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Safety Disposal of Domestic Wastes and Its Environmental Benefit in Disease Control in Gwagwalada FCT, Abuja

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Abstract- ***A house to house survey of some domestic wastes produced in Gwagwalada town of the FCT was carried out to determine the safety disposal of wastes and its environmental benefit in disease control. Primary data were obtained through the administration of structured questionnaires, Oral interviews, field observation and household survey. Secondary data was obtained from desk review method. The result showed that eight (8) type of domestic waste were generated in Gwagwalada town. These are remnant of food crops, Vegetable and Perishables, Paper/Cardboards, and Textiles, these are degradable. While, Glass materials, Plastic/Ceramics, Polythene materials, and Used Cans are non-degradables. Result also showed that the impact of pollution from remnants of food, vegetables and perishable fruits are more in low income and high density areas. The noticeable problem of most collection centres are accumulation and over spilling . These may lead to seapage of the affluence from these wastes to water bodies. The major environmental challenges resulting from improper disposal and poor management of domestic waste in Gwagwalada metropolis are physical nuisance of the waste to the environment, waste are blown around by winds making the environment dirt , the wastes some time block drainage channels during rainfall causing flooding .The wastes also serve as good hideouts for reptiles, rodents , and other dangerous insects. The degradable wastes may decomposed to emit methane which contributes to climate change and environmental degradation . Daily collection and effective management of these wastes is emphasised , more so that some of the waste drain into River Usuman and subsequently emptied into Gurara falls, the main water reservoir of FCT . Therefore , the study recommends that a strong legislation with severe sanction be put in place and there should be a continuous public enlightment on the danger of waste, and economic opportunities of recycling / safe disposal.***

Keywords; Environment, Disposal, Domestic, Wastes, Safety.

I. INTRODUCTION

Waste can be defined as a refuse or any material that is discarded or intended to be discarded. wastes may be solid, semi-solid, liquid or contained gaseous materials. Commercial products are not wastes unless and until they are discarded. A simple system would recognized three categories of wastes, namely; animals, vegetable and mineral wastes, with the two (animals and vegetable) being easily decomposed and re-absorbed or biodegradable (Ogbodu, 1996). According to Butu and Mshelia, 2014, Municipal solid wastes are discarded materials arising from operational activities taken place in different land use such as residential, commercial and industrial. Domestic or residential wastes are those that are collected from dwelling places on regular basis, such wastes include organic matter resulting from preparation and consumption of food, rags nylon and ashes are the remains after various cooking and heating processes. The commercial wastes are those that arise from food and drink establishments, markets, shops and banks. These include polythene material, papers, nylons etc. The industrial wastes are waste material that arise from industrial processes. These could be solid, liquid or gases. Residential solid waste (sometime called household waste) usually form the largest proportions of municipal waste (Open wash, 2016). A clear distinction exists between disposal of municipal wastes and other types of wastes, in particular to industrial or hazardous wastes (Gunter, 2003). Municipal refuse is generated every where people live. This is not the case with industrial wastes. The organisation of municipal waste disposal is a necessity for every community on the local level. Industrial wastes disposal can only be done on a regional, super regional or even national level (George,2006).

Environmental and developmental issues have become integral parts of policy agenda in development planning at National and International levels. The United Nation (UN) Conference on the Human Environment held in Johannesburg, South Africa 2002 and the UN Conference in Environment and Development (UNCED), of 2012 otherwise

