SOCIO-ECONOMIC DETERMINANTS OF THE OCCURRENCE AND EXTENSION OF INFORMAL WASTE COLLECTION IN IBADAN NORTH EAST LOCAL GOVERNMENT AREA OF OYO STATE, NIGERIA

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Abstract: Against the background of the phenomenal influx of labour into the informal waste management subsector of many cities in Nigeria in recent times, despite the persistent official harassment of the participants and the seemingly low economic reward offered by the job, this paper examines the influence of social and economic attributes of participants on the emergence and development of the sector. Using a cross-sectional survey research design, data were collected via a structured questionnaire interview involving 103 identified informal waste collectors in the Ibadan North East Local Government Area of Oyo State, Nigeria. Both descriptive (frequency and percentage) and inferential statistics (Pearson's correlation analysis and multinomial logistic regression) were used in analysing the data generated from the questionnaire survey. The study found that informal waste collectors' socio-economic attributes (gender, age, education, income, marital status, ethnicity, religion, nationalities and state of origin) influenced their participation in waste management. The results of the multinomial logistic regression confirmed the hypothesis that participation in informal waste collection is a function of socio-economic attributes. The study concluded that adequate knowledge of informal waste collectors' socio-economic attributes will lead to positive policy response from the government towards the subsector, thereby ensuring its sustainability in the waste management sector.

Keywords: Sustainability, informal waste collectors, waste management, socio-economic characteristics, municipal authorities.

Introduction

Over three decades of formal private sector participation in solid waste management in Nigeria has failed to deliver an appreciable increase in waste collection coverage. For instance, the collection rate in Lagos is about 43% (LAWMA, 2012), 35% in Kano, 48% in Enugu, 63% in the Federal Capital Territory (Abuja) and 52% in Ibadan. In the Ibadan North East Local Government Area, only 55% of the waste is evacuated daily (Ogu, 2000; Odewumi *et al.,* 2016; Wahab & Ola, 2017). The inability of the formal sector to provide adequate solid waste management services has led to the emergence of informal waste collectors in waste management schemes in the country (Adebola, 2007; Oguntoyinbo, 2012; Ola, 2017).

Katusiimeh *et al.* (2013) broadly defined the informal waste sector as individuals or enterprises involved in the private sector waste management activities that are not sponsored, financed, recognised, supported, organised or acknowledged by the formal solid waste authorities or those that operate in violation of or in competition with formal authorities.

Specifically, informal waste collection involves house-to-house waste collection at a fee, using specially built carts, wheel barrows, head pots or baskets, donkey and horse carts (Guibrunet, 2019). It provides employment and income opportunities for the urban poor in Nigeria and many third-world countries (Adebola, 2006; Magaji & Dakyes, 2011). Informal waste collectors usually restrict their

operation largely to the less accessible high-density residential neighbourhoods, where municipal waste management service is virtually non-existent (Coleman & Rajabu, 2010). They are usually faced with official harassment but enjoy some level of social acceptance, especially among residents of high-density neighbourhoods (Ola, 2016). Informal waste collectors work under deplorable conditions, with much exposure to hazardous, contaminated and toxic materials (Ukoje, 2012). They are sometimes seen as nuisance to society and to waste management authorities, in the case of municipal solid waste management. Their work in most cases are criminalised and not recognised as a contribution to ecological sustainability and resilience (Reno, 2015). Despite the socio-economic and health challenges of informal waste collection, there has been a phenomena influx of labour into the subsector in Nigeria in recent times. Considering the nature of informal waste collection as highlighted above, the influx of labour into the subsector in recent times has triggered the big question of "WHY". The reasons for this may be multifaceted, but social and economic factors present strong appeal for examination. This is because people's social and economic attributes have been found to strongly influence their involvement in certain activities (Kosine & Lewis, 2006; Ausman *et al.,* 2013; Sohail & Al-Emran, 2018).

