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Faculty of Environmental Design and Management,
Obafemi Awolowo University,
Ile-Ife, Nigeria

The activities of informal waste collectors in municipal solid waste management in Ibadan, Nigeria

Bolanle WAHAB¹ and Akeem Bayonle OLA²

¹Department of Urban and Regional Planning, University of Ibadan, Ibadan

²Department of Urban and Regional Planning, Federal Polytechnic, Offa,

Corresponding e-mail: bolanle_wahab@yahoo.com

Abstract

The study investigated the role of informal waste collectors (IWCs) in municipal solid waste management in Ibadan with a view to integrating them into the Oyo State Government waste management scheme. Using snowball technique, 253 IWCs were identified and sampled. A structured questionnaire was used to elicit information from the informal waste collectors, while interviews were held with officials of the Oyo State Waste Management Authority (OYSWMA). Descriptive statistics were used in analyzing the data collected. The study revealed that push cart (51.6%), basket head pan (32.9%) and wheel barrow (15.5%) were the tools for collecting waste by the IWCs. Findings of study also established that 71.1% of IWCs disposed waste in public waste containers, while 13.8%, 8.0%, 5.9% and 1.2% disposed in rivers/streams, nearby bush and any available open space, and neighbourhood dump sites respectively. A fee between N30 and N2000 was charged by IWCs depending on the quantity of waste collected. Despite the active involvement of IWCs in the city's waste management system, the OYSWMA did not recognise their activities. About 82.6% of the IWCs were willing to be integrated into the Oyo State Waste Management scheme. The study recommended state government's recognition and integration of the IWCs into the waste management scheme of the city to enable them to render more efficient services to the city residents.

Keywords: Informal waste collectors, solid waste management, waste collection tools, service charge, integration

Introduction

Municipal solid waste refers to materials discarded in urban centres for which municipalities are usually held responsible for collection, transportation and final disposal (UNEP, 2000). Municipal solid waste encompasses household refuse, institutional wastes, commercial wastes as well as construction and demolition debris (UNEP, 2000). Medina (2001) described municipal waste management as the collection, storing, transportation, treatment and disposal of waste materials in such a way as to render them harmless to humans and animals, the ecology and environment and local aesthetics.

Waste management has emerged as one of the greatest challenges facing municipal governments in Nigeria. The quantity of waste generated continues to increase at a faster rate than the ability of the authorities to effectively manage it, leading to health and environmental hazards (Akinwale, 2005). Research efforts in municipal solid waste management challenges have largely addressed the

problem from public and private sectors perspectives. Basically, the public sector is characterized by service provision to the citizens either directly or by financing private provision of services on behalf of government (Daniel, 2006). Public authorities in most countries, including Nigeria, usually create waste management agencies to undertake waste collection, processing, transportation and disposal. This is because waste management is considered a merit good which should be provided to all regardless of income.

The private sector, on the other hand, is a business unit or any organization owned and operated by private individuals or a group of persons for profit (Mayer, 2012). Generally, it is divided into two: formal and informal. The formal private sector has a legal and separately identifiable existence. It is capital-intensive, has a regular pattern of working hours, and a recognized income sources on which income tax must be paid (Mayer, 2012). Holmes (2004) categorizes the formal waste sector into waste

collectors and waste recyclers. The waste collection sub-sector is made up of registered companies and enterprises which have the financial strength, technical know-how and are generally mechanized. They engage in waste collection at designated points in a neighbourhood or from house-to-house, depending on the structure of the neighbourhood and the willingness of the residents to pay for the services. Recyclers comprise medium and large scale waste recycling companies. They convert recovered waste materials, like paper, aluminum, animal byproduct, plastic, scrap metal, among others, to valuable materials and raw materials for the consumption of the industrial sector (Furendy, 2004).

