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Full Length Research Paper

Waste Disposal Practices in Informal Settlements and its Impact on Health: The Case of Port Harcourt, Nigeria

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Abstract

Port Harcourt, the capital of Rivers State is one of the fastest growing urban centers in Nigeria. The result of this growth is the development of informal settlements along the water-fronts. These settlements lack amenities such as toilets, waste collection points, roads, and water supply. This paper aims at examining the health implications of households and human waste disposal systems in these neighbourhoods. Two informal settlements were studied namely; Marine Base Waterfront and Afikpo waterfront. The study utilized both secondary and primary data. Primary data was collected using the administration of a household questionnaire, to a probability sample of 192 respondents, drawn from the 2 neighbourhoods. Data analysis was based on responses from 191 questionnaires retrieved and the univariate analytical method was adopted. The study found, that human and household wastes are disposed on the roads, drains, and creeks, which create odour and water pollution problems. The study also revealed inadequacy of water supply in these neighbourhoods. The authors recommended that to improve health and environmental sanitation, adequate planning is necessary for the regular collection and disposal of waste in these neighbourhoods. This cannot be done by the government alones but public-private partnership should be encouraged to achieve this goal.

Keywords: Waste disposal, waste collection, informal settlements, human waste, household waste, health.

INTRODUCTION

Most city governments are facing mounting problems with the collection and disposal of solid wastes. In high income countries, the problems usually centre on the difficulties and high costs of disposing of the large quantities of wastes generated by households and businesses. In lower-income countries, the problems are more to do with collection. In most cities, in Less Developed Countries (LDCs), between a third and half of the of the solid wastes generated within urban centres remains uncollected and such waste generally accumulate on open spaces, wasteland and streets and bring with them serious health and environmental problems (United Nations Centre for Human Settlements (Habitat),1996). These problems are especially serious for the inhabitants of the larger and most densely populated informal or illegal settlements or tenement districts that have no regular garbage collection service since there is no-where close by where such wastes can be dumped (United Nations Centre for Human Settlements (Habitat), 1996).

According to (United Nations Centre for Human Settlements (Habitat) (1996) the health of the inhabitant has always depended on their ability to manage their environment. However, urban environmental management is concerned with the provision of a safe environment for people to live in through the provision of adequate water supply, sanitation, drainage and the regular collection and safe disposal of waste. Provision

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of water, sanitation, drainage and the safe disposal of wastes are obviously central to good housing and living conditions and to health.

The Oxford Advanced learner's dictionary defined sanitation as the equipment and systems that keep places clean, especially by removing human waste." It also defines sanitary as "connected with keeping places clean and healthy to live in, especially by removing human waste. Official statistics suggest that at least a third of the urban population in LDC_S are unsaved by sanitation and an even greater number lack adequate means to dispose of waste water. A sanitation system that minimizes the possibility of human contact with human excreta is lacking. Most toilet facilities have no running water (United Nations Children's Fund **(**UNICEF**)**, 1996). Most environmental problems that threaten lives and health occur within low-income households in LDCs.

REVIEW OF RELEVANT LITERATURE

The literature review is divided into four sub-sections which include: composition of household and human waste, waste storage, collection and disposal, methods of waste disposal and health implications of waste collection and disposal.

Classification of Household and Human Waste

Waste is any unavoidable material resulting from domestic activity or industrial operation for which there is no economic demand and which must be disposed of. (Tchobanoglous et al., 1977; Sridhar, 1996; Uchegbu, 2002). Waste is also conceived as any unwanted material. Waste is also defined as materials which though may no longer be needed here may become feed stock or raw material elsewhere. Wastes do not, therefore, altogether apply to worthless substances. Wastes are generally categorized into solid and liquid waste, which are materials discharged in household dustbins, flushdown toilets and chemical processing. Several authors (Isirimah, 2002; Gobo and Ubong, 2001; Ucheghu, 2002) have agreed that household wastes include: bottles, vegetable trimmings, cans, plastics, sludge and sewage, garbage, rubbish, large waste from homes such as old furniture. food wastes, paper, cardboard, textiles, leather, yard wastes, wood, glass, tins, aluminum, rags, beddings, feaces, urine etc. According to Uchegbu, (2002) garbage is putrefied waste from food such as meat, fish, fruit and vegetables while rubbish is non-perishable waste that are either combustible or non-combustible such as paper, carton, wood, clothes, polythene, iron, glasses and ceramics.