Few studies on informal waste sector in Nigeria have essentially focused on identifying some socio-economic features defining involvement in waste scavenging (Nzeadibe & Iwuoha, 2008; Afon, 2012) while the socio-economic features of the waste collectors who provide door-to-door waste collection services have not been given much research attention. Considering the fact that the waste management services provided by the two groups of informal waste workers are to some extent different, with slightly different mode of operations, it is safe to assume that the socio-economic factors influencing their participation in the waste management sector may be different. This informed the decision to conduct this study. It is designed to explore the socio-economic

determinants of participation in informal waste collection. Understanding the socio-economic characteristics of informal waste collectors is important to better inform policymakers and the public on the reasons for their emergence, the characteristics of the people involved, as well as the nature of the sector and how this will shape the future of waste management in the city.

The paper is divided into five main sections: The first defines the research problem addressed by the paper; the second focuses on the review of relevant literature, as well as a brief overview of the study area; the third section explains the methods and processes of data acquisition and analysis; and critical discussions of the social and economic determinants of the emergence and expansion of informal waste collection in the study area is the focus of the fourth section. The last section summarises the major findings of the study enumerates the implications of the findings and suggests measures to address the challenges hindering the development of informal waste collection in the study area.

Literature Review

Since the 1970s, formal private sector participation in municipal solid waste management has been touted as the best key to eradicating inefficiency in municipal solid waste management. Since then, various studies have been conducted to investigate the extent to which formal private sector involvement have helped in eliminating inefficiency in waste management. There is, however, a consensus of opinions in the literature, in that while private participation in waste management have produced the desired results in the global North, the same cannot be said in developing countries (Burcea, 2015; Herat, 2015). The gap created by the less successful formal private sector participation in waste management has opened the floodgates to the entrance of informal private actors into municipal waste management in many developing countries (Medina, 2001; UN-Habitat, 2010). Although informal waste collectors are often ignored or seen as hindrances to efficient waste management processes by

municipal authorities, they have continued to increase in number (Coleman & Rajabu, 2010). Their proliferation has been attributed to a number of factors. The urbanisation process, the internal and external migration of inhabitants, rapid growth of the population, low literacy level, low level of the quality of life, and a lack of sanitation services have been enumerated as being essential factors to the occurrence and development of informal waste collection in many developing countries (Andrianisa & Brou, 2016).

It has been observed that informal waste collection is often driven by poverty and is usually initiated personally and spontaneously, sometimes haphazardly in the struggle for survival (Langenhoven & Dyssel, 2006; Steuer *et al.,* 2017). However, there are some individuals who joined the informal solid waste collection after being aware of the profitability of the sector while working in a government office linked to sanitation service. Thus, the element of income constitutes the most decisive motivation for people to enter the informal waste collection sector. Local policies regarding waste management issues, the nature of legislative regulations of municipalities and the authorities' communication with civil societies have been identified as largely determining the informal waste collection development in developing countries (Omotoso, 2017; Navarrete-Hernandez & Navarrete-Hernandez, 2018). Furthermore, many waste collectors are motivated by the flexible nature of the sector (Wilson *et al.,* 2006). Unlike the formal system, the informal waste collection allows easy entry into the sector. The sector helps informal waste collectors to avoid lengthy and complicated bureaucratic hassles and legalisation expenses. Thus, the collectors need only to invest their time and labour with a relatively small capital outlay (Oates *et al.,* 2018). The working hour arrangement could be cited as one of the pulling factors of the sector since informal waste collectors will have an opportunity to engage in other economic activities and generate additional income. Quite often, waste collection is done in the morning so that informal waste collectors may spend the rest of their day on other income-generating activities (Zelalem, 2006).

While many municipal and state governments in Nigeria have maintained hostile attitudes towards informal waste collectors (Adebola, 2007; LAWMA, 2012), the situation is different in some African countries. Informal waste collectors are allowed to operate freely in Accra, Ghana, without any interference by the Accra City Council (Oteng-Ababio, 2017; Amoah, 2017). Furthermore, the government has equally made efforts to incorporate informal waste collectors into the mainstream waste management scheme by helping them to acquire affordable and appropriate waste collection equipment on very flexible terms to enhance their operations within the waste management scheme (Mariwah, 2012). In Monrovia, Liberia, the country's waste management agency, DUCOR expressly recognises the legitimacy and importance of collaborating with and creating careers for informal waste collectors. Therefore, the waste management agency gives express permission to informal waste collectors to operate freely in Monrovia and other major cities, and has sought legal backing for their operation by sponsoring municipal edicts to that effect (DUCOR, 2012). There are also instances in which governments take the initiative to organise informal waste collection enterprises with moral and financial support. The case of Addis Ababa (Ethiopia) is a classic example of how governments deliberately create informal waste collection enterprises (Zelalem, 2006). The situation is, however different in Ibadan North East, Nigeria. The Local Government and Oyo State Government outlawed informal waste collection because of their perceived indiscriminate dumping of refuse on the streets, in open space and drains. However, the ban has not in any way stopped the operations of informal collectors. They only avoid major streets where they can be easily spotted by law enforcement agents (Wahab & Ola, 2017).

