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Health Impacts of Indiscriminate Dumping of Solid Waste Disposal in Wukari Local Government Area, Taraba State, Nigeria

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Abstract

This study examines the health impacts of indiscriminate dumping of solid waste disposal in Wukari Local Government area Taraba State, Nigeria. It aimed at identifying composition of waste material, assessed waste management practice among the residents, assessed health implications of indiscriminate dumping of solid waste disposal in the study area. Primary data was obtained through a set of questionnaire to the waste generators. A structured questionnaire was distributed randomly in residential areas, market/public places, schools, workshops and business centres within the study area. The sample size of this study consisted of 400 respondents household head in Wukari was sampled for the study. The data collection was sequentially using field observation and questionnaires. The data obtained was analysed using SPSS (statistical package for social sciences) version 25.0 to determine frequency distribution, percentage ratio and mean. The result was presented in tables for better understanding. The finding showed different types of waste generated in the study area as polythene waste constituted 33.4%. Clothe/carton/paper wastes constituted 27.3%. Crop residue/food remains 18.0%. Plastics waste, 15.9% while can/tins/battles waste constituted

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5.4% of the total waste generated. Survey revealed that about 43.1% of the household heads which constituted a majority dumped their wastes in open space. Based on the result, it was observed that educational level had positive impacts on the waste management practices.

Keywards: Solid Waste Disposal; Indiscriminate Dumping; Waste Composition; Waste Management Practices; Public Health Impacts

INTRODUCTION

Solid waste means any garbage or refuse, sludge from a waste water treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities. Nearly everything we do leaves behind some kind of waste. United State Environmental Protection Agency, (2021). Solid waste comprises all the leftover arising from human, animal, plants activities and by-products of processes, which are normally solid, and are discarded as useless or unwanted materials.

Solid wastes are waste generated through domestic, commercial, industrial, agricultural and other social activities including institutional wastes, street sweepings and construction debris. Solid waste generated in many cities in Nigeria are composed of organic materials, plastics, polythene, cans/metals, glasses, clothes/shoes, and ceramics Imoh and Udofia, (2011); Aliyu, (2010).

According to (Nwigwe 2014), "refuse disposal is one of the major environmental problems that developing countries are faced with. Health hazard, traffic congestion, unsightliness, unpleasantness and blockage of drainages are some of the problems caused by lack of efficient waste management practice in Nigeria Afangideh *et al.,* (2012). Dispersed solid waste from the illegal open dumps often blocks the drains and sewage ultimately these blockages are creating flooding and unhygienic conditions in many cities. During rainy seasons, leachate from the open dumped sites are causing serious pollution to water bodies, Liquids and fumes, escaping from deposits of chemical wastes are creating fatal or other serious effects to the community Ejaz *et al.* (2013). Direct dumping of untreated waste in rivers, seas, and lakes results in the accumulation of toxic substances in the food chain through the plants and animals that feed on it. Improperly operated incineration plants cause air pollution and improperly managed and designed landfills

attract all types of insects and rodents that spread disease Mattiello *et al., (*2013).

The open garbage system in society is a huge menace to the well-being of stray animals. Stray animals on the road, chewing from the open garbage bins and looking for anything edible to survive. The plight of this animal has become a major concern to society. They grazed around and people discard waste in plastic bags, and the animals searching for food consume the plastic, along with the leftover food materials. The plastics get accumulated in their rumens and become hard Donald *et al.,* (2021).

