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Framework development for mitigating intangible attributes of toxic waste pollution on real estate facilities in Ganjuwa Bauchi

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Abstract
Atmospheric air, light, moisture, temperature, wind, soil and vegetation form part of the living environment that produce the oxygen we inhaled and absorb carbon dioxide we exhaled. Designed objectives: (1.) To evaluate the prevailing intangible attributes of toxic organic waste pollution affecting community health as well as the value of real estate facilities; (2.) To assess the quantum of environmental degradation and community health effects sequel to the consequence of intangible attributes of toxic organic waste pollution affecting community health and the value of real estate facilities. Research Questions: (1.) What are the prevailing intangible attributes of toxic organic waste pollution affecting community health as well as the value of real estate facilities? (2.) Why is the quantum of environmental degradation and community health effects sequel to the consequence of intangible attributes of toxic organic waste pollution affect the value of real estate facilities? Methodology: Quantitative paradigm was used to determine the relationship between independent and dependent variables. Data Analysis: Descriptive statistics was used to analyze the structured questionnaires. T- test and Pearson Correlation were used in analyzing the attributes of toxic organic waste pollution relationship with community health and the value of real estate facilities. Findings: 13 sub-wards surveyed have no refuse dumps or municipal waste collection points, toxic waste litter the whole environment which cause serious health ailments and pollution that affects the value of the real estate facilities. Illnesses such as asthma, respiratory tract infections, food poisoning, onchocerciasis, flu, cholera, diarrhea affect a significant percentage of the people living there. Other findings include presence of two (2) maternity clinics in the study area, under 5 health care center, onchocerciasis and disease control center, three (3) private clinics all of which produce toxic clinical waste that were being incinerated locally which causes pollution and attendant heath impacts to the households. The latter cause several ailments and diseases as mentioned in the first finding. In conclusion, the coefficient value of the attributes of toxic organic waste pollution shows strong positive relationship while that of community health shows weak positive relationship (1 and 0.111). All were significant at 0.02 and 0.03 levels (2 tailed) respectively. Recommendations: The study suggested that refuse dumps be provide at each of the 13 sub-wards; toxic clinical waste from the 5 maternity clinics and the onchocerciasis disease control center be incinerated as appropriate; government should improve municipal waste collection, transportation and disposal system via its environmental protection agency.

Keywords: Mitigation, intangible attributes, toxic waste, pollution, real estate facilities

Introduction

Such human problems as maintenance of the renewable energy and resources, reducing efforts of natural disasters, alleviating chronic damage and abating pollution are all parts of environmental system. most significant and considered in this paper were soil, water, air and the ecosystem. Tangible and intangible attributes of toxic waste pollution affect real estate facilities. Toxic waste is part of solid waste (SW) which consists of organic, inorganic and e-waste. This generates chemical, biological and physical attributes to the environment that affect health of the inhabitants of real estates which accordingly affects the value of the whole estate. Pollutants like metals, herbicides, fungicides, pesticides, toxic waste, tangibly and intangibly affects health of the whole community which in essence affects the value of Real Estate Facilities (REF). Decomposition of chemical substances causes significant damage to ECs and generates poisonous greenhouse gases such as water (H_2O), carbon dioxide (CO_2), methane (CH_4), fluorinated gases and nitrate oxide (N_2O) all of which are significant in triggering global warming. Environment is the sum total of all external conditions which may act upon an organism or community to influence their development or existence (Egunjobi, L. 2017) [4]. Other chemical substances of significant consideration include zinc oxide which is toxic to aquatic life, lead oxide that cause other health effects. Physical decomposition of solid waste causes environmental degradation which cause harm with or without contact and invariably affects the value of Real Estate Facilities (REF).

This article delves to address the issue of intangible effects of toxic waste pollution that generate pollutants which affect real estate facilities and accordingly affect the health and well-being of the inhabitants which all the literature materials perused did not talk about. This have been achieved via the designed objectives to wit: (1.) To appraise the prevailing intangible attributes of toxic organic waste pollution affecting community health as well as the value of real estate facilities; (2.) To evaluate the quantum of environmental degradation and community health effects sequel to the consequence of intangible attributes of toxic organic waste pollution affecting community health and the value of real estate facilities. Many literature materials that highlight on the effects of solid waste pollution did not touch on the absence of refuse dumps and or incinerators that could reduce the quantum of waste littering the living environment which causes serious diseases. This is the gap that this article attempts to bridge. The article observed