known as Earth Summit in Rio de Janeiro, Brazil, reflect the political attention that has been accorded to the environment and its linkages to sustainable development. Every participating country at the summit re-affirmed her commitment to the waste recovery and conversion of wastes to other useful purposes, and disposal of wastes in environmentally sound and sustainable manner (UNCED, 2016). In Nigeria environmental consciousness is evolving, as major public events like natural disasters, flood/erosion, threats of disease outbreaks have increased people's interest and according to Ogbodu, 1996 these are not enough to combat the problems that if not given urgent attention will negatively affect the security of the nation. Protection against short term direct and indirect risks due to improper waste collection and disposal as well as protection from the long term effect on public health of possible ecological changes resulting from unsafe disposal method should form integral part of town planning and should be the priority of any researcher. In march 1980, the world bank published a policy paper on health which reported that most deaths in developing countries are caused by diseases transmitted by human wastes (intestinal parasitic and infectious dirrhea diseases), by air borne infectious (turberculosis and pneumonia) and by malnutrition (Gunter,2003). The basic health problems of less developed countries are likely to prevail for some time since they are essentially related to faecal-oral and vector-borne diseases. It may be noted that life expectancy at birth in developing countries rarely exceed 50 years, with infant mortality commonly surpasses 75 to 100 per 1000 live birth. Lack of a healthy environment is the major cause of high morbidity and mortality and those responsible for the treatment and safe disposal of solid wastes must be aware of this potential health hazards and the need for precaution(Gunter,2003). Health impact of domestic wastes also include exposure to toxic chemicals through air, water and soil media, exposure to infection and biological contaminants, stress related to visual amenity, risk of fire, explosions, spills and transport emission (Dolk,2002). According to Seo,2004 environmental impact can be clustered into six categories; global warming, photochemical oxidant creation, abiotic resources depletion, acidification, eutrophication and ecotoxicity to water. Health and social impact of domestic waste include odour nuisance, ozone formation that can cause pulmonary and central nervous system damage, fire and explosion hazard from build-up methane, and increase in number of vermin which act as disease vectors and ground air pollution from leachate land-fill gases and incineration (Neal and Schubel,1987). Ozone formation can cause decrease in crop yield and plant growth rate. Methane and carbon dioxide are green-house gases that contribute to global warming. Methane is twenty times more effective in trapping than carbon dioxide, and more persistent in the environment (USEPA,2010). Leachate from land-fills can enter ground water system, leading to increases in nutrient levels that cause eutrophication, bio-accumulation of toxins and heavy metals. Recycling also pose health and environmental risks. Sorting facilities contain high concentration of dust, bio-aerosols and metals. Workers commonly experience itching eyes, sore throats and respiratory diseases (Gladding and Toni, 2002). Human race in Nigeria has an uphill task protecting itself from unhealthy environment; saddle with epidemics, poor sanitation, unwholesome waste management, poor urban planning, unregulated human settlement patterns, water borne diseases and other communicable diseases. To fight environmental degradation of our cities, towns and villages and to enhance the quality of the lives of the people, there must be provision of pure drinking water (George, 2006). The primary consideration in the treatment and disposal of solid wastes is the prevention of communicable diseases transmitted by enteric, parasitic and vector-borne agents. The dangers are far greater in developing countries than in industrialized ones because of the greater prevalence of disease organisms (Gunter,2003). The public health is safe-guarded if the wastes are stored in a closed container from which they are transferred direct (without contact with the ground and without exposure for more than a few seconds) into an enclosed vehicle and if the frequency of collection is shorter than the life cycle of insect vectors. Because the wastes in cities are often stored in open street bins for several days or weeks, insects have complete access for food and egg-laying, while rats and mice have access to the food contents (Gunter, 2003). Hence, quick waste disposal is the easiest and surest way to avoid wastes accumulation (Umenweke, 1997). Inadequate management is a major cause of environmental degradation in most of our major cities. Solid waste management in Nigeria is characterized by inefficient collection methods, insufficient coverage of the collection systems and improper disposal of the wastes (Ogwueleke, 2009). Gwagwalada faces serious environmental degradation and health risk

due to uncontrolled municipal refuse on streets and in public areas. The constitution of the monthly environmental sanitation which state that sewage and refuse disposal shall be the responsibility of the local government council is a total failure. As a result of this, the growth in heaps of refuse blocking the streets of our major towns and cities is evidently seen at many locations of Gwagwalada.

This research is designed to study the safety disposal of some domestic solid wastes in Gwagwalada metropolis and its environmental benefits in diseases control. Environmental hazards of varying magnitude dangerously threaten human and animal lives in most urban centre of Nigeria, Gwagwalada is not an exception. Rapid urbanisation, rural urban migration , influence of capital city, non adherence to town planning regulations, lack of political will etc created some of the environmental challenges facing Gwagwalada.