MATERIALS AND METHODS

Description of Study Area

The study area was Wukari Local Government Area of Taraba State, Nigeria. Its headquarters is Wukari on the A-4 high way. It is located on latitude $7^0$51'N to $7^0$52'00"N and longitude $9^0$45'00"E to $9^0$47'00"N. It covers an area of about 4308km^2. Wukari Local Government has a total Population based on the 2006 National Population Census as 241,546. The Donga River flows through the area and the Benue River forms a boundary with Nassarawa State to the Northwest. Wukari Local Government is a Jukun land and they are an ethno-linguistic group or ethnic nation in West Africa. The Jukun are traditionally located in Taraba, Benue, Nasarawa, Plateau, Adamawa, and Gombe States in Nigeria and parts of North-western Cameroon. They are descendants of the people of Kwararafa. Most of the tribes in the North Central of Nigeria trace their origin to the Jukun people and are related in one way or the other to the Jukuns. Until the coming of both Christianity and Islam, the Jukun people were followers of their own Traditional Religions, Most of the tribes, Alago, Agatu, Rendere, Goemai in Shendam, and others left Kwararafa when it disintegrated as a result of a power tussle. The Jukuns are divided into two major groups; the Jukun Wanu and Jukun Wapa. The Jukun Wanu are fishermen residing along the banks of the river Benue and Niger where they run through Taraba State, Benue State and Nasarawa State.The (Fig.1) shows the map of Nigeria at the top left hand corner indicating the map of Taraba State, then map of Taraba Tate indicating map of Wukari the larger one. The (Fig.2) map is Wukari Local Government Area map indicating the study area. This is the location where the sample collection and studies took place (Blench 2019).

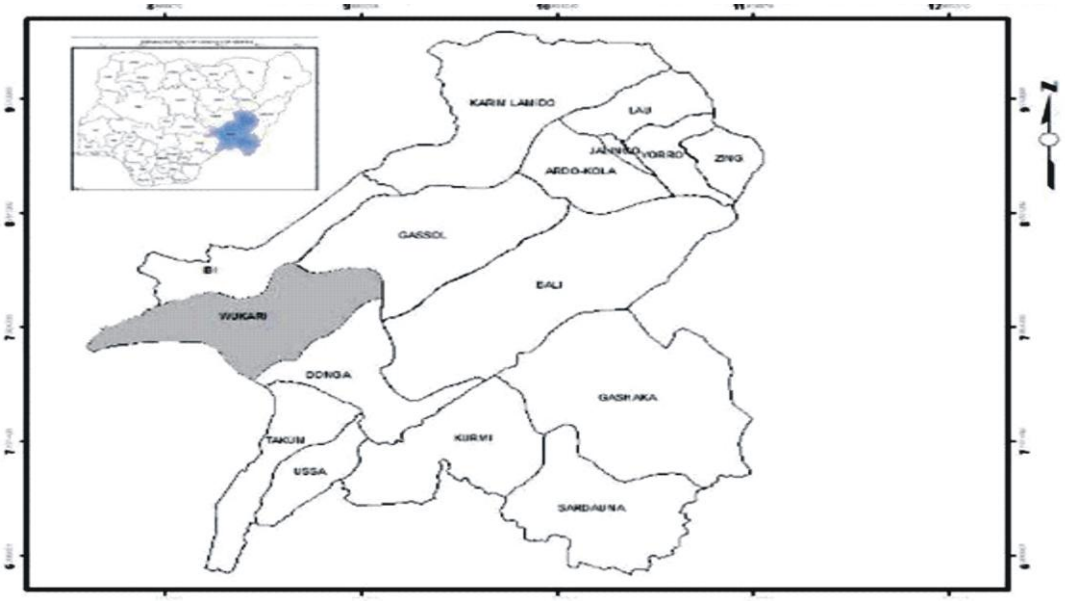


Figure 1: Map of Taraba State showing Wukari Local Government. (Google)



Figure 2: Map of Wukari Local Government showing the study area. (GIS LAB MAU)

Ethical Consideration

An introductory letter was obtained from the Department of Zoology, Modibbo Adama University Yola, in order to secure ethical permission from the Wukari Local Government Area Department of Environment. Before administering the questionnaire, sensitization was made to explain the aim of this study to the people. There after a verbal consent of all individual /respondents was obtained.

Data Collection / Sampling Techniques

Data was obtained primarily through administering questionnaire to the waste generators. Structured questionnaires were distributed randomly in residential areas, market/public places, schools, workshops and business centres within the study area. The Data was collected through the questionnaire survey based on the following variables: what season do you mostly generate waste? In what type of waste container do you collect the waste and frequency of waste disposal? Place of disposal, method of disposal and why do you prefer this method of disposal?