The informal private sector is the part of an economy that is not structurally taxed, not included in any GNDP and not monitored by any public authority (Schneider, 2003). It is governed by the principle of self-employment and usually labour-intensive, with a very paltry use of tools and equipment (Tripp, 2003). Search through literature revealed a categorization of informal actors in municipal waste management into four, based on the nature of their activities in municipal solid waste management, especially in developing countries. These are the waste collectors, the scavengers, the resource merchants, and the recyclers (Chapin, 1995; Volger, 2004; Furendy, 2004 and Samson, 2010).

The informal waste collectors are a group of informal private waste operators involved in house-to-house waste collection at a fee, using specially built carts, wheel barrows, head pots/baskets, donkey carts and horse carts (Samson, 2010). The scavengers, according to Chapin (1995), are a group of waste workers that salvage materials such as plastics, aluminum, glass, paper, metals, animal wastes (horns, bones) to sell for recycling, or repair for sale or for reused by themselves. The World Bank (2002) estimated that up to 2% of the population in Third World countries survives by recovering materials from waste. The resource merchants are made up of traders involved in the purchase of all recovered recyclable and reusable materials from scavengers (Vogler, 2004). The recyclers convert recovered waste materials, like paper, aluminum, animal byproduct, plastic scrap, metal, to valuable materials and raw materials for the consumption of

both informal and formal manufacturing sectors (Furendy, 2004).

A close look at literature on municipal solid waste management showed that researchers have been preoccupied with either theoretical discussions aimed at establishing the central role played by public agencies (Diaz *et al.*, 2007; CPCB, 2008; Meyer, 2008; Hon, 2011); or with empirical studies undertaken to justify the necessity for continued partnership between the government and the formal private sector in solving waste management problems (Ogu, 2000; Sridhar, 2005; Siyanbola, 2009). Furthermore, research efforts in the aspect of the informal sector participation in waste management tend to focus on waste scavengers and recyclers (Medina, 1997; 2001; Mukhtar, 2008; Coleman and Rajabu, 2010), while the contribution of the informal waste collectors appears to have received less research attention. This study, therefore, investigated the role of the informal solid waste collectors to solid waste management, using Ibadan as the case study. Awareness and understanding of the contributions of the informal waste collection sub-sector to solid waste management are required for monitoring and evaluating the performance of the sub-sector with reference to its ability to meet the immediate waste management need of the urban dwellers at minimal cost and time. This will assist the policy makers to evolve well-informed policies on sustainable solid waste management in Ibadan and other parts of Nigeria.

Literature review

International Labour Organization (ILO) (2002) defined the informal sector as unregistered or unincorporated enterprises below a certain size. These enterprises include micro enterprises owned by informal employers who hire one or more employees on a continuous basis; and own-account operations owned by individuals who may employ contributing family workers and employees on an occasional basis. The informal waste collectors belong to these informal enterprises. Informal waste collection involves provision of waste collection service, often in parts of low-income residential neighbourhoods that are not fully served by municipal waste service.

Studies on informal waste collection have

identified some operational and social characteristics of the IWCs, which, to some extent, influence their activities within the waste management sector. As observed by Wilson *et al.* (2009), collection of waste by IWCs is carried out in accordance with the spontaneous needs of households and small commercial institutions. Thus, waste collection is done without any fixed schedule and the service is delivered by itinerant collectors. This, however, contradicts the view of Zelalem (2006), who maintains that IWCs services are usually pre-arranged with clients. Waste collection fees are often negotiated and fixed prior to the very start of the delivery of the service and adjusted through the course of the service (Henry *et al.*, 2006). The informal waste collectors have no well-defined territories of solid waste collection; rather, each waste collector has his own clients situated as intermingling with others in the same locality. Hence, two adjoining housing units could have different clients of waste collection services (Scheinberg *et al.*, 2010). The informal waste collectors usually use push carts, donkey carts, horse carts and head pot/basket/calabash to transport waste (Scheinberg *et al.*, 2010) which they dump indiscriminately owing to their lack of necessary equipment to haul wastes to official landfills (Pacheco, 2008).

