furnaces while some others just collected plastic materials from the wastes for recycling. These people just pick the items they need from the wastes dumped in several places in the quarter.

**Table 8: Distribution of respondents on how to make solid waste disposal more effective**

Responses	Frequency	Percent
By legislating and penalizing against indiscriminate disposal of waste	129	22.4
By providing sufficient waste disposal facilities	227	39.4
By intensifying awareness on the dangers of poor sanitary condition	124	21.5
By employing more sanitary workers to assist in the management of waste	82	14.2
All of the above	3	.5
No response	11	1.9
<b>Total</b>	<b>576</b>	<b>100.0</b>

Source: Field Survey, 2017





In table 8, (39.4%) of the respondents averred that solid waste disposal systems could be made more effective by providing sufficient waste disposal facilities, (22.4%) of the said by legislating and penalizing against indiscriminate disposal of waste while (21.5%) of them emphasized intensifying awareness on the dangers of poor sanitary condition. It is also shown in the table that (14.2%) of the respondents urged for employment of more sanitary workers to assist in the management of waste.

The in depth interview showed that a lot of things should be done to improve the manner in which solid wastes are disposed of in Awka. For instance, the female management official of ASWAMA stated that;

The agency needs more waste disposal facilities; personnel and funds to motivate the existing workers by increasing their salaries and other benefits so as to spur them into better performance.

The elderly male management staff of the agency stressed that;

People need to change their attitude on waste disposal. They should stop dumping solid wastes indiscriminately. People need to also pay their levies to the agency on time so that the agency will be able to carry out its functions effectively. Defaulters should be brought to book and prosecuted convincingly to serve as deterrence to others.

In a similar vein, the 62 year old female opinion leader from Awka quarter 3 stated;

That solid waste disposal system in Awka could be made effective by providing more waste disposal facilities and by evacuating the waste timely. The agency needs to be up and doing and people should stop dumping waste indiscriminately. The law enforcement personnel should arrest people who refuse to dump the solid wastes in the proper way and at the right time.

### **Discussion Of Finding**

This study made a lot of interesting findings. It was found in this study that solid waste generated in Awka was partly as a result of high population growth. The growth in population posed a huge challenge to the agency responsible for disposal of waste in Awka. The study found also that overcrowding was a factor in the generation of all forms of waste in Awka. Presently, there is a very dense population in Awka town which is increasingly making the



collection of solid waste difficult and ineffective. The study found that massive solid waste dumps in Awka made the town look somehow filthy thereby polluting the environment.

The study found that whereas many people that live in the quarters do not have adequate disposal facilities. The shortage of waste disposal facilities coupled with the large population affected the collection and disposal of solid waste in the quarter. It was established that most people often dump solid wastes along drainages and even on the major roads thereby creating problems which have very serious health implications on the people in the quarter.

The study found that urban residents were infested with diseases like cholera, malaria, typhoid, asthma, bronchitis and several others as a result of poor waste disposal and the presence of rodents and flies due to solid wastes has become a menace on the health of urban dwellers. Further revelation showed that uncollected and uncontrolled wastes caused diseases or sickness and some urban dwellers defecate in nearly bush or river which in turn affected the health of the people. This certainly requires urgent public policy to address the situation.

It was found in this study that uncollected and improperly disposed solid waste had serious effects on the urban residents. In addition, solid waste were found to pollute water supply sources especially from stream and rivers. We observed that when solid waste remain uncollected or improperly disposed for a long time, they become potential destructive components in the area and could lead to spread of outbreak of epidemics and deaths. This again calls for concerted action on the part of stakeholders.

The study also found that poorly disposed solid waste in the quarter had a lot of health implications in the area. Some of the people in the quarter were reported to have lost their children to vomiting and diarrhea which were attributed to improperly disposed and uncollected solid waste. In addition mosquitoes bred profusely due to solid wastes in the environment and rodents, flies and other disease-carrying vectors pose serious menace due to improperly disposed and collected solid waste. This may require that more efforts be put in by appropriate authorities- state and local government to address the problem.