Sample Size Determination

The total population of Puje 24059, Avyi 14534, Hospital 22826, Chunku 11581 and Rafinkada 19933 wards in wukari according to 2006, National Population Census was 92933.

To obtain the sample size, the study adopted Burleys sample size determination, using this formula.

$$S = \frac{N}{(1+N)e^2}$$

Where;

S= sample size

N= population

e =margin of error assumed (0.05% with 95% confidence level).

1= the theoretical constant.

$$S = \frac{92933}{(1+92933)0.05^2}$$

$$S = \frac{92933}{232.335} = 399.94$$

This however, scaled to 4000. Therefore, a total of 400 respondents in wukari were sampled for the study.

Methods of Data Analysis

Data was analysed using Statistical Package for the Social Sciences (SPSS) version 25.0. The statistical analysis was used to determine the frequency distribution, percentage

ratio and mean. The result was presented in tables to facilitate a better understanding of the study.

RESULTS AND DISCUSSION

The result of socio-demographic characteristic of the household based on gender in (Table 1) shows various wards and percentages of both male and female that participated in the study. Out of 400 respondents 58.3% were male household while 51.7% were female in all the wards. From the result obtained hospital had the highest percentage of male 71.3% follow by Puje 58.8% and Avyi 57.5% while the least was reported in chunku 47.5%.

Table 1: Socio-Demographic Characteristic of the Households in Wukari LGA Based on Gender.

Wards	No. Respondents	Male No. (%)	Female No. (%)
Puje	80	47 (58.8)	33 (41.3)
Avyi	80	46 (57.5)	34 (42.5)
Rafinkada	80	45 (56.3)	35 (43.8)
Hospital	80	57 (71.3)	23 (28.8)
Chunku	80	38 (47.5)	42 (52.5)
Total	400	233 (58.3)	167 (51.7)

The highest percentage participation of female in this study, was in Chunku 52.5% followed by Rafinkada 43.8% and Avyi 42,5% while the least was reported in Hospital 28.8%.

This study showed the gender distribution of the survey population in various wards and percentages of both males and females that participated in the study. Out of 400 respondents 58.3% were male household and 51.7% were female in all the wards. This finding agreed with United Nation Population, (2011). This is because, in study of socio-

demographics males availed themselves easily to participate in the research than the females.

Table 2: Distribution of Respondents in Relation to Age in Various Wards of Wukari L.G.A Taraba State.

Wards	No. respond.	21-29 No.(%)	30-39 No.(%)	40-49 No.(%)	50-59 No.(%)	60> No.(%)
Puje	80	11 (13.8)	20(25.0)	18 (22.5)	17 (21.3)	14 (17.5)
Avyi	80	13 (16.3)	19 (23.8)	16 (20.0)	22 (27.5)	10 (1.3)
Rafinkada	80	11 (13.8)	16 (20.0)	21 (26.3)	18 (22.5)	14 (17.5)
Chunku	80	16 (20.0)	18 (22.5)	14 (17.5)	17 (21.3)	15 (18.8)
Hospital	80	11 (13.8)	21 (26.3)	19 (23.8)	13 (16.3)	16 (20.0)
Total	400	62 (15.5)	94 (23.5)	88 (22.0)	87 (21.8)	69 (17.3)

The analysis of distribution of respondents in relation to age in various ward in Table 2, indicate that majority of respondents were between the ages of 30 – 39 years which represent 23.5%, followed by 40 – 49 years 22.0% and the least was 21 – 29 years 15.5% of total respondents in all the wards.

Age plays a vital role in the research of social as well as environmental issues as maturity might affect the level of awareness on sanitation and environmental health. The study indicated that majority of the respondents were mature adults, between the ages of 30 – 39 years which represent 23.5%, who are expected to possess a considerable level of reasoning and understanding of the concept of solid waste management, and who were able to provide answers to the survey questions to a high degree of certainty.

