

Vectors of Human Diseases associated with undisposed refuse dumps in Aboh Mbaise Local Government Area of Imo State Nigeria

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ABSTRACT:

This study investigated on vectors of human diseases associated with undisposed refuse dumps in Aboh Mbaise Local government area of Imo State. The study randomly selected five (5) communities from Aboh Mbaise and a total of 200 respondents were randomly selected for the study. The study was a community-based cross sectional study; as a result structured questionnaire was used for data collection. Instruments used for vector collection include; sticky traps, water traps, snap traps, sweep net and handpicking. Vectors collected were preserved in specimen bottle using 70%ethonal, which later was transferred to parasitology and entomology laboratory, Imo State University. Percentage and frequency tables were used to analyze the results. Results, therefore, revealed that age group 31-35years and 36-40years participated more in the study, while over 50% males showed interest in the study than their female counterparts. Single (62.5%) responded more in the than married. It was observed that the refuse dump sites in Okwuato and Nguru-Nwenkwo are the recent dump sites in years, while Nguru-Nweke and Nguru-Ahiato dump sites has lasted over 5years. Vectors collected showed that houseflies 251(49.4%) and cockroaches 127(26.0%) were more abundant than other vectors. Awareness of the vector of human diseases revealed that malaria 105(52.5%) was the major contracted disease while vector breeding ground 130(65.0%) was the major health and environmental effects as observed by the respondents. The uncontrolled manner in which refuse is disposed of at different disposal sites creates serious health problems to human, animals and the environment at large. Therefore, control efforts should be directed against these insect-vectors in order to keep to the barest level the influence of these insects in the spread of diseases

Keywords: *Vectors, Human diseases, Undisposed, Refuse dumps*

INTRODUCTION:

Refuse dumps refer to areas or land sites where material wastes from several sources and processes are deposited. Refuse dumps include both municipal and industrial wastes (Olanrewaju, 2002). Refuse dumps provide a rich source of microorganisms most of which are pathogenic (Odeyemi et al, 2011). This is usually as a result of the attraction of rodents and vectors insects for which the dump serves as shelter and food source (Donderski et al., 2000).

In Nigeria, the sources of solid waste are commercial, industrial, household, agricultural and educational establishments (Babayemi and Dauda, 2009). Proper waste management is not only regarded as a political tool and an indicator of good government policy, it is also an important element for good health (Oyedele, 2009).

The consequences resulting from improperly managed wastes include its serving as reservoir of pathogens, habitat for pests such as rats, flies and mosquitoes,

reduction of usable land area of the society, obstruction of motorable roads and general nuisance and societal problems in residential areas (Oyedele, 2009). Other negative aspects associated with unmanaged solid waste include negative impact on the value of properties surrounding it, acid rain and contamination of aquifers or water table. These pathogens, including bacteria, viruses, protozoa and intestinal worms causes diverse diseases. Of particular concern are the cyst-forming protozoans that cause giardiasis and amoebic dysentery which have the common housefly as the vector. The houseflies breed and frequently visit human homes where they crawl over food and household utensils depositing the pathogens as they do. Food remains from homes and commercial stores found in the refuse attract rats and other rodents, which harbor ecto-parasites such as ticks and fleas that are vectors of dangerous diseases as relapsing fever and plague. Also, the rodents attract vermins and snakes to the sites making refuse dumps very hazardous to human

health. Most of the urban centres in Nigeria are virtually littered with garbage and refuse dumps and the government and the people seem very unconcerned. Only isolated reports have been made on entomological aspects despite the significant role that the vectors found in such surroundings play in public health. As a result, our knowledge of the biology, ecology and the relationship of vectors to various diseases are scanty. With the realization that it is practically impossible to maintain a strict sanitary condition in Imo State, especially, Aboh Mbaise town with the current rapid growth in population of the city, inventory of vectors will be taken from selected refuse dumps in Aboh Mbaise and discussed in relation to the diseases they are known to transmit. Understanding the epidemiology of diseases depends on the knowledge of the biology and ecology of the insect vectors implicated in the transmission of such diseases.