The literature also revealed diverse views on the social characteristics of IWCs. Eisenberg, (2009) argued that a significant percentage of IWCs were recent migrants, often from rural areas such as a group of rural pig farmers, known as the Zabaleen, who migrated to Cairo, Egypt in the 1930's and undertook much of Cairo's waste collection duties in order to feed and sustain their pigs on the organic waste in the city's trash. The work of Klundert and Lardinois (1995) showed that the informal waste work was done by people belonging to religious or ethnic minorities, looking for a way to generate subsistence income in an urban setting. Rogerson (2001) observed that elderly individuals of retirement age that either do not receive pension or the pensions they receive are insufficient for their needs engaged in informal waste collection. Ward and Kamsteeg (2006) noted that child labour is common in the informal waste collection sector. Factors that influenced entrance into the informal waste collection included poverty (Langenhoven and Dyssel, 2006), unemployment (Medina, 2008),

profitability (Zelalem, 2006) and ease of entry (Medina, 2003). All these factors are believed to influence the activities of the IWCs in waste management system. Few works on informality in waste management in Nigeria have reported waste scavenging (Adeyemi *et al.*, 2001; Magaji and Dakyes, 2011; Afon, 2007, 2012); and waste recycling (Mukhtar, 2008; Nzeadibe, 2009; Nzeadibe and Iwuoha, 2008).

Cursory observations of the activities of the informal waste collectors in Ibadan revealed that the informal waste collectors have been very active in providing waste management services in some low-income residential areas and markets. The literature (Sridhar and Ojediran, 1983; Sridhar *et al.*, 1985; Sridhar, 2005; Ayorinde *et al.*, 2010; Mudashiru, 2014) revealed a gap in scholarship on the informal waste collectors and their role in solid waste management in the city. It is on this premise that this paper examined the role, socio-economic and operational characteristics of the informal waste collector in municipal solid waste management (MSWM).

The study area

Ibadan, the largest indigenous city in tropical Africa and the capital city of Oyo State is the study area. It is located between longitude 7°20'E and 7°40'E and latitude 3°35'N and 4°10'N. It is 145 km north-east of Lagos and 345 km south-west of Abuja, the federal capital. The development of Ibadan has been influenced by traditional and colonial urbanization. It was founded in 1829 and occupied by immigrants who moved into the city in search of security from inter-tribal wars in Yoruba land (Fatokun, 2011). Since its founding, the city has experienced rapid spatial and demographic growths. The developed land area in 2011 was 463.33km² (Hoekstra, 2012). The 2013 population of Ibadan, using 2.83% growth rate (National Population Commission, 2007), was estimated at about 3 million. There are 11 Local Government Areas (LGAs) in Ibadan. These include Ibadan North, Ibadan North-East, Ibadan North-West, Ibadan South-East, Ibadan South-West. Others are Akinyele, Egbeda, Ido, Lagelu, Ona-Ara, and Oluyole.

Municipal solid waste is one of the most enduring urbanization-induced problems in Ibadan, as heaps of garbage are found in most parts of the city,

especially in high-density areas, roadsides/medians, open spaces and drains. The per capita waste generation rates for the city in the late 1960s, early 1970s and 1980s varied from 0.37 to 0.50kg/capita/day and 3.2 to 3.4 kg/household/day (Maclaren, 1970; PAI Associates, 1982; Egunjobi, 1986). The recent generation rate is 0.52kg/capita/day (Ayorinde *et al.*, 2010; Wahab and Sridhar, 2014).

The Oyo State Solid Waste Management Authority (OYSWMA) is the statutory body established in 1997 by the state government to undertake waste collection, processing and disposal in the city. In addition, 259 private companies were licensed by the state government to complement the efforts of the OYSWMA in waste collection, particularly in the low-density areas of the city (OYSWMA, 2013). The informal private sector is observed to be very active in solid waste management, particularly in the largely inaccessible waste-ridden core areas of the city, given their own types of equipment. However, in view of the non-recognition of this group of workers by the state government, their role in waste management is not well documented.