Table 3: Educational Attainment of the Household in Relation to Wards of Wukari L.G.A Taraba State.

Wards	No. Respondent	Never Schooled No.(%)	Primary No.(%)	Secondary No.(%)	Tertiary No. (%)
Puje	80	11 (13.8)	17 (21.3)	28 (35.0)	24 (30.0)
Avyi	80	11 (13.8)	15 (18.8)	26 (32.5)	28 (35.0)
Rafinkada	80	4 (5.0)	22 (27.5)	31 (38.8)	23 (28.7)
Hospital	80	12 (15.0)	22 (27.5)	35 (43.8)	11 (13.8)
Chunku	80	13 (16.3)	18 (22.5)	20 (25.0)	29 (36.3)
Total	400	51 (12.8)	94 (23.5)	140 (35.0)	115 (28.8)

Educational attainment of the household in relation to ward shows that majority of the respondents had secondary school qualification 35.0% in all the wards and therefore were qualified to give accurate answers to the question asked in (Table 3). The report of tertiary educational level of the respondents was 28.8% and never schooled respondents 12.8% respectively. The educational levels had influence on waste management. The higher the level of education one attained, the more conscious one is towards proper waste management. This finding had concurred with EPA, (2014). The lack of environmental education in form teaching and awareness about waste generation and management in environment has further complicated the problems. Evidently, predominantly waste seen mostly everywhere around the residential areas. This shows that the residents of the high and medium education can easily accept changes and awareness on proper waste management than the residents of the low educational attainment.

Table 4: Occupation Status of the Respondent in Relation to Wards of Wukari L.G.A Taraba State.

Wards	No. Respondents	Farmer No.(%)	Business No. (%)	Civil Servant No.(%)
Puje	80	10 (12.5)	50 (62.5)	20 (25.0)
Avyi	80	10 (12.5)	20 (25.0)	50 (62.5)
Rafinkada	80	43 (53.8)	23 (28.7)	14 (17.5)
Hospital	80	18 (22.5)	39 (48.8)	23 (28.8)
Chunku	80	47 (58.8)	11 (13.8)	22 (27.5)
Total	400	128 (32.0)	143 (35.8)	129 (32.3)

The result of occupational status of the household in relation to wards (Table.4), revealed the total number of business men and women were 35.8%, followed by civil servant 32.3% and least were farmers 32.0%. Puje ward had business people 28.5%, civil servant 25.0% and farmers 12.5%. Avyi ward had civil servants 62.5%, business people 25.0% and least reported was farmers 12.5%. Rafinkada ward had farmers 53.8%, business people 28.7% and least was civil servants 17.7%. Hospital ward had business people 48.8%, civil servants 28.8% and least was farmers 22.5%. Chunku ward had farmers 58.9%, civil servants 27.5% and least was business people 13.8% respectively, who engaged actively in their business activities.

Assessment of Household Waste Generation and Disposal

This was to assess the waste generations and the method of disposal by the residents of the study area.

Table 5: Respondent Types of Waste Collection Containers, Method of Waste Disposal and Frequency of Waste Disposal in Wukari L.G.A Taraba State.

Variable	Frequency	Percent
(a)Type of waste collection container		
Carton	147	22.8
Old bucket/ drum	337	52.2
Plastic bags	161	25.0
Total	645	100.0
(b) Method of waste disposal		
Burning	145	29.6
Burying	134	27.3
Dumping	211	43.1
Total	490	100.0
(c) Frequency of waste disposal		
Once a day	214	53.5
Once a week	186	46.5
Total	400	100.0

Table 5 result has Shoes, tins/can waste 5.4% while plastic 15.9% of the total waste generated. Information on the types of waste collection containers showed that 52.2% of the respondents used old bucket/ drum to collect waste, twenty five percent (25.0%) used plastic waste bag while 22.8% used carton in collecting waste in the area under observation. The reason why most of the residents used old bucket/ drum could probably be, because old bucket/ drum was more convenient and affordable. This finding agrees with the finding of (Buba 2013). The survey revealed that majority of the household representing 40% made used of open ground; 25% used polythene bags; 13% used baskets; 10% used drums while 8% and 4% made use of cartons and sacks respectively.