Several studies have shown that informal waste collection has positive effects on the environment, reduce the costs of waste

management systems, and provide employment and income opportunities for large numbers of poor people (Medina, 2008; Tong & Tao, 2016). But it appears these facts are little known to many municipal authorities in Nigeria as they have consistently put up a hostile posture against informal waste collection (Steuer *et al.,* 2017). This paper seeks to investigate the social and economic factors influencing the emergence and development of the informal waste management sector, with a view of bringing to the fore the reasons and characteristics of the people involved in the waste management subsector. The ultimate goal of the study is to ensure that municipal authorities are better informed of the subsector in order to elicit positive government policies on the informal sector's involvement in municipal solid waste management.

The Study Area

The study was conducted in the Ibadan North East Local Government Area of Oyo State. Carved from the defunct Ibadan Municipal Government, Ibadan North East Local Government Area was created in 1991 with its administrative headquarters situated along the Iwo Road axis of Ibadan, a major entry point along the Ife-Ibadan Expressway end of the Oyo State Capital (NIPOST, 2009). The local government area lies between longitudes $3^0 55^1$E and $3^0 91^1$E and latitudes $7^0 22^1$ and $7^0 90^1$ (Oguntoyintoyinbo, 1994). It covers a land area of 51.250 square kilometres (NIPOST, 2009). Using a growth rate of 3.2% from the 2006 census as recommended by the Nigerian National Population Commission, the 2019 estimated population of the Local Government Area is 498,447. The local government area has the highest population density in Oyo State with 7,313 people per square kilometre. It is bounded by Ona-Ara, Ibadan South East, Ibadan North and Egbeda Local Government Areas. The Ibadan North East Local Government Area is an urban centre that forms part of the Ibadan metropolis. The inhabitants of the local government area are predominantly Yoruba, although it is highly heterogeneous, accommodating people from various other tribes who either engage in commercial activities or work in the public service. The local government area is notable for banking and trading activities. A considerable number of commercial banks are lined up among major streets of the local government area. It has the largest spare-parts market, called the Araromi Market Gate. The Ibadan North East Local Government Area is subdivided into 12 wards and has 25 localities. The local government is governed by an elected chairman and 12 councillors, one elected from each ward. The most notable mode of transport in the study area is road transport.

Research Methodology

Population of Study and Sampling Technique

This study targeted informal waste collectors in Ibadan North East. However, because informal waste collectors are not registered with the local or state governments, their numbers were not readily available. Therefore, the snowballing method was used to recruit participants for this study. Initial contact was made with a sizeable number of informal waste collectors in the study area. The few contacted informal waste collectors were then used to establish contact with other informal waste collectors. A total of 114 informal waste collectors were then identified and sampled for this study. The decision to adopt total sampling was informed by the small number of respondents.

Methods and Instruments of Data Collection

A set of pre-tested questionnaire was used to obtain information from the sampled informal waste collectors. The questionnaire was designed to capture socio-economic attributes e.g., age, occupation, income, gender, literacy level, household size, religion, ethnic origin and marital status, among other questions. The questionnaire was prepared in English and administered by four trained field assistants who were graduates and could translate the questions into the native language of the respondents who did not understand English. Questionnaire

administration was conducted between 8.00 am and 6.00 pm daily for six days from Saturday to Thursday in April 2018.

Data Analysis

After the survey was completed, inputs from the survey were translated into a format that could be analysed by SPSS 21. A total of 11 questionnaires were dropped due to reasons such as partially-finished and incoherent answers. Therefore, 103 questionnaires were eventually captured for the analysis. Descriptive statistical tools i.e., simple frequency distributions and percentages were used to perform data interpretation and analysis. Furthermore, multinomial logistic regression and person correlation analysis were used to statistically measure the relationship between involvement in informal waste collection and socio-economic attributes of the informal waste collectors.