MATERIALS AND METHODS:

Study Area:

This study was carried out in Aboh Mbaise Local Government Area of Imo State, Nigeria between January and May, 2023. Aboh Mbaise is one of the local government areas of Imo State (Figure 1). Its headquarters is at Aboh and it is made up of eight villages namely; Nguru-Nweke, Okwuato, Nguru-Ahiato, Nguru-Nwenkwo, Enyiogugu, Lorji, Amuzu and Uvuru. The geographical coordinates are Latitude 5.10N -55N and longitude 6.35E -28E. The climate of the area is tropical and vegetation characteristics are tropical rain forest. It experiences a moderate rainfall of 1500mm and average minimum temperature of 20°. It also experiences two varying seasons of wet and dry season with an intermediate harmattan period within the months of December and January. The wet season is usually between April and October, while the dry season is from November to March. The major occupation of the people is farming and this is done at the subsistence level, some of the people also embraced small scale trading, fishing and hunting. The people are Igbos and share similar social-cultural characteristics with most Igbo communities in Nigeria. Their major economic activity includes; farming, trading, food processing, craft making and hunting. Aboh Mbaise has many refuse dumps scattered all over the area. As a result the scattered dump sites, there is a rapid increase in the breeding of vector borne diseases that has affected human and domestic health in Aboh Mbaise.

Study Sites/Population:

The field investigations were carried out in five different location sites, these are Nguru-Nweke, Okwuato, Nguru-Ahiato, Nguru-Nwenkwo and Enyiogugu. The researcher randomly selected 40 respondents from each of the communities giving a total population of 200 respondents.

Selection of Refuse Dumps:

Aboh Mbaise, a densely populated town with numerous human activities has several refuse dumps scattered around the village with differences in their age, size and composition. Some are large deposits of refuse accumulated over the years while others are smaller but more recent roadside dumps. From all these refuse dumps, five strategic sites were randomly selected for the purpose of this field observation with respect to their volumes, location and composition.

Data Collection:

The study was a community based cross-sectional study. The data collection was achieved with the use of a structured questionnaire administered to individuals within the selected communities. This was complemented by focus group discussion and environmental health disease survey of refuse dumps and its vector association. Only those above the age 18 years that are seen around the refuse dump areas were interviewed.

Methods of Vector Collection:

Visual observation was employed to closely study the refuse dumps to understand their composition, while sticky traps, water traps, snap traps, sweep nets and Hand picking methods were used to collect the vectors. The sticky traps were used for trapping smaller insects and cockroaches. The sticky trap was designed with plywood. The surface of the plywood was covered with bright coloured piece of cloth to attract insect vectors and pinned with thumbtacks. Castor oil and grease were applied on the surface of the trap. The sticky traps were then placed in horizontal and vertical positions in the refuse dumps. The insects were caught when they crept onto or alighted on or blown onto the sticky surfaces by wind. The water traps were designed using plastic buckets, which were three quarter filled with water. Detergent was added to the water to reduce surface tension and enhance wetting of the insects and other water-loving arthropods. Snap traps for rodents were set to trap rodents visiting refuse dumps for food. Baits like crayfish and pieces of bread were used to attract the rodents. This was used for catching mosquitoes and other flying insects. The sweep net was made with mosquito net, a quarter inch iron rod to form the rim and a wooden handle. Handpicking was employed in catching other larger arthropods like scorpion, with the aid of forceps and hand gloves.

Preservation:

The arthropod vectors like scorpions, centipedes, Cockroaches, houseflies and other invertebrate animals were preserved in specimen bottles using 70% ethanol, while mosquitoes were kept in a petri dish, on a filter paper, placed on moist cotton wool. They were later sent

to the Department of Parasitology and Entomology Laboratory of Imo State University, Owerri for identification and processing.

Statistical Analysis:

The data obtained was subjected to statistical analysis using Chi-Square and percentage table. The level of significance of all data was taken at $p<0.05$.