Waste storage, Collection and Disposal

According to Uchegbu, (2002) the waste generated should be well stored for easy collection and disposal by the appropriate authority concerned. On – site storage is of primary importance because of public health concerns and aesthetic consideration. Unsightly makeshift containers and even open ground storage, both of which are undesirable and often seen at many residential and commercial sites (Isirimah, 2000). In Port Harcourt refuse storage, while awaiting collection is generally poor and observation shows it generally covers one side of the road (Gobo and Ubong, 2001). According to Isirimah (2002) it includes the gathering of solid wastes and recyclable materials and also transport of these materials, after collection to the location where the collection vehicle is emptied. Waste disposal by land filling or land spreading is the ultimate fate of all solid wastes, whether they are residential wastes collected and transported directly to a landfill site, residual materials from materials recovery facilities (MRFs) residue from the combustion of solid wastes, compost or other substances from various solid wastes–processing facilities (Isirimah,2002). In many of the urban centres in the lowest – income countries, perhaps only 10-20 percent of the solid waste is collected. The results of uncollected garbage include smells, disease vectors, pests (rats, mosquitoes, flies etc), overflowing drainage channels clogged with Garbage, leachate from decomposing and putrefying garbage can contaminate water sources (United Nations Centre for Human Settlements (Habitat), 1996). The waste disposal system includes the following: sanitary landfill, open dumping, incineration, animal feeding, composting, resource recovery and pyrolysis. Sanitary landfill is a disposal method whereby refuse is placed in trenches, abandoned mines or quarry sites after the site has been properly designed. Deposited wastes are usually spread and covered with a required quantity of earth materials which are also spread and compacted after each day tips (Uchegbu, 2002). Open dumping is the cheapest form of waste disposal but it is a source of number of public health and safety problems such as diseases, air, water pollution and fire. Incineration is a method of disposing waste by a controlled combustion of combustible wastes at a very high temperature. Resource recovery is the process of turning what has been considered as waste into product for use. In composting refuse is buried with or without light soil to produce humus that could be used as fertilizers, carbondioxide, water and heat. Pyrolysis is a technique of thermal decomposition of organic materials in the absence of oxygen and is seen as an alternative to incineration. Recycling of refuse is currently the most pursued method of waste disposal

(Uchegbu, 2002).

Ugwuorah (2003) noted that solid waste in a city cause odour problems and health hazards if not properly collected and disposed of. Its pollution risks and effects cover fly breeding, strong odours, complex biological interactions which pollute streams or ground water and spread of disease among human beings and animals.

According the finding the existing method in Port Harcourt of tipping wastes in creeks and water logged areas draining towards the estuary involves a substantial risk for surface and underground water pollution is inimical to health. Indeed, basic sanitation should be a daily routine whereby man keeps his surroundings clean. The refuse generated should be well stored for easy collection and disposal by the appropriate authority concerned.

Health Implications of Waste Collection and Disposal

Where water supplies and provision for sanitation are inadequate for high proportions of the entire population, diarrhoeal diseases can remain one of the most serious health problems within city-wide averages. (United Nations Centre for Human Settlements (Habitat), 1996)

World Health Organisation (WHO) (1974) report affirms that over 10,000 deaths occur worldwide from home related accidents and diseases, shelter inadequacies and lack of access to basic facilities of water and sanitary disposal (as cited in Akinbaminjo, 1996). Table 1 indicates the potential reductions in morbidity for different diseases, as a result of improvements in water and sanitation.