Ethical Consideration

All issues relating to ethical principles were strictly adhered to. The study was anchored on informed consent by the participants, encouraged voluntary participation, ensured confidentiality and ensured that the principle of anonymity was sustained throughout the duration of the study.

Research Results and Discussions

Analysis of the data obtained through the questionnaire revealed that 10 major socio-economic variables play significant roles in the emergence and extension of informal waste collection in the study area which are gender, age, educational status, marital status, religion, nationalities, ethnicity, state of origin, existence of other occupations and income.

Gender Composition of Informal Waste Collectors

Analysis of the gender composition of the informal waste collectors indicated that informal waste collection is a male-dominated economic endeavour. Out of the 103 sampled informal waste collectors, 98.0% were males while only 2.0% were females (Table 1). The Pearson's correlation analysis (P-value of 0.183 > 0.05) established that there is significant relationship between gender and participation in informal waste collection (Table 11). The preponderance of males in the business may be due to the fact that informal waste collection requires much physical strength, which places men at advantage over women. In fact, it was observed during the field survey that none of the women waste collectors were using carts but head pans and baskets for waste collection. Thus, the physical strength requirement of the job appears to a major pull factor for males rather than females.

Table 1: Gender composition of the informal waste collectors

Gender	Frequencies	Percentage (%)
Male	101	98.0
Female	2	2.0
Total	103	100.0

Source: Authors' field survey

Studies on informal waste collectors in sub-Saharan Africa, to which the Ibadan North East Local Government Area belongs, have reported a range of different situations with respect to the gender composition of informal waste workers. In some instances, informal waste collectors were exclusively or primarily male (Mutenga & Muyakwa, 1999; Bjerkli, 2005; Masocha, 2006; Mwanzia, 2006; Ngoepe, 2007). In other studies, they were fairly equally divided between men and women (De Kock, 1986; Tevera, 1993; Ralfe, 2007; Zoya, 2008) and in a few, women far outnumbered men (Tevera, 1994; Mueller, 2005). Studies in sub-Saharan Africa have equally reported the existence of a gender division of labour in informal solid waste collection. For instance, Mwanzia (2005) observed that men monopolised collection of waste in Jinja (Uganda) while Mutenga and Muyakwa (1999) asserted that women specialised in resource recovery in Kisumu (Kenya). The situation in the Ibadan North East Local Government Area as reported initially appears to be in line with that of Jinja.

Age Distribution of Informal Waste Collectors

The age of the informal waste collectors ranged from 17 to 69 years old. About 2.0% were between 17 and 18 years of age while a substantial percentage (37.7%) of the sampled waste collectors was between 18 and 27 years of age. This is followed by those between 28 and 37 years of age (30.1%) while those between 38 and 47 years, 48 and 57 years, 58 and 67 years, as well as above 67 years of age represented 17.5%, 7.8% and 2.9% of the sample, respectively. About 2.0% were above 67 years of age (Table 2). The Pearson's correlation analysis indicated that the relationship between age and participation in informal waste collection was statistically significant with P-value = 0.964 > 0.05 (Table 11). Age plays an important role in the type and choice of work an individual can take to earn a living. This is because age is a function of strength that is needed to do certain work effectively so that a reasonable amount of income from such work can be earned. In this study, the majority of the waste collectors were within the economically active segment of the population i.e., 15 to 60 years of age. The absence of persons less than 16 years and more than 70 years of age amplifies the earlier assertion that informal waste collection requires much physical strength to carry out. It should be noted that people in this age category naturally lack the required strength for the job. This appears to influence their non-participation in the job.