RESULTS:

Table 1 shows the vector species collected from different refuse dumps. Seven (7) different vectors were collected from five (5) refuse dumps. Result revealed that housefly 241(49.4%) was more in abundance followed by cockroach 127(26.0%), mosquito 43(8.8%), Dung beetle 35(7.2%), Green bottle fly 22(4.5%), Drain fly 11(2.3%) and blue bottle fly 9(1.8%) recorded the least abundance. Table 2 shows the different species of vectors collected using different methods. Cockroaches were collected

using handing picking and sticky trap while mosquitoes and most of the flies were collected using sweep net and water trap. Over 50% of the vectors were collected using sweep net which has 270(55.3%), followed by hand picking 142(29.1%), water trap 56(11.5%)only few were collected with sticky trap 20(4.1%). None of the vectors were collected with snap trap. Table 3 shows the knowledge, awareness and effects of environmental health diseases of refuse disposal dumps. Findings revealed that malaria 105(52.5%) was the highest contracted diseases of refuse dump, followed by Diarrhea 33(16.5%), skin infections 20(10.0%), typhoid fever 15(7.5%), allergy 14(7.0%) and cholera 3(1.5%) had the least response. 10(5.0%) are not aware of any associated diseases of refuse dump. Vectors breeding ground 130(65.0%) had the highest environmental effect, eyesore 34(17.0%), unpleasant odour 23(11.5%) and pest and diseases proliferation 13(6.5%) as the least. In Table it shows the Location and Composition of Different Refuse Dumps in the Study Area.

Table 1: Vectors collected from different refuse dumps

Locations	VECTORS SPECIES						
	Cockroach	Housefly	Mosquito	Drain fly	Blue bottle fly	Green bottle fly	Dung Beetle
Nguru-Nucke	21	46	6	3	1	9	5
Okualo	27	49	11	-	4	1	9
Nguru-Ahiato	33	52	7	-	-	3	3
Nguru-Ncnkno	29	39	8	6	-	7	7
Enyogugu	17	55	11	2	4	1	11
Total (%6)	127	241	43	11	9	22	35
N=488	(26.0)	(49.4)	(8.8)	(2.3)	(1.8)	(4.5)	(7.2)

Table :2 Vectors collected from refuse dumps with different trapping methods

Trap	VECTORS SPECIES (%)							Total (%)
	Cockroach	Housefly	Mosquito	Drain fly	Blue bottle fly	Green bottle fly	Dung Beetle	
Hand picking	107(75.4)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	35(24.6)	142(29.1)
Water trap	0(0.00)	45(80.4)	7(12.5)	0(0.00)	1(1.8)	3(5.4)	0(0.00)	56(11.5)
Snap Traps	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
Sticky trap	20(100.0)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	20(4.1)
Sweep net	0(0.00)	196(72.6)	36(13.3)	11(4.1)	8(2.9)	19(7.1)	0(0.00)	270(55.3)

Total (%)	127 (26.0)	241 (49.4)	43 (8.8)	11 (2.3)	9 (1.8)	22 (4.5)	35 (7.2)	488
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Table 3: Awareness of the environmental effects of refuse disposal and diseases contracted

Variables	Frequency	Percentage (%)
Some of the related diseases contracted		
Malaria	105	52.5
Cholera	3	1.5
Diarrhea	33	16.5
Allergy	14	7.0
Typhoid fever	15	7.5
Skin infections	20	10.0
Not aware	10	5.0
Health and environmental effects		
Unpleasant odour	23	11.5
Vectors breeding ground	130	65.0
Pest and diseases proliferatic	13	6.5
Eyesores	34	17.0

Table 4: Location and Composition of Different Refuse Dumps in the Study Area

Locations	Descriptions	Composition of refuse dump	Duration
Nguru-Nweke	High density area, poor planning and poor drainages inhabited by traders, top and low civil servants.	Used cans, vegetable matters, disposable cups, pots and plates, broken dishes, polythene bags, plastics, papers, old tyres etc.	5year and above
Okwuato	Residential homes, mostly civil servant and student with good drainage system.	Household garbage, pieces of clothing, broken bottles, and polythene bags etc.	Less than 2-3years
Nguru-Ahiato	High density area with poor drainage and poor planning, inhabited by traders and low civil servant.	Faecal matter, vegetable matter disposable pots and plates, broken dishes, polythene bags and plates, broken dishes, polythene bags, etc.	Over 5years
Nguru-Nwenkwo	High density area with poor drainage and poor planning, inhabited by both low and top civil servant and traders	Vegetable matters, polythene bags, used tyres, faecal matter, disposable pots, cups and plates broken dishes.	Above 18months
Enyiogugu	High density area with poor drainage and poor planning, inhabited by both top and low civil servant and some traders	Faecal matter, household garbage, polythene bags, broken wooden furniture's, disposable cup sand plates, used tyers, broken bottles, pieces of clothing etc	Over 2years