critically that although scholars have several papers on solid waste, organic solid waste, toxic waste pollution as well as their impacts. Accordingly, Bisschop and Wingerde (2024) [3] rightly observed that toxic organic waste generated in households goes hand in hand with increase in wealth and urbanization as this paper discovered. But Bisschop and Wingerde (2024) [3] did not highlighted on the intangible aspect of harms done to the households. Similarly, Beatrice et.al (2023) [2] found that illegal dumping of solid waste stem from urbanization and negative perception of people towards waste management as well as lack of municipal solid waste collection or dumping sites as discovered by Bisschop and Wingerde (2024) [3]. Okoloeze, (2024) [7] discovered that Lagosian's conceded to toxic emissions from expired trucks and vehicles that should not have been permitted in a health-conscious society. In addition, people burn wastes haphazardly emitting toxic chemicals into an already bumbled-up environment.

1. Intangible Attributes of Toxic Waste Pollution

Sequel to indiscriminate and haphazard disposal as well as ill management of toxic waste such as organic and inorganic including e-waste which is a global problem, toxic waste pollution affects significant percentage of our community which invariably generates various types of diseases. Interaction and impact of human activities on the environment generates contaminants and pollutants that threatens and negatively affects the value of Real Estate Facilities (REF). Significantly, global population would be about 2 billion in the next two (2) decades, reaching about 9.6 billion meaning a significant increase in environmental degradation and pollution alike. The intangible attributes of toxic waste generate pollutants that threatens and affects ecosystem, vegetation, health and cause pollution and severe epidemics to urban community which vehemently affects the value of Real Estate Facilities (REF). The research focused and gave overwhelming emphasis on the tangible and intangible attributes of toxic organic waste which invariably generates pollutants that is of devastating significance causing pollution that affects the value of Real Estate Facilities (REF). Accordingly, Bisschop and Wingerde (2024) [3] rightly observed that toxic organic waste generated in households goes hand in hand with increase in wealth and urbanization as this paper discovered. But Bisschop and Wingerde (2024) [3] did not highlighted on the intangible aspect of harms done to the households. Similarly, Beatrice et.al (2023) [2] found that illegal dumping of solid waste stem from urbanization and negative perception of people towards waste management as well as lack of municipal solid waste collection or dumping sites as discovered by Bisschop and Wingerde (2024) [3]. Okoloeze, (2024) [7] discovered that Lagosian's conceded to toxic emissions from expired trucks and vehicles that should not have been permitted in a health-conscious society. In addition, people burn wastes haphazardly emitting toxic chemicals into an already bumbled-up environment.

1. Concept of Environmental Components

Environmental components are the surroundings that surrounds human beings from all angles and accordingly affect their lives in totality which include atmosphere, hydrosphere, lithosphere, biosphere, etc. Specifically, these components are soil, water, air, microorganisms and solar energy. However, solid waste consists of organic, inorganic and E-waste. The composition of organic solid waste includes vegetables, papers, textiles, woods, packaging materials; while the composition of inorganic solid waste include cans, plastics, glasses etc. E-waste however, consist of discarded electronic appliances such as mobile phones, computers and televisions. Solid waste generates single or combination of toxic chemical, biological, or physical attributes to the environment that may have negative impact on the health of exposed subjects, including pollutants such as heavy metals, pesticides, biological contaminants and toxic waste, industrial and home chemicals. Some of the substances are clearly conspicuous while others are not openly noticed but their ill effects manifest on the environment as well as on the public over a given period of time. "Disasters have spread throughout the land and sea as a result of what people do and they shall therefore taste the consequences of the effects of their activities (Quran Chapter 30: Verse 41)." The interaction and impact of human activities on the natural environment generates substantial substances, materials, contaminants and pollutants that contaminate and pollute the immediate living environment. Tangible and intangible attributes of toxic solid waste pollution have the potential to threaten the surrounding natural environment as well as important environmental components or adversely affects the ecosystem, vegetation, people's health that will trigger various ailments and epidemics.