Table 2: Age distribution of the informal waste collectors

Age (years)	Frequencies	Percentage (%)
Less than 18	2	2.0
18 – 27	39	37.7
28 – 37	31	30.1
38 – 47	18	17.5
48 – 57	8	7.8
58 – 67	3	2.9
Above 67	2	2.0
Total	103	100.0

Source: Authors' field survey

Another important issue relating to age is the problem of child labour, which has been in the front burner of national and international discourse in recent years. It should be noted that there has been persistent accusation against developing countries, particularly Africa, of complicity in child labour, and current debates on child labour have consistently emphasised the informal waste management sector as one of the areas where child labour is rife. Looking at the minimum age of the waste collectors (16 years) and considering that the age of maturity (voting age) in Nigeria as stipulated by section 32 (2) of the 1999 constitution of the Federal Republic of Nigeria is 18 years, it is safe to assume that child labour issue does not exist in informal solid waste collection in the Ibadan North East Local Government Area. However, this is not to say that it does not exist in other informal solid waste management subsector. For instance, De Kock (1986) reported the presence of children recovering recyclable wastes in the dumps of Durban (South Africa). Also, Benjamin (2007) found waste reclaiming by children to be widespread in the dumps she studied in South Africa. Children's participation in waste scavenging in Cairo (Egypt) was also visible to the extent that the city council had to establish a number of educational and development programmes for child reclaimers (Assaad & Bruce, 1997; Iskandar, 2007).

It is noteworthy that the sampled informal waste collectors were mostly youths (17-40 years), indicating a changing disposition towards waste management jobs, especially in Yoruba land. Despite the "dirty" nature of the job and the way Yoruba community traditionally view this kind of venture, that youths are mostly engaged in it suggests the need for concrete support from governments and relevant stakeholders to make the sector more appealing to other potential informal waste collectors.

Educational Status of Informal Waste Collectors

The waste collectors were asked to state the highest level of education they had attained at the time of the field work. The data revealed that

the respondents had one form of education or the other. About 44.6% of the waste collectors had secondary education, 33.0% had primary education and those with tertiary education (NCE and ND) accounted for 1.0% of the sampled waste collectors. Moreover, 18.4% had apprenticeship training, about 2.0% attended Quranic school while 1.0% had no formal education (Table 3). Further analysis shows that the relationship between educational attainment and participation in informal waste collection was statistically significant with P-value = 0.143 > 0.05 (Table 11). Thus, education does not play a major role in influencing the waste collectors' decision to take up the job.

People's educational attainment has been shown to be one of the important social variables affecting occupational engagement, as well as influencing the course of interaction of other variables such as income (Coleman, 1988; Kathleen & Silva, 2002; Newell *et al.,* 2004). A careful look at the data presented in this section shows that there was a relatively high literacy level among the informal waste collectors in the Ibadan North East Local Government Area. As noted earlier, waste servicing has traditionally been viewed as a job for the wretched and illiterates in the society. However, the exploitation of this sector by the literates (though not highly educated) is a negation of the traditional view and a pointer to its potential contribution to the nation's socio-economic development.

It is important to note that the educational status of the informal waste collectors presented above is a departure from the findings of Ward and Kamsteeg (2006), as well as McLean (2000a), who reported high levels of illiteracy and low average levels of formal education amongst the informal waste collectors studied. Nevertheless, Langenhoven and Dyssel (2007) and Ralfe (2007) reported higher levels of education, asserting that on average, the informal waste collectors studied had at least finished primary school and in some instances, had finished secondary school.

Table 3: Educational status of the informal waste collectors

Education	Frequencies	Percentage (%)
Primary	34	33.0
Secondary	46	44.6
Tertiary	1	1.0
Apprenticeship	19	18.4
Informal	1	1.0
Quranic	2	2.0
Total	103	100.0

Source: Authors' field survey

Marital Status of Informal Waste Collectors

Table 4 shows the analysis of the sampled waste collectors by marital status. The informal waste collectors that were married accounted for 37.9% of the total respondents; those not yet married made up 27.2% and the divorced (16.5%). About 11.6% of the sampled informal waste collectors were separated from their wives while the widows amongst the respondents accounted for 6.8%. The Pearson's correlation analysis (P-value = 0.455 > 0.05) established that the relationship between marital status and participation in informal waste collection was statistically significant (Table 11). Although the majority of the sampled informal waste collectors were married, the substantial percentage (27.2%) of them being single lent credence to our earlier observation that informal waste collection is becoming more attractive to the youths, who ordinarily would not want anything to do with "dirty jobs". Also, the possibility of working longer hours and relatively low returns, which probably may affect the ability of the informal waste collectors to adequately discharge their responsibilities to their family, appears to influence a substantial percentage of the respondents being either divorced or separated from their wives.