Study methodology

The study relied on data from both primary and secondary sources. Five of the eleven LGAs are predominantly urban, while the remaining six are partially rural. The five urban LGAs were selected for survey. These were: Ibadan South-West (IBSW), Ibadan South-East (IBSE), Ibadan North-West (IBNW), Ibadan North-East (IBNE), and Ibadan North.

Owing to the difficulty of getting processed data on the number of informal waste collectors in the study area, the authors, with the help of their trained field assistants who were university graduates, used the snowball (or chain referral) sampling technique to identify the IWCs. Snowball sampling, according to Bernard (2000), is conducted by locating one or more key candidates of research and asking them to name others who would be likely candidates for a research. It is used in studies of difficult-to-find populations. An identified IWC was able to identify the locations of other IWCs known to him. With this approach, 253 informal solid waste collectors were identified and sampled.

The primary data were sourced through the use of a structured questionnaire, interviews and physical observations. A pretested questionnaire containing questions on the socio-economic characteristics of the informal waste collectors, volume of waste collected per day, the tools or equipment used for waste collection, method of transportation and disposal of waste, among others, was used in eliciting information from the sampled informal waste collectors. The questionnaire was pretested and administered to a pilot group of 15 IWCs in the study area, who were excluded from the final survey. The 253 copies of the questionnaire administered were retrieved for analysis. Interviews were held with officials of the OYSWMA to obtain information on their perception of the operations of the IWCs in the city. The secondary sources of information included journal articles, textbooks and technical reports. The data collected were analysed using descriptive statistics, such as simple frequencies and percentages.

Results and discussion

Socio-economic characteristics of the informal waste collectors

Out of the 253 sampled informal waste collectors, 192 (75.9%) were male, while 61 (24.1%) were females (Table 1). The age of the collectors ranged from seventeen to sixty years old and the modal age was twenty-nine years (54.9%). About 8.3% of the respondents were teenagers, while 19% and 7.1% were in the 30-39 years and 40-49 years age categories, respectively. Some (5%) were above 60 years of age.

Analysis of the respondents' education showed that, 35.8% of the respondents had secondary education; about 27.9% had primary education; while those with tertiary education (NCE and ND) accounted for 2% of the sampled waste collectors. Furthermore, 20.9% had apprenticeship training; about 6.3% attended Quranic schools; while 7.1% had no formal education (Table 1). This is a departure from the findings of the earlier studies which reported a high level of illiteracy amongst the informal waste collectors (McLean, 2000; Ward and Kamsteeg, 2006).

Respondents who were not married accounted for 38.7% of sampled IWCs. On the other hand,

widows, divorced and respondents separated from spouse accounted for 2.0%, 0.8% and 0.4% respectively (Table 1). Analysis of the religious leaning of the waste collectors revealed that 63.2% were Muslims, while 36.8% were Christians. The sampled waste collectors were of varying nationalities; however, 97.2% were Nigerians. Other nationals were: Nigeriens (1.2%), Beninois,

(0.8%), Togolese (0.4%) and Chadians (0.4%). Analysis of the ethnic structure of the Nigerians in informal waste collection business in Ibadan showed that the Yoruba constituted the majority (73.1%), followed by the Hausa (20.7%), and the Igbo (3.1%). Other ethnic groups were the Ebira, from Kogi State (1.6%), and the Igede from Benue State (1.2%) (see Table 1).