II. MATERIALS AND METHODS

This study was carried out in Gwagwalada town of the Federal Capital Territory. Gwagwalada is the headquarter of one of Area council of the FCT, Abuja-Nigeria. The town has a population of 475,000, with annual growth rate of 8%. (NPC,2022). It is a cosmopolitan town comprising of different types of workforce, businessmen and peasant farmers.

Sampling method

The primary sources of data for this study were the use of questionnaire, oral interview and survey of the households. The secondary sources of data were obtained from desk review method, documented information on municipal solid waste in the city obtained from the relevant literatures and records from Abuja environmental protection Board (AEPB). Each household earmarked for sampling was given two labelled polythene bags for daily collection of their household wastes. These polythene bags were subsequently collected the following evening throughout the sampling period. Each labelled polythene bag was separately weighed using Torsion balance. Thereafter, the contents of each bag was emptied on the cement slab and separated into various types. The weight of each of the waste type was taken for each bag for the various households, and later totalled together. The results were analysed using Chi-square ($P<0.05$).

III. RESULT

The composition of domestic waste generated in Gwagwalada town was determined and result presented in Table 1.The result shows that eight (08) types of wastes were generated .These are remnant of food and food crops (41.2%), Vegetable and Perishables (26.3%), Paper/Cardboard (7.4%), and Textiles (4.1%). These are degradable wastes. Others are Glass materials (4.07%), Plastic/Ceramics (6.8%), Polythene materials (5.6%), and Used Cans (4.5%). These are non-degradable components

Table 1: Composition of domestic waste in Gwagwalada

S/NO	Types of wastes	%
1	food/food crops	41.22
2	Vegetable/Perishables	26.31
3	Glass materials	4.07
4	Paper/Cardboards	7.43
5	Plastic/Ceramics	6.75
6	Polythene materials	5.58
7	Used Cans	4.52
8	Textile materials	4.07
	TOTAL	100%

Impact of pollution from all the types of waste materials in six density areas of Gwagwalada town is shown on Table 2.The result showed that Central Mosque Area of the study area generated the highest amount of remnant food and food crops with a total of 13.38kg. It is closely followed by old kutunku with 22.82kg. While phases1and ll generated 5.12kg and 5.79kg respectively. The other two density areas, i.e. phase lll of low density area and phase III of high income areas generated 3kg of wastes each. Similarly, impact of pollution from Vegetable/Perishables showed that Old Kutunku which is the low income area generated 8.91kg, followed by Central Mosque of new Kutunku (8.32kg) which is the high density area. Phases I and II of both moderate income and moderate density areas generated 3.22kg and 3,43kg respectively. The high income area of Phase III (rear) and low density area of Phase III, both generated 2kg each. Similarly, impact of pollution from Glass, Paper/Cardboard, Plastic, Polythene, Used Cans and Textiles followed the same pattern, of high density (Central Mosque Area) and Low income area (Old Kutunku)

generating the high rates of these wastes that pollute the environment.

Table2 .Impact of pollution from all the types of waste materials in six density areas of Gwagwalada town.

S/N	Res. Area	Remn. of F/food crops	Veg. &perish.	Glass mate-Rials	Paper& C/board	Plast.&ce ram	Poly-thene.	Used Cans	Textile
1	Old kutunku (L.I)	12.82	8.91	0.90	1.34	1.57	1.21	0.89	0.42
2	Phase l (M.I)	5.12	3.22	0.62	1.34	1.08	0.92	0.28	0.07
3	Phase lll C. (H.I)	3.41	2.19	0.05	1.30	0.62	0.79	0.91	0.00
4	Centrai MQA (H.D)	13.38	8.32	1.42	1.65	2.01	1.38	1.28	3.95
5	Phase ll (M.D)	5.79	3.43	0.77	1.35	1.28	0.98	095	0.08
6	Phase lll R (L.D)	3.77	2.21	0.62	1.02	0.69	0.73	0.61	0.01
	Total	44.29	18.28	4.38	7.99	7.25	6.01	4.92	4.42

Trend of wastes generated in Gwagwalada.