Table 4: Respondents' marital status

Education	Frequencies	Percentage (%)
Single	28	27.2
Married	39	37.9
Divorced	17	16.5
Separated	12	11.6
Widowed	7	6.8
Total	103	100.0

Source: Authors' field survey

Informal Waste Collectors' Religions

Analysis of the religious leaning of the informal waste collectors reveals that 56.3% were Christians, 40.8% were Muslims while 2.9% of the respondents were adherents of African traditional religion (Table 5). The relationship between religion and participation in informal waste collection was found to be statistically significant with P-value $= 0.089 > 0.05$ (Table 11). This suggests that religion is one of the inducing factors for engaging in informal waste collection. The lower percentage of Muslims engaging in the job may be a result of Islam's prescription of regular body cleaning in preparation for prayers, right from the morning through the afternoon and evening. The data confirm the assertions by scholars that informal waste collection is usually engaged by people belonging to a particular religion in a city/country. For instance, in Cairo (Egypt), Coptic Christians are known for their informal waste evacuation (Slackman, 2009) while in Addis Ababa (Ethiopia), there was preponderance of Muslims in the informal waste collection sector (Zelalem, 2006). Note that the present study revealed that Christians were more involved in waste servicing in the Ibadan North East Local Government Area as presented above.

Nationalities of Informal Waste Collectors

The sampled informal waste collectors were of varying nationalities but the majority (95.0%) were Nigerians. Other nationals operating in the local government area were Beninois (4.0%) and Togolese (1.0%) (Table 6). A comparative analysis of the informal waste

Table 5: Religions of the informal waste collectors

Education	Frequencies	Percentage (%)
Islam	42	40.8
Christianity	58	56.3
African traditional religion	3	2.9
Total	103	100.0

Source: Authors' field survey

collectors operating in both cities indicates that there were more Beninois (2.1%) and Togolese (1.3%) informal waste collectors operating in Abeokuta than Ibadan (1.6% Beninois and 0.8% Togolese). The relationship between the respondents' nationalities and participation in informal waste collection was found to be statistically significant with P-value $= 0.450 > 0.05$ (Table 11). The proximity of the countries of origin of the informal waste collectors appears to influence the nationality structure of the informal waste collectors in the local government area. Note that Oyo State shares boundary with the Republic of Benin while Togo, though not sharing boundaries with Oyo State, is equally not too far from the state with a distance of 500 km and its citizens have traditionally made Ibadan their second home right from the Nigerian independence.

Table 6: Nationalities of the informal waste collectors

Nationalities	Frequencies	Percentage (%)
Nigerians	98	95.0
Beninois	4	4.0
Togolese	1	1.0
Total	103	100.0

Source: Authors' field survey

Despite the relevance of the knowledge of the nationalities of the informal waste collectors in understanding the factors affecting international migration and the structure of regional economies, the question related to the nationalities of informal waste collectors has received less attention in the literature, with

few studies reporting on the nationalities of their sampled informal waste collectors. All of the informal waste collectors interviewed in Gaborone (Botswana) by Tevera (1994) were from Botswana. By contrast, almost a quarter of those interviewed in Harare (Zimbabwe) by Ferrao (2006) were foreigners (from Sudan, Central Africa Republic, Uganda and Djibouti). Most had, however, been in Zimbabwe for 14 years or more and had migrated to the city from farms. About 2% of the collectors interviewed by Mueller (2005) in Durban (South Africa) were from Lesotho. The nationalities of the informal waste collectors in the Ibadan North East Local Government Area as reported above appear to follow the pattern observed by Mueller (2005) in Durban in terms of size and the location of the countries of origin. As Lesotho is the next-door neighbour to South Africa, so is the Benin Republic to Nigeria. Togo is the only country among them that does not share a common boundary with Nigeria. The size of the Nigerian economy when compared with its West African neighbours seems to be responsible for the presence of foreigners among the informal waste collectors.