Table 1 has shown that many health problems can be combated from proper waste collection and disposal practices.

Description of the Study Area

The Study was undertaken in Port Harcourt, the capital of Rivers State. Port Harcourt is situated in the Niger Delta region of Nigeria, the largest African nation. The population of Port Harcourt is presently over one million according to the State Statistical agency and comprises two local government areas (Port Harcourt City Local Government Area (PHALGA) and Obio/Akpor Local Government Area. Port Harcourt is the centre of the oil industry in the country and occupies an important position in the national economy. As an industrial centre many people migrate to and from around the country and West Africa with consequential pressure on available resources. The study was based strictly on two informal settlements viz: Marine-Base and Afikpo waterfronts.

The aim of this paper is to examine the health implications of household and human waste disposal systems in informal settlements. The objectives of the paper are:

i. To identify the methods of household waste storage, collection and disposal in the informal settlements.

ii. To identify the methods of human waste disposal in the informal settlements.

RESEARCH METHODS

The study utilized both secondary and primary data sources. Primary data was collected using face-to-face administration of a household questionnaire, to a probability sample of 192 respondents, drawn from the 2 neighbourhoods. Data analysis was based on responses from 191 questionnaires retrieved, i.e. a response rate of 99.9%.. The univariate analytical method was adopted in analyzing the data. Photographs were also used to present visual quality of the study area. In each of the households the data was obtained from either the head of the household or an adult in the household since they are usually the most knowledgeable about waste disposal practices.

RESULTS AND DISCUSSION OF FINDINGS

This section is divided into four sub sections viz; methods of household waste collection and Disposal, methods of human waste Disposal, Water supply in the informal settlements, and health impact of waste collection and disposal.

Methods of Household Waste Collection and Disposal

The method of household waste collection and disposal is presented in Table 2. Table 2.shows that 69.4% of the respondents in Marine –Base and 81.7% of the respondents in Afikpo waterfront in the informal settlements dispose their waste into creeks, roads and drains. Plates 1, 2 and 3 confirm the situation on ground. Only 19.4% of the respondents in Marine- Base dump waste at collection points for the collection by Government contractors and subsequent disposal at final disposal sites which is open dumping. A previous study by the main study revealed that the ratio of households which dump refuse any where such as drains, creeks, and drains are more in the informal low-come settlements than other parts of the city. This is as a result of minimal government involvement

Table 1. Potential reduction in morbidity for different diseases, as a result of improvements in water and sanitation.

Diseases	Projected Reduction in Morbidity (%)
1. Cholera, Typhoid, Leptospirosis, Scabies, Guinea	80 - 100
2. Trachoma, Conjunctivitis, Yaws, Schistosomiasis	60 - 70
3. Tularaemia, Paratyphoid, Bacillary dysentery, Amoebic dysentery, Gastro-enteritis, Lice-borne diseases, Diarrhoeal diseases, Ascariasis, Skin infections	40 - 50

Source;UNCHS,1996

Table 2. Method of Household Refuse Disposal

Method of HouseHold Refuse Disposal	Marine–Base Waterfront		Afikpo Waterfront	
	N	%	N	%
1. Collected by Government Agency	4	4.1	0	0
2.Collected by Private Arrangement	0	0	0	0
3.Buried	0	0	2	2.2
4.Dumped of anywhere in the open	7	7.1	15	16.1
5 Burnt	0	0	0	0
6. Dumped in collection point.	19	19.4	0	0
7. Others specify (creek, drain)	68	69.4	76	81.7
8. Missing Data	0	0	0	0
Total	**98**	**100**	**93**	**100**
Does the city council pick up the garbage in this neighborhood very often, often, occasionally, very often?				
1. Never	67	68.4	83	89.2
2. Occasionally	20	20.4	10	10.8
3. Often	0	0	0	0
4. Very Often	4	4.1	0	0
5. Missing Data	7	7.1	0	0
Total	**98**	**100**	**93**	**100**