This study revealed gradual accumulation of wastes emanating from households in the different areas of the town. The gradual daily build up of these wastes is of serious concern more so that they are contaminants of total environment (land, water and air). The danger of these wastes in terms of disease transmission cannot be over ruled. Components of wastes due to food and food crops as well as those due to vegetables account for 67.5% of the total wastes generated from the study area. The implications of these is that such waste if not properly managed may decay rapidly leading to high multiplication and subsequent contamination with bacteria and other microbes from the rotten food and vegetables. Since some of these wastes are often removed by the less privileged for either direct consumption or sold to make money or for recycling back to the immediate communities, such practice may lead to dissemination of microbial infections that may be of immense public health significance. The much lower value for paper wastes showed that the use of paper materials is as wide spread among families as the other items. Similarly, the 4.07% reported for bottle and glass materials may be due to the common practice of salvaging some whole bottles especially those for soft drinks and wines leaving only a few of no return bottles of pharmaceutical origins as commonly practiced in Nigeria. These together with plastics are daily hunted for by human scavengers which might have led to removal of these categories of wastes for recycling in larger community in exchange for cash. These assertion is confirmed by the non significant difference of these wastes in the different households and density areas. However, since they are non-degradable , if continued to be dumped on the environment indiscriminately may lead to accumulation and can constitute a threat to the environment.Polythene and cellophane were found in all of the study areas. This could be due to their common use in this area. In recent time, polythene bags and other polythene materials are used in the package of almost all the commercial and domestic products such as magi, biscuits, sweets, onions, vegetable, grains etc. This explains the level of polythene usage as the common commercial material that littered our environment today in the area covered by this study. The 5.6% accounted for by the polythene materials in this study calls for the modification of the method of estimating daily solid waste generation in kg/day/household as advocated by McLaren(1996). The advocacy is not feasible with regard to polythene materials which were weightless but more in quantity and formed the commonest and widely pollutants in Gwagwalada town and other parts of Nigeria.

According to Salamatu et al., 2017, the composition of domestic solid waste is influenced by certain factors like areas (residential, commercial etc), the economic level (differences between high and low income areas), season and weather (differences in the amount of population during the year, tourist places and culture of the people living or doing business in the area).These factors played principal roles in the composition and rate of generation in Gwagwalada town. The areas inhabited by low income earners are the most populated part of the town and as well generated high rates of wastes. For example Old Kutunku and Central mosque area of town, the population density here is high and the inhabitants are mainly peasant farmers with low income. The waste generated in these areas were remnants of food like, yam cassava and potato peels, rotten vegetables/ fruits of different types and polythene materials. This, according to some residents is as a result of lack of stable electricity as well as lack of good storage facilities. This made the people throw away majority of food that would have been preserved for future use. Other areas like phases I and III where civil servants live , the population is low with less rate of wastes generation and the nature of wastes generated also differ. The waste contents range from the products of refined food like tins or cans food, fruits or vegetables, egg-shell, bones, polythenes, bottles. High income areas usually produce more inorganic materials such as plastic, while low income area produce relatively more of organic wastes (Salamatuet al.,2017). Income and educational levels determine the standard of living and as well the eating habit of the people including waste generation (USEPA, 2014). The wastes from finished or processed food dominate these areas, this may be connected to their level of income and enlightment. The amount of wastes generated in these areas remained generally lower of other areas.

Waste disposal and Pollution.