2. The Intangible Impact of Chemical Decomposition of Substances (CDS)

Decomposition of chemical substances in solid waste is causing statistically significant damage to environmental components. Substances with aquatic toxicity include zinc oxide which is a common paint pigment and is extremely toxic to aquatic life of the ecosystem. Chemical elements like lead may cause health effects especially in large concentrations in the natural environment. Other chemical substances that cause health attendant effects include herbicides, pesticides, fungicides as well as toxic chemical waste. The decomposition of chemical waste generates poisonous gases such as the greenhouse gases that are very significant in triggering global warming. Greenhouse gases appears to be the leading causes in keeping the Earth surface warm because they keep some of the planet's heat that would otherwise escape from the atmosphere.

Bisschop and Wingerde (2024) [3] rightly observed that toxic organic waste generated in households goes hand in hand with increase in wealth and urbanization as this paper discovered. But Bisschop and Wingerde (2024) [3] did not highlighted on the intangible aspect of harms done to the households. Similarly, Beatrice et.al (2023) [2] found that illegal dumping of solid waste stem from urbanization and negative perception of people towards waste management as well as lack of municipal solid waste collection or dumping sites as discovered by Bisschop and Wingerde (2024) [3]. Okoloeze, (2024) [7] discovered that Lagosian's conceded to toxic emissions from expired trucks and vehicles that should not have been permitted in a health-conscious society. In addition, people burn wastes haphazardly emitting toxic chemicals into an already bumbled-up environment. Okoloeze, (2024) [7] further observed that sequel to the haphazard burning of toxic waste which pollute the air, increasing health concern emerges.

to pay the highest price for the effects of the climate crisis.

3. The Intangible Impact of Biological Decomposition of Substances (BDS)

In the same vein, toxic waste containing vulnerable biological substances when decompose poses threat to the health of living organisms, primarily human beings. This includes the menace of cumulative medical waste that can affect human health and cause ailments such as cholera, malaria, food poisoning, onchocerciasis, etc. However, the number of people affected by the jeopardy of these toxic solid waste pollution that causes environmental degradations and the injuries imposed by the impact of the tangible and intangible attributes of the solid waste has been unique and alarming (Iginiasia, 2024) [5].

4. Current Environmental Protection Practices (CEPP)

Substantial environmental protection practices that were in place to suppress the threatening attributes of both the tangible and intangible impact of toxic solid waste pollution appeared to be in vain. Consequently, efforts were equally made to formulate measures to lessen the confrontational impacts of the attributes of the tangible and intangible effects of toxic solid waste pollution on various environmental components have been identified but eventually yielded statistically insignificant results (Iginiasia, 2024) [5]. Inefficient solid waste management system creates severe destruction on various environmental components and consequently generates harmful effects such as contagious ailments, water and land pollution as well as blockade of drainages and general damage of biodiversity. Another consequence of accumulated toxic waste is air pollution, which causes various respirational infections and other hostile health effects. Toxic clinical waste from the 5 maternity clinics and the onchocerciasis disease control center be incinerated as appropriate. Government should fund scavengers to boost their activities and recycling businesses and fine haphazard toxic waste disposal especially in neighborhoods where people live. Municipal waste collection, transportation and disposal system should be improved via Government Environmental Protection Agency. Households and other stake holders should be enlightened on the dangers of disposing toxic waste especially from health facilities in neighborhoods. Governments should invest in green environmental systems and machineries to restore and recycle toxic wastes into accepted vegetative systems that would vehemently improve the living environment (Okoloeze, 2024) [7].

1. Research Design

This research implored quantitative approach paradigm to determine the relationship between independent and dependent variable. Quantitative research designs are either descriptive (subjects usually measured once) or experimental (subjects measured before and after a treatment). A descriptive study establishes associations between variables desired (Saunders, etal, 2016) [8].

2. Research Respondents

The respondents of this research were the residents of Ganjuwa neighborhood, council chairman, secretary, five head of departments, five supervisory councillors, district head, five district head staffs, Land officer, Divisional Police Officer (DPO), Emirate council representative, Director fire service, state development board, ministry of lands, ministry of works, state security service (SSS), state government representative, central market chairman, local authorities, state water board etc. (Saunders, etal, 2016) [8].

3. Sample Population of the Research

The research was conducted at Ganjuwa neighborhood of Bauchi local government area of Bauchi state. The 13 sub wards upon which the research was conducted is having a population of about one hundred and fifty-three thousand households (153000) and a sample population of three hundred households was taken (Saunders, etal, 2016) [8]. The respondents of this research were the residents of Ganjuwa neighborhood, council chairman, secretary, five head of departments, five supervisory councilors, district head, five district head staffs, Land officer, Divisional Police Officer (DPO), Emirate council representative, Director fire service, state development board, ministry of lands, ministry of works, state security service (SSS), state government representative, central market chairman, local authorities, state water board etc. (Saunders, etal, 2016) [8].