Table 1: Socio-Demographic Characteristics of Informal Waste Collectors

Characteristics	Frequency	Percentage
Sex		
Male	192	75.9
Female	61	24.1
Age (year)		
>20	21	8.3
20 – 29	139	54.9
30 – 39	48	19.0
40 – 49	18	7.1
50 – 59	14	5.7
>60	13	5.0
Education qualification		
Primary	71	27.9
Secondary	91	35.8
Tertiary	5	2.0
Apprenticeship	52	20.9
Quranic	16	6.3
Informal	18	7.1
Marital Status		
Single	98	38.7
Married	147	58.1
Divorced	2	0.8
Separated	1	0.4
Widowed	5	2.0
Religion of Respondents		
Islam	160	63.2
Christianity	93	36.8
Total	253	100.0
Nationalities of Respondents		
Nigerians	246	97.2
Beninois	2	0.8
Togolese	1	0.4
Nigeriens	3	1.2
Chadians	1	0.4

Source: Authors' Field Survey (2013)

Note: N = 253

Income of the informal waste collectors

The monthly income of the respondents is presented in Table 2. The monthly income earned from waste collection ranged from N7,000 to N50,000. While 2 (0.8%) earned less than N10,000 a month; 130 (51.5%) earned between N10,000 and N20,000; 80 (31.6%) earned between N21,000 and N30,000. Similarly, 25 (9.8%) earned between N31,000 and N40,000; while 16 (6.3%) earned between N41,000 and N50,000. The national minimum wage in Nigeria is N18,000. This implies that about 52.3% of the IWCs earned below the minimum wage.

In analysing the income structure of the informal waste collectors, the general categorization of income into low, medium and high was adopted. The monthly income below N40,000 was

categorized as low; the income between N40,000 and N100,000 was regarded as medium, while the monthly income above N100,000 was grouped as high. Following these categorization, it can be established that 93.7% were within the low income category. Those in the middle income bracket accounted for 6.3%, while none of the respondents was within the high-income category. The computed mean monthly income was N32,000. Thus, a collector earned an average of N1,032 daily. Given the official exchange rate of N197 to a US dollar, a collector earned more than five dollars per day. This is above the two dollars benchmark for living above the poverty line as defined by World Bank (2010). In other words, informal waste collection is economically rewarding if given adequate patronage and essential operational tools.

Table 2: Monthly Income of Informal Waste Collectors

Income (N)	Frequency	Percentage
Less than 10,000	2	0.8
10,000-20,000	130	51.5
21,000-30,000	80	31.6
31,000-40,000	25	9.8
41,000-50,000	16	6.3
Total	253	100.0

Source: Authors' Field Survey, 2013

Mode of operation of the informal waste collectors

The study established that 70.4% of the sampled waste collectors operated every day. The fact that man generates waste on daily basis and, therefore, requires collection accordingly explains the necessity for the waste collectors to operate every day. Furthermore, 17.3% of IWCs worked during the weekend. The reasons for the choice of weekends, as enunciated by the waste collectors, are: "clients usually did general cleaning of homes and their environments at weekends" (4.2%); "clients were always at home at weekends, they tend to generate more waste and, therefore, require the services of IWCs" (10.4%); "some waste collectors were students who had to go to school between

Monday and Friday and, therefore, had only Saturdays and Sundays to operate" (1.2%); and "those whose primary occupations were not waste collection usually dedicated Monday to Friday for their primary occupation and devoted Saturday and Sunday for waste collection" (1.5%). Moreover, some collectors (7.1%) (who were Muslims) did not operate on Fridays because of Juma'at service, and according to one of them, "... Friday, being a holy day, must meet them clean". Similarly, "the need to attend church service and to rest" also influenced the decision of 5.2% of IWCs, who were Christian not to operate on Sundays.

On whether the waste collectors had specific periods of the day when they operated, the findings revealed that 63.2% do not, while 36.8% operated at

certain periods of the day. Of the 93 IWCs that worked at certain periods of the day, 32.4% worked in the morning (between 5 am and 12 pm); 3.2% worked in the afternoon (12 pm to 6 pm), while 1.2% worked in the evening (6 pm to 11 pm). There were various reasons advanced for choosing specific periods to operate by the waste collectors. For instance, of those who operated only in the morning, 15.4% indicated the nature of their primary occupation as the major reason. They were mostly night guards who worked in the evening and rested in the afternoon in preparation for their evening assignment. Also, some (9.6%) chose to work in the morning simply to fulfill a popular saying among the Yoruba, "*owuro lejo*", (the morning is the most suitable part of the day to start working). Some (7.4%) met their clients at home in the morning and, therefore, had no cause to work in the afternoon or evening. Availability of customers and the need to engage in other socio-economic activities also influenced those that worked in the afternoon and evening.