The disposal of household solid waste is one of the functional elements in the management of waste. The survey revealed that 43.1% of the household which constitutes the majority dumped their wastes in open space, twenty seven point three percent (27.3)% disposed their waste by burying while the remaining 29.6% respondents disposed their waste by burning, (setting the waste on flame). Analysis of the frequency of municipal solid waste disposal revealed that 53.5% of the respondents disposed of their waste daily while 45.5% disposed their waste weekly.

It was observed that a higher percentage of the residents disposed off their waste daily. Weekly disposal of waste could have a negative effect on the environment as it creates unsightly environment, environmental nuisance, stinky environment, storm or runoff may scatter the waste, littering the entire landscape before the collection time, forms conducive habitats for rodents, reptiles (lizards) and insects (flies, cockroaches, mosquitoes) as well as breeding of micro-organisms which may be dangerous to human health Kaoje *et al.*, (2015).

The study revealed that majority of waste disposal practice by household was surface dumping (43.15%). Surface dumping is the term used to describe all forms of dumping on the soil surface which include gutters, roadside, nearest bush or simply anywhere outside ones house. This is same with (Buba 2013). Disposal of household solid waste is one of the functional elements in the management of waste. The survey revealed that about 39% of the household heads which constitutes a majority dumped their wastes in open space, though some respondents in the study area indicated that surface waste disposal is a means of landfills in order to reduce the rate of erosion around their surroundings, since there is no drainage that can reduce such environmental problems.

Table 6: Respondents response to health problems due to indiscriminate dumping of solid waste in Wukari L.G.A Taraba State.

Variable	Frequency	Percent
Have you heard of health problems due to indiscriminate dumping of solid waste?		
No	63	15.8
Yes	337	84.3
Total	400	100.0
How concern are you about health impact of solid waste?		
Not Concern	92	23.0
Concern	308	77.0
Total	400	100.0
Do you notice the presence of the following in and around public land?		
Leachate water	338	21.5
Odour	393	24.9
Mosquitoes and cockroaches	219	13.8
Fire	217	13.8

Variable	Frequency	Percent
Rats	208	13.2
Scavengers	203	12.8
Total	1579	100.0

Analysis in Table 6 revealed that most of the respondents were aware of the health impact of indiscriminate dumping of solid waste in the study area indicated No, meaning they have not heard of health problems due to indiscriminate dumping of solid waste in the study area. Based on this most of the uneducated people who disposed their waste indiscriminately in and around their households were not sensitized or educated on the health implication of what they were doing. According to Igoni *et al.,*(2007). In some parts of Nigeria, refuse is generally buried or disposed in a designated site, though some heedless burning is sometimes observed.

On assessing the concerned priority of the respondents on health impacts of solid waste disposal, 77.0% of the respondents indicated concern on the impacts of waste on public health, while only 23.0% showed no concern on the impact of solid waste disposal. This shows that majority of the study populations were really concerned on the impacts of wastes on public health. From public health point of view, such improper waste disposal techniques can become a serious health hazard through creating a suitable environment from which diseases can be transmitted. A report of (Donald 2021) from PAI associate international opines that such communicable disease may be fly borne. They include typhoid, dysentery, cholera, onchocerciasis, sandfly fever and conjunctivitis and many others.

Table 7: Respondents Perspective on Indiscriminate Dumping of Solid Waste Disposal Impacts on the People's Health in Wukari L.G.A Taraba State.

Variable	Frequency	Percent
Indiscriminate Dumping of Solid Waste Predispose Diseases Among People Such as Cholera, Dysentery Etc?		
Disagree	100	25.0
Strongly Agree	300	75.0
Total	400	100.0
Indiscriminate Dumping of Solid Waste disposal serve as Breeding sites for Diseases Vectors Which Transmit Diseases?		