Table 1: Questionnaires Administered

S/n	Questionnaires	Number	Percentage	Location
1.	Number Administered	300	100.00(%)	Ganjuwa Neighborhood
2.	Number Returned	280	90(%)	Ganjuwa Neighborhood
3.	Number Not returned	20	10(%)	Ganjuwa Neighborhood

Source: Field Survey, (2024).

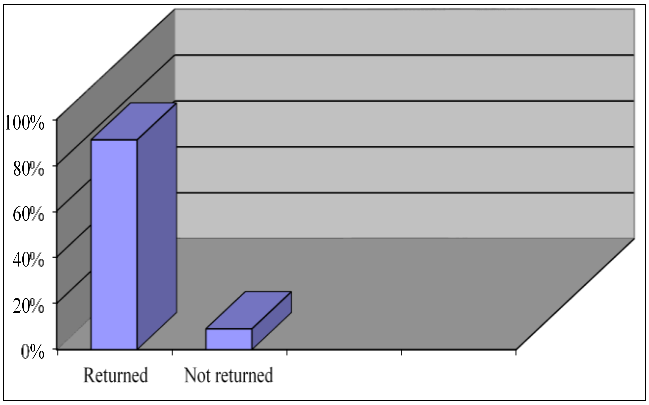

Fig 1: Questionnaires administered

4. Internality and the Impact of the Intangible Effects of Toxic Waste Pollution

Hernstein *et al*. (1993) perceived that internality is the intangible cost or effects impose on persons of the urban community as a result of the tangible and intangible attributes or effects of the activities of the urban community. For instance, internality as Bisschop and Wingerde (2024) [3] rightly observed that toxic organic waste generated in households goes hand in hand with increase in wealth and urbanization as this paper discovered. This article highlighted on the intangible aspect (internality) of harms done to the households. Similarly, Beatrice et.al (2023) [2] found that illegal dumping of solid waste stem from urbanization and negative perception of people towards

waste management as well as lack of municipal solid waste collection or dumping sites as discovered by Bisschop and Wingerde (2024) [3] also affects other people that do not in any way take part in the harm done. Similarly, as Okoloeze, (2024) [7] discovered that Lagosian's agreed to toxic emissions from expired trucks and vehicles that should not have been permitted in a health-conscious society is also an internality that affect others that were not party to the ruin executed. In addition, people burn wastes haphazardly emitting toxic chemicals into an already bumbled-up environment which affects others. Okoloeze, (2024) [7] further observed that sequel to the haphazard burning of toxic waste which pollute the air, increasing health concern emerges and consequential effects affect innocent inhabitants.

5. Externality and the Impact of the Intangible Effects of Toxic Waste Pollution

Laffont (2008) observed that externality, however, is the tangible effect of the activities of the urban community affecting environmental components which inevitably affects health and REF that invariably affects others physically. Tangible effects of the mess of others that affect innocent inhabitants physically. Externality according to Tiamiyu (2023) [9] is the tangible effects of the toxic waste pollution caused by the carbon emissions triggered by others and physically affect people that were not party to the emissions. Iginiasia (2024) [5] found in his article '5 Biggest Environmental Issues in India' that one of the most persistent environmental issues in India is air pollution which negatively causes several ailments and diseases to innocent inhabitants of a neighborhood physically. Iginiasia (2024) [5] further conceded that according to the 2021 World Air Quality Report (WAQR), India is the home to 63 out of the 100 largely polluted cities affecting the well-being of prudent people physically, with New Delhi having the worst air quality in the world. This tangible effect or externality in New Delhi, triggers pollution and pollutants from vehicular emissions, industrial waste, smoke from cooking, building waste and harvest sweltering which were among the major causes of air pollution in India physically affecting third parties. India depend on coal, oil, and gas which makes it the world's third-largest polluter, this tangible externality delves deep in causing over 2.65 billion metric tons of carbon emissions to the atmosphere annually (Iginiasia, 2024) [5]. Intergovernmental Panel on Climate Change (IPCC) added that India is the country expected to pay the highest price for the effects of the tangible or physical climate crisis.