Push cart (51.6%), basket/head pan (32.9%) and wheel barrow (15.5%) were the main tools of waste collection by the IWCs. The use of push cart by over a half of the IWCs is similar to Afon's (2007) findings of the use of human driven cart as operational equipment by the *barro'* boys who engaged in informal waste collection in Mushin and Kosofe local government areas of Lagos State. In addition, all of them used shovel and iron/wooden rods. Equally, some (11.9%) of the respondents used hand gloves and boots; 2.4% used gloves, boots and nose covers; 1.6% used gloves, boots, nose covers and eye glasses; while 1.2% used gloves, boots, nose covers, eye glasses and helmets. Waste collection fees ranged from N30 for a sack of waste (a fully loaded

medium-size sack cost between N30 and N40) to N2000 (for the waste that could not be measured through sack, such as scrap metals/aluminium).

Waste disposal

The majority (71.1%) of the IWCs disposed wastes in public stationary containers provided by the Oyo State Government at strategic points in the city. Also, 13.8%, 8%, and 5.9% of the IWCs, respectively disposed waste in rivers and streams, nearby bush and any available open space, while 1.2% disposed waste in illegal dumpsites (Table 3). The inability of the government to provide public stationary containers in certain areas and the attempt by some IWCs to make as many trips as possible appeared to be responsible for this negative outcome of informal waste collection in the city. Also, the nonchalant attitude of some residents who condoned the activities of these waste collectors as well as weak monitoring by the environmental health officers of both the local and state governments equally contributed to this phenomenon.

Another important factor that influenced where the IWCs disposed wastes is the distance between the waste collection points and disposal points. As presented in Table 4, 37% of the sampled collectors covered a distance of about 4 km; 24.8%, 23.4% and 10.4% covered a distance of 1 km, 2 km and 3 km, respectively; while 3.2%, 0.8% and 0.4% travelled about 5 km, 6 km and 7 km, respectively before disposing waste collected. It can be inferred from the above that 58.6% of IWCs sampled disposed waste within the surroundings of the neighbourhoods where the wastes were collected. This has negative implication for environmental quality and public health.

Table 3: Waste Disposal Points Used by Informal Waste Collectors

Disposal Points	Frequency	Percentage
Public Waste Containers	180	71.1
Rivers/Streams	35	13.8
Nearby Bush	20	8.0
Any Available Open Space	15	5.9
Neighbourhood Dumpsites	3	1.2
Total	253	100.0

Source: Authors' Field Survey, 2013

Table 4: Distance from Collection to Disposal Points

Distance	Frequency	Percentage
<1km	63	24.8
1 – 2km	59	23.4
2.1km – 3km	26	10.4
3.1km – 4km	94	37.0
4.1km – 5km	8	3.2
5.1km – 6km	2	0.8
6.1km – 7km	1	0.4
Total	253	100.0

Source: Authors' Field Survey, 2013

Waste collectors' willingness to obtain government recognition

Almost all (98.8%) the IWCs did not have any cordial relationship with the local and state governments or their agencies. The IWCs claimed that the relationship between them and OYSWMA and Local Government Health Services Departments (LGEHSDs) was largely hostile and characterized by harassment, arrest, prosecution and denial of the use of the public dumpsites. The officials of the OYSWMA and LGEHSDs in separate interviews described the activities of the IWCs as:

- undesirable in the city because the IWCs always disposed of waste
- indiscriminately in undesignated points and public places.

Another OYSWMA official said:

the extant waste management law does not recognise the IWCs and so they are operating illegally.