DISCUSSION:

The identified dumpsites in the study areas are at varying decomposing stages. This is perhaps an indication of poor sanitary condition in Aboh Mbaïse communities. Obionu (2004) noted that the greatest challenges to the environmental health are those of solid waste and human excreta. The negative effect of uncontrolled dumping of wastes in developing countries has been a great threat to human health (Siboe and Kimetti, 1996; Onyido et al., 2009). The composition of the dumpsites in this study agrees with that of Onyido et al., (2009). The present study revealed the knowledge, awareness and effects of human diseases of refuse disposal dumps. Findings revealed that malaria (52.5%) was the highest contracted diseases of refuse dump as a result of high rate of mosquito breeding. Followed by Diarrhea (16.5%), which also encourages the breeding, and infestation houseflies, skin infections, typhoid fever, allergy and cholera were also observed as diseases associated with undisposed refuse dumps. Reports of Lakshmikantha, (2006) from Bangalore highlighted the danger of waste disposal sites in the spread of diseases to people living in the immediate vicinity.

Pokkala and Ponka (2001) observed that waste increase the incidence of cancer and asthma in houses built in sites that have been previously used as refuse dumps. Result of the study also shows that undisposed refuse dumps are vectors breeding ground (65.0%), eyesore (17.0%), unpleasant odour (11.5%), pest and diseases proliferation (6.5%) all of which associates with undisposed wastes in Aboh Mbaïse Community. Seven (7) insect species including Cockroach, Housefly Mosquito, Drain fly, Blue bottle fly, Green bottle fly and Dung Beetle were collected from the refuse dumps under study and it was observed that houseflies (49.4%) and cockroaches (26.0%) were the most abundant species collected. This findings in lined with the report of Onyido et al (2009) who study collected Nine (9) insect species including *M. domestica*, *P.americanus*, *Aedes spp*, *Culex spp*, *Anopheles spp*, *F. scalaris*, *S.calcitrans*, *O.lencostoma* and *S. longipalpa* were collected from the dumpsites. *M. domestica*, was the most abundant species collected. Also, this finding agrees with that of Onyido (2011), where they reported the high frequency of *M. domestica*.

This indicates the probable endemicity of diseases transmitted by these vectors in the city as the environmental conditions (warm humid climate), etiological sources of infection (faecal materials in the refuse) and human population for the maintenance of infections abound. Out of the nine species collected *M. domestica* and *P. Americana* were encountered in all the study sites, this also agrees with that of Banjo (2012).

The predominance of houseflies and Cockroaches revealed possible mechanical transmission of diseases. Apart from *M.domestica*, *Anopheles species* are the most

abundant species of insect collected in the survey sites; this also corresponds with the finding of Banjo (2012), where they reported the relative abundance of mosquitoes breeding in the water holding containers found in the refuse dumps as an indicative that malaria and other mosquitoes borne diseases will be prevalent in the area. On the other hand, this disagreed with the result of Ahmed (2011), where they stated that *Aedes* mosquitoes, the vector of yellow fever were the only species encountered in their study. A possible reason for their absence could be the absence of water holding containers for the female to lay eggs.

CONCLUSION:

The uncontrolled manner in which refuse is disposed of at different disposal sites creates serious health problems to human, animals and the environment at large. This indiscriminate waste disposal results into economic and other welfare loses. The sanitary state of an area is largely influenced by proper handling of waste practices of the residents and the measures in place for safe waste evacuation and disposal. Also, the result from the present investigation is consistent with previous reports in which similar insects capable of transmitting pathogens were identified in refuse dumps. Therefore, control efforts should be directed against these insect-vectors in order to keep to the barest level the influence of these insects in the spread of diseases

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