In waste management, it is very important to understand the nature of waste generated in order to design an appropriate collection and disposal methods. The result of daily waste generated in Gwagwalada is presented in Table 1. Collection of wastes in this study coincided with end of rainy season. It is possible that rain might have washed some of the wastes to streams and major rivers of Gwagwalada area council, including River Usuman. Since water from streams in Gwagwalada town drains into the Gurara falls, a major water reservoir of the FCT, there is the possibility of wastes polluting the reservoir. This calls for the need for intensification of daily collection and evacuation of these wastes by Abuja environmental protection board (AEPB).This will help to reduce contamination of this water body. More so, several other pollutants are drained into the reservoir from other towns of area councils of the FCT. Domestic wastes dumped into the river to get rid of them harbour pathogenic agents such as viruses, bacteria and eggs of worms, this can cause diseases such as dysentery, cholera, typhoid, hepatitis (jaundice), ascariosis, schistosomiosis, among others (Butu and Mshelia, 2014). It is evident that some of these domestic wastes (sewage and other domestic substances) encourage rapid growth of these parasites and microbial agents especially bacteria when waste is in water or damped condition (Bernad, 2006). The bacteria require oxygen for decay of waste matter and oxygen comes from water, hence the dissolved oxygen in water is reduced to a point that cannot support aquatic organisms.Hence the death of algae from algal bloom and other aquatic plants in fresh water may lead to shortage of oxygen in the atmosphere. And about 65% of atmospheric oxygen comes from the sea plant through photosynthesis; aquatic animals and man will therefore die of suffocation if water pollution continues unchecked. (Zerinetal,2016) .The aquatic flora and fauna may be depleted due to the pollution and this affect biodiversity.

In Gwagwalada, the study revealed two systems of waste collection; primary and secondary collection. The primary collection system is limited to households level while the Secondary or municipal collection system is effected from the communal collection or depot centres and transported to a collection or disposal sites. The noticeable problem of most communal collection centre is the accumulation and over spilling. These may lead to seapage of the affluence from these wastes to water bodies. This has been a frequent occurrence in major dams such as ABU dam in Zaria, (Kela, personal communication). In Gwagwalada, refuse are dumped or deposited under the cover of night on unofficial dumping grounds including drainage channels and water course. Blockage of drainage system results into flooding and may become even breeding places for vector borne diseases and microbes of public health. Wastes deposited on open communal collection centres are left for months without being collected by task force. Some of these wastes are

found scattered by animals and sometimes blown about by winds or found their ways back to the households, streets or even streams. In the developed areas of the town, where plastic waste bins were provided, sometimes the containers are filled up for months without being evacuated by the environmental officials. These accumulations and over spilling create unpalatable odours and provide conducive breeding places for flies, rodents and reptiles. Furthermore, polythene wastes are blown around by wind consequently most of the refuse end up in drains and thereby contribute to the blockage and subsequent pollution of stream/rivers. This can lead to outbreak of diseases as well as erosion of the top soil by running water. Human faecal matter presence in all the solid waste dump sites in the study area can present a faecal health problem to waste workers, residents, scavengers and even children who play around waste containers. The usual disease pathways include placing contaminated hands in the mouth or eating food, through vector insects such as cockroaches or mosquitoes or by directly inhaling air borne particles contaminated with pollutants.

Several studies have shown that most of the synthetic and electronic wastes that are found in open dump sites contain toxic elements that are harmful to humans, plants and animals. Shagalet al.,2012 and Akronget al.,2012 emphasised on the effect of toxic metals that originate from these sources. Gwagwalada metropolis, been a highly populated city with high use of electronic materials is similarly exposed to this type of chemical pollution. It was observed that solid wastes in Gwagwalada that are put into enormous piles can decompose to emit methane a 'greenhouse gas' that is more potent than carbon dioxide. Methane contribute to global warming which could result into climate change (Sharma, 2010).

Solid waste management is an important element of public health and environmental protection. Its purpose is to provide hygienic, efficient and economic collection, transportation, and treatment or disposal of solid wastes without pollution of atmosphere, soil or water system.

According to (Ojeshina and Longer, 1996) the identified areas of concern that influences poor solid waste management in Nigeria are collection, transportation, treatment and disposal of waste. Also,poorly structured agencies, low budgetary allocations to agencies, lack of awareness on part of general public have also influence their level of performance. Refuse collection as for Jaochin (2005), is the essential prerequisite for effective handling of waste. The task connected with collection, sorting and transport of waste must be solved first, before its treatment. Thus, waste treatment plants can be correctly planned when the quantity and quality of waste is known. In Nigeria, cities continue to grow and expand without proper attention to planning and building of safe environment. According to Adesoje (1996), over 50% of Nigerians have no facilities for human waste and refuse disposal. It is seen in Gwagalada, no properly designed solid waste disposal facility, only incinerators were installed but were never put to use. All land fill sites are actually open dump sites, where municipal wastes are disposed in an uncontrolled manner, which poses public health and environmental health problems of great magnitude, odour, surface and ground water contamination through leachate infiltration and other health hazards. There is therefore the need for Gwagwalada area council to ensure strict compliance with Abuja master plan as earlier advocated during El-Rufai administration.