Ethnicities of Collectors

Analysis of the ethnic structure of the Nigerians in informal waste collection business in the LGA shows that the Yoruba constituted the majority (61.2%). This is followed by Hausas (20.4%) and Ebiras (7.8%) from Kogi State. Other ethnic groups operating in the informal waste collection business in the local government area were the Igede from Benue State (4.0%) and the Igbos (2.0%) (Table 7). Pearson's correlation analysis indicates a significant relationship between the ethnic origins of the respondents and participation in informal waste collection with P-value = 0.088 > 0.05 (Table 11). The results of the correlation analysis and the data presented here simply confirm the expectation of an average observer that naturally, the more the population of a particular ethnic group in a community, the higher the likelihood of such ethnic group dominating several sectors of the community's economy. Therefore, the Ibadan

North East Local Government being a Yoruba-dominated community, it is expected that the Yoruba would constitute a higher number of informal waste collectors vis-à-vis other ethnic groups. The presence of a substantial percentage of Hausas in the informal waste collection business may be due to the security problems in the northern part of Nigeria, which has displaced a number of people. Most of those displaced have migrated to the southern part of the country and are taking up menial jobs to survive. Note that the Ibadan North- East Local Government Area is in southwestern part of Nigeria. The fewer Igbos in the business may be as a result of the natural liking of Igbos for trading. They are known for trading compared with any other job in Nigeria.

Table 7: The ethnicities of the informal waste collectors

Ethnicity	Frequencies	Percentage (%)
Yoruba	63	61.2
Hausa	21	20.4
Ebira	8	7.8
Igede	4	4.0
Igbo	2	2.0
Non-Nigerians	5	4.6
Total	103	100.0

Source: Authors' field survey

The issue of ethnicity in informal waste collection has received considerable attention in the literature due to its importance in the analysis of the social and economic structure of urban centres. For instance, in Addis Ababa (in Ethiopia), Bjerkli (2005) observed that the majority of the informal waste collectors she interviewed were Gurage (which is not the main ethnic group in Addis Ababa). Thus, the majority of the informal waste collectors in Addis Ababa were not from the dominant ethnic group in the city. However, Ralfe (2007) reported that more than half of her respondents in Durban were Zulu (the main ethnic group in the province where Durban is located) and the rest were Xhosa and Sotho. Although Mwanzia (2005 and 2006) does not note which ethnic groups his respondents

(in Nakuru, Kenya) were from, he noted that tribalism in the allocation of casual jobs affected the ability of waste collectors to obtain other forms of employment. He also explained that many people in his sample migrated to Nakuru and became informal waste collectors as they fled tribal clashes in rural areas. The ethnic structure of the informal waste collectors in the Ibadan North East Local Government Area as revealed by the above data obviously follows the patterns reported by Ralfe (2007) in Durban (South Africa). However, the size of the population of Ibadan and the extent of demand for waste management services appear to be the major factors attracting other ethnic groups into the informal waste collection sector in the local government area.

States of Origin of the Informal Waste Collectors

The states of origin of the informal waste collectors is equally important in a study of this nature. This is because of the tendency of state governments in Nigeria to protect the economic interests of their citizens, irrespective of their state of residence, and the strenuous attempts of these governments to repatriate what is termed "diaspora fund" from their citizens living outside their states of origin. The analysis of the distribution of the informal waste collectors according to their states of origin indicates that the Yoruba were from four out of the seven Yoruba states. However, many (37.7%) were from Oyo State. This is followed by those from Osun (17.4%), Ogun (7.1%) and Ekiti State (2.0%). The Hausas were from six northern states of Kaduna (11.2%), Jigawa (10.2%), Kogi (8.2%) and Benue State (4.2%). The Igbos were from Abia State (2.0%) (Table 8). The relationship between the states of origin of the respondents and participation in informal waste collection was found to be statistically significant with P-value = 0.0576 > 0.05 (Table 11). The data presented above and the correlation analysis revealed that the states of origin influences participation in informal waste collection. This is as a result of the influence of ethnicity on informal waste collection and the

fact that these ethnic groups exist in certain states of Nigeria.