Source: Field Survey, 2011

LEGEND:
N- Number of Respondents in Marine-Base and Afikpo
% - Percent

in refuse collection and lack of physical infrastructure such as roads in these neighbourhoods. The study revealed that the method of refuse collection and disposal in the city and neighbourhoods is poor. The study further revealed that 68.4%percent of the respondents in Marine –Base and 89.2% of respondents in Afikpo water front stated that the city council never picks up garbage from their neighbourhoods. Table 2 also revealed that 20.4% and 10.8% of the respondents in Marine – base front and Afikpo water front respectively said that the government picks up garbage occasionally. In the waterfront settlements garbage was tipped into water bodies or dumped near the pier toilets (See Plate 1, 2 and 3).

Methods of Human Waste Disposal

The method of human waste disposal is presented in Table 3. The typical type of toilet in the study area was the pier toilet found mostly in the waterfront settlements of Marine Base and Afikpo while the water closet was also found in Marine- Base and two of the respondents said that water closet is also used. (See Table 3, Plates 1 and 2). The study revealed that about 50% of the respondents in Marine Base and 95.7% in Afikpo informal settlements dispose off their excreta (feaces) and urine into creeks (See Table 3, Plates 1 and 2.). Human and household waste disposal into creeks are known sources of water pollution. The data also

Plate 1. Creek Pier Toilets at Marine Base Waterfront Settlement
(Source: Author's Field Survey, 2011)

Plate 2. Creek Makeshift Pier Toilet at Afikpo Waterfront Settlement
(Source: Author's Field Survey, 2011)

Plate 3. A Creek Waste Dump at Afikpo Water Front.
(Source: Author's Field Survey, 2011)

Table 3. Methods of Human Waste Disposal

Method of sewage (human waste) disposal i.e type of toilet	Marine-Base Waterfront		Afikpo Waterfront	
	N	%	N	%
1 Water closet	47	48.0	2	2.2
2 Pit latrine	0	0	0	0
3. Pail I bucket	1	1.0	0	0
4. Bush	0	0	0	0
5. Pier waterside	48	49.0	89	95.7
6. No Toilet	2	2.0	2	2.2
7. Missing Data	0	0	0	0
Total	**98**	**100**	**93**	**100**

Source: Author's Field Survey, 2011

Table 4. Sources of Portable Water Supply

Potable Water Supply	Marine-BaseWaterfront		Afikpo Waterfront	
	N	%	N	%
Pipe borne water from public mains.	12	12.2	3	3.2
Pipe borne water from borehole.	19	19.4	0	0
Well.	0	0	0	0
Buy from borehole.	67	68.4	88	94.6
Missing data.	0	0	2	2.2
Total	**98**	**100**	**93**	**100**

Source: Field Survey, 2011

revealed a 48% disposal of human waste in water closet in the study area. This is prevalent in Marine – Base.

Sources of Water Supply

Presented in Table 4 is the source of water supply in the informal settlements. Table 4 shows that borehole is a major source of water supply in these neighborhoods. The study revealed that most respondents 68.4% in Marine Base and 94.6% in Afikpo buy water from owners of private borehole. The study also revealed that the provision of water and Sanitation are inadequate. Bartlett, (2003) highlighted the implication of inadequate provision of water and sanitation to the health and development of children. According to Omofonmwan (2000) pit latrine and open detached bathrooms do pollute the environment and can cause serious diseases such as cholera. Waterborne diseases such as intestinal worms, guinea worms (dracunculiasis) and filariasis, eye and skin diseases are associated with inadequate provision of water and sanitation (United Nations Centre for Human Settlements (Habitat), 1996).