Variable	Frequency	Percent
Disagree	106	26.5
Strongly Agree	294	73.5
Total	400	100.0
Indiscriminate Dumping of Solid Waste Pollutes the Atmosphere Which Causes Air-Borne Diseases		
Disagree	91	22.8
Strongly Agree	309	77.3
Total	400	100.0
Do You Think Most Environmental and Health Issues in Wukari LGA Could be Minimized if Solid Waste is Managed Properly?		
Disagree	106	26.5
Strongly Agree	294	73.5
Total	400	100.0

Analysis of Table 7 on health impacts of indiscriminate dumping of solid waste disposal revealed that 75.0% of the respondents strongly agree that indiscriminate dumping of solid waste disposal causes infectious diseases among people such cholera, dysentery etc. in the study area, while 25.0% of the respondents also agreed. 73.5% of the respondents strongly agreed that indiscriminate dumping of solid waste disposal provide breeding sites for disease vectors which transmits diseases. These are for examples mosquitos, flies and other insect, rats which are capable of transmitting such disease through contact with food and water. These also compounded by the issues of unsanitary mode of disposal of waste such as defecation in the streams and dumping of refuse in pit, rivers and drainages channel, this will eventually lead to contamination of surface and ground water quality.

With about 77.3% of the respondents revealed that indiscriminate dumping of solid waste disposal pollute the atmosphere which causes air-borne diseases. 73.5% of the respondents also strongly agree that must health and environmental issues in the study area could be minimized if solid waste disposal is managed properly while 26.5% of the respondents also agreed. This finding is in agreement with (Oluwaleye 2012) Improper handling of solid waste creates negative effect on human health and most affected groups are mostly workers working in the field, who need to be educated on the risk and as well as people living in such area. Waste disposed on land or water become toxic and infectious material that are dangerous to human health. These infectious materials can cause skin and blood infection, eye and respiratory infection as well as different diseases that result from

the vector borne disease to name a few The Ministry of Urban Development Government of India, (2012).

According to Pervez and kafeel, (2013) there are potential risks to environment and health from improper handling of solid wastes. Direct health risks concern mainly the workers in this field, who need to be protected, as far as possible, from contact with wastes. For the general public, the main risks to health are indirect and arise from the breeding of disease vectors, primarily flies and rats Royal Commission on Environmental Pollution, (2018**)**.

Uncontrolled hazardous wastes from industries mixing up with municipal wastes create potential risks to human health. Traffic accidents can result from toxic spilled wastes. There is specific danger of concentration of heavy metals in the food chain, a problem that illustrates the relationship between municipal solid wastes and liquid industrial effluents containing heavy metals discharged to a drainage/sewage system and /or open dumping sites of municipal solid wastes and the wastes discharged thereby maintaining a vicious cycle including some other types of problems are as follows; low birth weight, cancer, neurological disease, vomiting etc. Royal Commission on Environmental Pollution, (2018**)**.

CONCLUSION

Indiscriminate dumping of solid waste generation, disposal and management in Wukari Local Government Area, are serious health problems. Managing solid waste is a universal problems but universal solution cannot solve a local problem as different location require different solution based on the magnitude of the problem. Indiscriminate dumping of solid waste is serious problems in our society today. Creating people awareness and knowledge, their attitude, willingness and effort towards solving the problem is very paramount. Hence the finding of this study revealed that majority of the household waste disposal practice found to be unsatisfactory as most of the respondents disposed their household waste in manner best described as just throw away outside the house. The key factor affecting waste management practice in the study area was ignorant of the health and environmental related problems of indiscriminate dumping of solid waste disposal and also lack of designated waste disposal mechanism or regulations, hence contributing to the poor waste management practice. This study will serve as eye opener to most of the residents

using open dumping and burning as a method of waste disposal. Some undeveloped land had been taken over by refuse dump as this pollutes the air within the local environment while this also gives the environs unpleasant looks.

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