Analysis of the Data Collected

Analysis of data is a process of inspecting, cleaning, transforming, and modelling data with the goal of highlighting useful information, suggesting conclusions, and supporting decision making. Data analysis has multiple facets and approaches, encompassing diverse techniques under a variety of names, in different business, science, and social science domains. The quality of the data should be checked as early as possible. Data quality can be assessed in several ways, using different types of analyses: frequency counts, descriptive statistics (mean, standard deviation, and median), normality (skewness, kurtosis, frequency histograms, normal probability plots), associations (correlations, scatter plots). Data analysis is a body of methods that help to describe facts, detect patterns, develop explanations, and test hypotheses (Saunders, etal, 2016) [8].

1. Relationship between attributes of toxic organic waste pollution on community health and the value of real estate facilities

The coefficient value of the attributes of toxic organic waste pollution shows strong positive relationship while that of community health shows weak positive relationship (1 and 0.111) respectively. All of which were significant at 0.02 and 0.03 levels (2 tailed) respectively.

Table 2: Correlations on the relationship between the attributes of toxic organic waste pollution and community health

		Toxic waste pollution	Toxic waste pollution	Toxic waste pollution	Toxic waste pollution	Toxic waste pollution	Toxic waste pollution
Toxic waste pollution	Pearson Correlation	1	.111	.073	.233**	.237**	.239**
	Sig. (2-tailed)		.051	.073	.011	.013	.015
Communit y health	Pearson Correlation	.111	1	-.251**	.412**	.011	.415**
	Sig. (2-tailed)	.051		.012	.014	.971	.010
Toxic waste pollution	Pearson Correlation	.073	-.271**	1	-.171**	.233**	-.072
	Sig. (2-tailed)	.071	.000		.001	.002	.112
Communit y health	Pearson Correlation	.373**	.411**	-.171**	1	-.033	.611**
	Sig. (2-tailed)	.001	.010	.001		.221	.011
Toxic waste pollution	Pearson Correlation	.251**	.011	.252**	-.033	1	-.032
	Sig. (2-tailed)	.001	.731	.011	.312		.311
Communit y health	Pearson Correlation	.273**	.373**	-.073	.503**	-.031	1
	Sig. (2-tailed)	.001	.010	.001	.000	.321	

**Correlation is significant at the 0.02 & 0.03 levels (2-tailed)

Source: SPSS T – Test Statistics, June, (2024)

Table 3: Correlation between the attributes of toxic organic waste pollution and the value of real estate facilities

		Toxic waste pollution	Toxic waste pollution	Toxic waste pollution	Toxic waste pollution	Toxic waste pollution	Toxic waste pollution
Toxic waste pollutio n	Pearson Correlation	1	.333**	.337**	-.339**	.235**	.237**
	Sig. (2tailed)		.001	.002	.003	.004	.005
Value of Real Estate facilities	Pearson Correlation	.355**	1	.352**	-.521**	.535**	.541**
	Sig. (2tailed)	.000		.001	.002	.003	.004

Toxic waste pollution	Pearson Correlation	.507**	.642**	1	-.512**	.303**	.253**
	Sig. (2tailed)	.000	.000		.000	.000	.000
Value of Real Estate facilities	Pearson Correlation	-.455**	-.643**	-.512**	1	-.271**	-.359**
	Sig. (2tailed)	.001	.002	.003	.004	.005	.006
Toxic waste pollutio n	Pearson Correlation	.211**	.333**	.335**	-.252**	1	.359**
	Sig. (2tailed)	.001	.002	.003	.004		.005
Value of Real Estate facilities	Pearson Correlation	.333**	.335**	.253**	-.512**	.514**	1
	Sig. (2tailed)	.001	.002	.003	.004	.005	