Impact of Poor Disposal of Refuse on Human Health

The importance of health to man can never be over emphasized. No man can function beyond the state of his health. Whatever is capable of affecting the health of man adversely should be adequately addressed. One of such problems is improper refuse disposal. Man can never be disassociated from refuse generation. Refuse emanates from the activities of man It therefore becomes necessary to educate man on proper disposal of these refuse. Improper disposal of refuse constitutes a threat to human health (Lucas and Gilles, 1990).

Poor disposal of refuse is a public health problem and thus impacts negatively on human health. Heaps of improperly disposed refuse enhances the breeding of rodents, vectors and emission of bad odours which are transmitters of various forms of diseases. Where refuse are not properly stored and disposed, insects, rodents and bad odours abound (Lucas and Gilles, 2003). A nuisance condition becomes the outcome. Components of refuse include empty tins, bottles, tyres, plastic containers and even drums (Ojo and Briggs, 2002). All these are capable of holding water thus serve as a very good breeding ground for mosquitoes. Where drains are turned into dumping grounds for refuse, it also becomes a very good breeding ground for mosquitoes. The outcome of this is human infestation with malarial parasites. Vectors include flies which are implicated in the transmission of feco-oral diseases, culex mosquitoes transmit microfilaria and aedes mosquitoes transmit dengue and yellow fever (Ojo and Briggs, 2002). Rodents

are capable of transmitting various forms of diseases such as plague, salmonella and leptospirosis (Lucas and Gilles, 2003). Rodents also attract snakes whose bite can even kill especially where immediate intervention with anti-snake venom is not easy to come by (Lucas and Gilles 2003). . The air also becomes polluted giving rise to diseases like tuberculosis and other forms of respiratory tract infections (Mishra 2003). Surface or underground water is capable of being contaminated through the washing of the refuse by storms and floodwater into these sources of water. Water becomes contaminated and unfit for human consumption (Williams, 1997). Unfortunately in a place like Port Harcourt due to insufficient water supply people will still consume this water and thereby become susceptible to one form of water borne disease or the other. Those that live in the water side empty their human waste into the same water that they use for drinking and cooking. The end result of this ignorant act is water borne diseases. Typhoid fever has become like a household name in this city. Water borne diseases include cholera, dysentery, and typhoid fever and as well as guinea worm infestations (Williams, 1997). The aesthetic aspect of poor refuse disposal cannot be missed out. The improperly disposed refuse might be further scattered and littered all over the area by animals and birds thereby producing an ugly sight. The odour from the decomposed stuff depending on the components of the refuse pollutes the air around the area making it unhealthy for inhalation. Inhaling this polluted air which is inevitable tantamount to inhaling various forms of micro-organisms which cause different types of diseases. In this instance it is the poor that will be affected most. This so because in the developing countries, the poor live in the slums, polluted and congested areas. The poor, the undernourished, the very young, the very old and those with pre-existing respiratory tract diseases and other illnesses are more vulnerable to the health effect of air pollution (Mishra, 2003).

Heaps of improperly disposed refuse further narrows roads, increases traffic congestion, blocks the views of drivers and predisposes to road carnages. This further puts human lives at risk.

CONCLUSION

The study examined the health implications of household and human waste disposal systems in informal settlements in Port Harcourt. Observation in the study area revealed that the waste generated is not properly stored, regularly collected and disposed off in the city in general and the informal settlements in particular. The study shows that human and household wastes are disposed on the roads, drains, and creeks, which create odour and water pollution problems.

Bartlett (2003) highlighted the implication of inadequate provision of water and sanitation to the health and development of children. Lucas and Gilles (2003).states that rodents are capable of transmitting various forms of diseases such as plague, salmonella and leptospirosis. As stated in the preceding section poor disposal of refuse is a public health problem and thus impacts negatively on human health.

To improve health and environmental sanitation, adequate planning is necessary for the regular collection and disposal of waste in the city. This cannot be done by the government alones but public-private partnership should be encouraged to achieve this goal.

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