In this study, it was found that lack of adequate sanitary conditions in which solid wastes are collected and disposed contributed to environmental degradation in Awka town and that ineffective solid waste disposal constituted danger to the beauty of the environment. The study found that solid waste heaps led to environmental pollution and that blocking of drains due to indiscriminate dumping led to heavy erosion and flooding of roads in the vicinity. In this wise,



the state government needs to intensify efforts to involve all in the monthly environmental sanitation activities.

Furthermore, it was found that high rate of illiteracy made people to dump waste indiscriminately. Lack of education was responsible for people not knowing the effects of improperly disposed waste and that people's way of life affected their action towards environmental sanitation. The inhabitants needed to be educated to enable them appreciate the gains or benefit of the appropriate ways.

The study found that people did not have regards for safety measures when disposing solid waters. This was more evident among the non-literate and less endowed members of the society. They failed to understand that people's environment will give back to them what they gave to it. When people choose to dump indiscriminately, usually they will face the ensuing consequences that follow. Obviously there is need to change the orientation of the people (value system) through seminars, conferences and public enlightenment programmes.

In this study, it was found that the agency in charge of waste lacked disposal facilities, Personnel and funds to be able to effectively perform its duties optimally, hence the call to enhance the motivation of ASWAMA workers by increasing their salaries and other benefits so as to spur them to better performance. The study revealed that people needed to change their attitude towards waste disposal. They should avoid dumping solid wastes indiscriminately. People needed to also pay their levies to the agency on time so that the agency will be able to carry out its function effectively. Defaulters should be brought to book and prosecuted convincingly to serve as deterrence to others.

Finally, the study noted that solid waste disposal system in Awka could be made effective by providing adequate waste disposal facilities and also evacuating the waste timely. If this is operational, the agency will be able to stop people from dumping waste indiscriminately. The law enforcement personnel should arrest people who refuse to dump their waste in the proper way and at the right time.

### **Recommendations**

Arising from the findings, in this study, the following recommendations are hereby proposed.

1. Awareness should be created on the need to appreciate the implications of improperly disposed wastes. Efforts should be geared towards changing the waste disposal habits of the people. Acquisition of equipment cannot fully address the problem unless the



waste disposal habits and attitudes of people are changed. This can only produce positive result if they are sensitised on the need for clean and healthy environment which will help to reduce the risk of being infested with waste related diseases.

2. The most important strategy to adopt in order to deal with the problem of solid disposal and its implications on our health is to introduce environmental education in our country. What this implies, is that our educational system must be broadened to embrace new perceptions of environmental education in our country. Environmental education should be taught at all levels of our educational system. The inclusion of environmental education in our school curricular will produce tremendous result since attributes and values are formed early in life. People will learn early to place high premium on the environmental cleanliness thus helping to promote healthy living.
3. Sorting of wastes should be encouraged. The idea of sorting implies that when wastes are generated, the different components are put directly into appropriate (separate) containers. For instance, at household level, separate waste bins should be created for different items. Two waste bins should at least be created by each household for bio-degradable and non-degradable sites. Collection should be done according to types and dumpsites should as well be created for different items.
4. Dumpsites should be located at very far distance to where the inhabitants live. This will help to prevent environmental pollution, unpleasant odour oozing form the dumpsite coupled with the regular discharge of effluents into the atmosphere as a result of incineration activities operating on the dumpsites.
5. The Anambra state government should budget and allocate sufficient funds for waste management programmes to enable the provision of necessary equipment. Presently, there is the challenge of insufficient number of dumpsites in Awka, compared with the population of the area. The dumpsites should be tailored to fit the socio-economic conditions of each quarter. Other equipment like refuse vans, compactors and pay loaders need to be provided in order to reduce the problem of waste menace
6. Recycling which is based on the treatment of solid waste as a resource should be encouraged. Recycling will help to bring all round improvement in urban sanitation as well as the enhancement of environmental protection, aesthetics, healthy and living conditions of urban residents.



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