** Correlation is significant at the 0.03 & 0.06 levels (2-tailed)
Source: SPSS T – Test Statistics, June, (2024)

2. Findings on the Existing Environmental Degradation in the Study Area

The prevailing tangible and intangible attributes of toxic organic waste pollution affecting environmental components (EC) that invariably affects community health as well as the value of real estate facilities were appraised and the existing environmental degradation was ascertained. However, analysis of the structured questionnaires was done using descriptive statistics revealed that the 30 sub-wards surveyed have no refuse dumps and as such, toxic waste that litter the whole environment was usually burnt thereby causing serious health ailments and toxic pollution that affects the value of the whole area. Illnesses such as asthma, food poisoning, onchocerciasis, flu, cholera, diarrhea affect a significant percentage of the people living there. Other findings include presence of two (2) maternity clinics in the study area, under 5 health care center, onchocerciasis and disease control center, three (3) private clinics all of which produce toxic clinical waste that were being incinerated locally in the neighborhood which causes the air and the whole environment to be polluted. This severe pollution was found to cause several ailments and diseases as mentioned in the first finding. Similarly, the findings also revealed that the coefficient value of the attributes of toxic organic waste pollution shows strong positive relationship while that of community health shows weak positive relationship (1 and 0.111) respectively. All of which were significant at 0.02 and 0.03 levels (2 tailed) respectively.

Table 4: Sub-Wards with intangible toxic waste pollution problem surveyed

S/n	Sub-wards	Remark
1	Gidan Baba Haladu	No refuse dump and or incinerator
2	Gwallaga Primary School	No refuse dump and or incinerator
3	Kofar mai Unguwa	No refuse dump and or incinerator
4	Kofar Alti Mohammed	No refuse dump and or incinerator
5	Gidan Baba Haladu	No refuse dump and or incinerator
6	Kofar Makama	No refuse dump and or incinerator
7	Kofar gidan Mamman Ingawa	No refuse dump and or incinerator
8	Kofar Garba Toro	No refuse dump and or incinerator
9	Gidan Baba Haladu	No refuse dump and or incinerator
10	Kofar Makama	No refuse dump and or incinerator
11	Kofar gidan Mamman Ingawa	No refuse dump and or incinerator
12	Kofar Garba Toro	No refuse dump and or incinerator
13	Gidan Baba Haladu	No refuse dump and or incinerator

Source: Field Survey, (2024)

Discussion

Findings of this research would vehemently control environmental pollution thereby controlling its menace in real estate housing as well as the whole society. It would also mitigate the tangible effect of physical decomposition of toxic solid waste that causes environmental degradation which cause harm with or without contact and invariably affects the value of Real Estate Facilities (REF). Equally, biological substances that cause cholera, malaria, food toxic condition, etc. sequel to ineffective management that creates devastation to the value of Real Estate Facilities (REF) would surely be mitigated if the findings of this research are fully implemented**.** Refuse dumps be provide at each of the 13 sub-wards; toxic clinical waste from the 5 maternity clinics and the onchocerciasis disease control center be incinerated as appropriate; government should improve municipal waste collection centers, transportation and disposal system via its environmental protection agency; government should fund scavengers to boost their activities and recycling businesses; government should also fine haphazard toxic waste disposal especially in neighborhoods where people live; households and other stake holders should be enlightened and acquainted on the dangers and health risks of disposing toxic waste especially from health facilities in neighborhoods of the study area and finally, governments should invest in green environmental systems and machineries to restore and recycle toxic wastes into wealth that would vehemently improve the inhabitants condition in their living environment.

Conclusion

Finally, the research is significantly important especially in developing African countries and some part of the globe experiencing substantial effects of toxic waste pollution that has dual effects on real estate facilities and the inhabitants alike. The study suggested that refuse dumps be provide at each of the 13 sub-wards; toxic clinical waste from the 5 maternity clinics and the onchocerciasis disease control center be incinerated as appropriate; government should improve municipal waste collection centers, transportation and disposal system via its environmental protection agency (BASEPA); government should fund scavengers to boost their activities and recycling businesses; government should also fine haphazard toxic waste disposal especially in

neighborhoods where people live; households and other stake holders should be enlightened and acquainted on the dangers and health risks of disposing toxic waste especially from health facilities in neighborhoods of the study area and finally, governments should invest in green environmental systems and machineries to restore and recycle toxic wastes into wealth that would vehemently improve the inhabitants condition in their living environment.

Recommendations

1. The study suggested that refuse dumps be provide at each of the 13 sub-wards;
2. Toxic clinical waste from the 5 maternity clinics and the onchocerciasis disease control center be incinerated as appropriate.
3. Government should fund scavengers to boost their activities and recycling businesses
4. Government should sanction haphazard toxic waste disposal especially in neighborhoods where people live
5. Government should improve municipal waste collection, transportation and disposal system via its Environmental Protection Agency
6. Households and other stake holders should be enlightened on the dangers of disposing toxic waste especially from health facilities in neighborhoods

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