Economic benefit of wastes.

Waste management creates employment opportunities for people and increased their economic power. By this, waste management created employment for such people and increased their economic power. For instance, empty glass bottles and containers were bought from various homes by some traders and sorted out according to their sizes, quality and usage for sale to breweries and pharmaceutical companies. The companies buy these empty bottles because it is cheaper than manufacturing new ones. Similarly, battered sleepers, plastics, waste paper and cardboards can be sold to recycling and packaging companies, though these type of factories are yet to be established in Gwagwalada town. Hence such wastes are taken to other places for recycling. By this, waste management creates employment for such people and increased their economic power.

In Russia, wastes from extraction and processing of metallic and non-metallic raw materials are used to produce aggregates suitable for maintaining forest roads (Umenweke,1997). Wastes from farm product, such as maize cob which is common in Gwagwalada can be bagged and sold to poultry farmers. Human and other organic wastes from agriculture which constitute about 79% can be composted or treated and

buried at shallow depth in the field for planting of crops. Nitrogen, phosphorus and potassium are known to be constituents of human wastes which are essential for plant growth, and production of biogas from anaerobic digestion of human wastes is practiced in China and Europe where compost, agricultural fertilizer and soil conditioner is produced from human wastes and water hyacinth through thermophilic composting (Umenweke,1997). Similar strategy should be adopted in Gwagwalada town and Nigeria at large. Polythene material,popularly called 'pure water sachets', which is a nuisance, and a major component of pollution in the study area are available on the streets for waste scavengers. In many public places, and commercial vehicles, waste paper baskets are usually provided so that cardboard materials, used papers are thrown in before being collected and burnt in designated places. Houses are also provided with big dust bins for weekly collection of wastes by the environmental protection agencies (EPA). In order to minimise waste accumulation, government introduced compulsory monthly environmental sanitation exercise to enable people clean up their environment. Full participation of households in this exercise will eliminate huge accumulation of wastes. Although, lack of sufficient and adequate storage facilities in this region made people to throw away some of the food crops, meat and processed food items. Large number of farmers and households have no access to chemicals which could help them store stable food crops like yam and cassava for use all the year round. This might have accounted for accumulation of some of these food items as wastes in this town. In homes and hotels, inconsistent electricity supply hampers food preservation and storage, even where refrigerators and coolers are available. Wastes production could be greatly minimized by provision of chemicals, refrigeration facilities to farmers and producers of such food items to aid preservation. Quick waste disposal is the easiest and surest ways to avoid waste accumulation.

CONCLUSION

The gradual build up of wastes of different origin in Gwagwalada is a threat to environment. Frequent collection and disposal of these wastes is crucial to public health. The study revealed that adequate attention is not given to refuse disposal and management thereby polluting the environment. Water is vital to human existence and one of the factors that can affect its usage is extensive contamination from sewage through wrongful disposed of these wastes. Also adequate planning of the town in accordance to Abuja's master plan may keep the town clean.

RECOMMENDATIONS

- The meagre resource coming from government and other donor agencies as ecological fund should be utilized in management of wastes. Also formal composting and recycling facilities should be set up.
- Area council should improve on daily collection of waste. This will avoid accumulation of waste as some of them may get rotten leading to dissemination of bacteria and other microbes.
- Sanitary landfills for burning all type of degradable wastes should be used to hasten the conversion and recycling of waste in natural ecosystem. The non-degradable waste should be collected, treated/recycled or disposed in accordance to the recommendation of USEPA (2014).
- Government should contract the cleaning of the town or more waste disposal vehicle should be purchased to facilitate rapid collection and disposal of the wastes, also community participation and involvement should be encouraged in waste management.
- Finally, electricity supply to Gwagwalada town should be improved, this is by connecting the town to main priority line of national grid, so that it can carry the major electrical storage facilities of the different households in other to minimise waste from food remnants.

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