However, residents in the five local government areas routinely patronize the "illegal services" of the IWCs as the available means of disposing their waste. This is similar to Afon's (2007) findings on the popularity of the illegal, but highly cherished service of the *barro*' boys which constitutes the most popular means of waste disposal among residents of Mushin and Kosofe local government areas of Lagos State. Having an official recognition of one's business (especially when it affects urban management and

environmental health policies of the government) automatically eliminates guerilla economic undertakings. A majority (82.6%) of the sampled IWCs subscribed to this school of thought and, therefore, wished to be formally integrated into the waste management scheme of Oyo State Government. On the other hand, 17.4% of the sampled IWCs preferred to maintain the status quo, citing exorbitant levies government usually imposed on formal business enterprises, cumbersome registration procedures that normally characterize official recognition and lack of awareness/training programmes as the major reasons.

Conclusion and recommendations

This study has shown that the informal waste collectors are very active in waste collection and disposal in Ibadan. The residents engage the services of the IWCs which they consider as a desirable, accessible and affordable means of disposing their waste. The non-recognition of the services of the IWCs by government and its agency is also noted in this study. Based on the findings of this study, the paper concludes that the continued involvement of the informal waste collectors is required to effectively tackle the waste collection and disposal problems in Ibadan. Official recognition of the IWCs, through integration into the existing waste management scheme is imperative to make their operations more efficient, easy to coordinate, regulated and monitored. This option or arrangement is expected to promote a

more effective, enduring and sustainable solid waste management system; eliminate guerilla economic undertakings, and create mutual benefits to government and society, than banning or criminalizing their operations. Against the form such involvement should take and to effectively address other challenges of solid waste management in the city, the following recommendations are imperative:

1. Oyo State Government should embark on an effective partnership with the informal waste collectors in order to achieve sustainable waste management in Ibadan and Oyo State, in general. This can be done by:
 - i. reviewing her current laws and policies on solid waste management to ensure the recognition and incorporation of the informal waste collectors into the waste management scheme of the city;
 - ii. putting in place simple registration procedures for the IWCs operating in the city and according them all the rights and privileges of waste management within the city. For the convenience of the waste collectors, local governments should be mandated to register the IWCs operating in their domain.
 - iii. providing capacity building programmes for the waste collectors to increase their awareness of the danger inherent in disposing waste in unauthorized places thereby enhancing their efficiency and effectiveness. The programme should be organised periodically and every informal waste collector should be mandated to attend the programme at little or no cost. The Oyo State Ministry of Environment and Habitat should collaborate with OYSWMA to achieve this.
2. Encouraging the formation and operation of an association of informal waste collectors by the state's Ministry of Commerce and Cooperatives. The association will serve as a platform for communicating government

policies on environmental sanitation to the waste collectors as well as monitoring the activities of the unscrupulous collectors who may attempt to degrade the environment through indiscriminate refuse dumping. The association could be used as a platform to secure loans for the acquisition of vital equipment towards efficient operations.

3. For enhanced service delivery, OYSWMA and local governments should provide more public stationary containers in strategic places that can be easily accessed by the IWCs within the city. The IWCs should be encouraged and assisted to embark on the use of motorized carts (tricycles) for waste transportation to the approved waste disposal sites. The motorized carts have the capacity to penetrate the high-density neighbourhoods and also move with relative ease in non-motorable roads. There are two types of tricycles for waste collection: the cover-roofed and open-roofed. The capacity of a covered cart is ab1000 kg (1 ton), while that of open-roofed is about 2000 kg (2 tons). Assuming a waste collector could make an average of eight trips per day (note that with push cart, a waste collector makes an average of four trips, as revealed during the survey), a waste collector using open-roofed cart will be able to collect about 8,000 kg (8 tons) of waste daily (other things being equal) and 240,000 kg (240 tons) monthly. This will reduce substantially the heaps of uncollected solid waste within neighbourhoods and along city streets. The state government, through its Ministry of Finance, should make soft loans available to the waste collectors through the micro-finance banks.

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