Table 8: States of origin of informal waste collectors from Nigeria

States	Frequencies	Percentage (%)
Oyo	37	37.7
Osun	17	17.4
Ogun	7	7.1
Ekiti	2	2.0
Jigawa	10	10.2
Abia	2	2.0
Kogi	8	8.2
Benue	4	4.2
Kaduna	11	11.2
Total	98	100.0

Source: Authors' field survey

The presence of a substantial number of non-indigenes of Oyo State in informal waste collection in the local government appears to have been influenced by the size of Ibadan's economy and the size of its population. In a report by the National Bureau of Statistics, Oyo State ranked sixth among the non-oil producing states that contribute most to Nigeria's gross domestic product (NBS, 2018). This is as a result of large number of small- and medium-scale enterprises that dot the landscape of the state, in addition to the presence of a substantial number of large-scale manufacturing companies, and educational and research institutions. In addition, the ease of entry into the business, the need to escape poverty and perhaps, the derivable economic benefits from informal waste collection might have equally influenced the presence of a substantial number of non-indigenes of Oyo State in the business.

Informal Waste Collectors' Primary Occupations

Analysis of the occupations of the informal waste collectors was carried out because during the preliminary survey and pre-test stages of the questionnaire, it was observed that many of the respondents have engaged or are still engaging

in other occupations aside from informal waste collection. Occupational analysis of the respondents revealed that informal waste collection is not the primary occupation of the sampled waste collectors. The primary occupation of the respondents, as presented in Table 9 were plumbing (25.2%), cobbling (15.6%), brick laying (12.6%), trading (10.7%), carpentry (9.7%), water vending (7.7%), security guards (6.8%), farming (6.89%) and schooling (2.4%) (Table 9). The relationship between the primary occupations of the respondents and their participation in informal waste collection was found not to be statistically significant with P-value = 0.476 > 0.05 (Table 11). Therefore, having another occupation does not influence the participation in informal waste collection. The inability of the primary occupation to meet the financial needs of the collectors informed the decision of some of these collectors to venture into the waste collection business.

Table 9: Primary occupations of the informal waste collectors

Occupation	Frequencies	Percentage (%)
Plumbing	26	25.2
Cobbling	16	15.6
Brick laying	13	12.6
Trading	11	10.7
Carpentry	10	9.7
Water vending	8	7.7
Farming	7	6.8
Security guard	7	6.8
Schooling	5	4.9
Total	103	100.0

Source: Authors' field survey

The majority of researchers did not explore the possibility of the waste collectors having another job aside from waste collection. Only Mwanzia (2006) referred to the possibility of informal waste collectors having or seeking another occupation, probably to support their earnings from the waste collection business. In the case of the Ibadan North East Local Government Area as reported above, the majority of the sampled collectors had other occupations before venturing into informal waste collection. The ease of entry into the business, its potential ability to generate substantial income and the collapse of major infrastructural facilities (especially energy and power), which has engineered the failure of many businesses in Ibadan in particular and Nigeria in general, (Oluba, 2008; UN-Habitat, 2009; Ola, 2011) seem to have prompted these informal waste collectors to undertake the business.

Incomes of Informal Waste Collectors

The general categorisation of income in Nigeria into low, medium and high was adopted in analysing the income structure of the informal waste collectors. Monthly incomes of below N40,000 were categorised as low. Incomes of between N40,000 and N100,000 were regarded as medium while monthly incomes of more than N100,000 were grouped as high. Following these categorisations, the summary of how the informal waste collectors were distributed into income groups is presented in Table 10. According to the data generated from the questionnaire survey, income generated from waste evacuation per month by the informal waste collectors ranged from N7,000 to N45,000. The majority (96.1%), however, fell within the low-income category, earning less than N40,000 per month. Those in the middle-income bracket made up 3.9% of the respondents. None of the sampled informal waste collectors fell within the high-income category (Table 10). The computed mean monthly income is about N26,000. Thus, a collector earns an average of N867 daily. Given the current exchange rate of N360 to US dollars,

Table 10: Incomes of the informal waste collectors

Income	Frequencies	Percentage (%)
Low	99	96.1
Middle	4	3.7
High	0	0
Total	103	99.8

Source: Authors' field survey

a collector earned about US$2.4 per day, which is above the US$1.90 per day benchmark for living above poverty line (World Bank, 2016). A significant relationship exists between income and participation in the informal waste collection business with P-value = 0.075 > 0.05 (Table 11). This indicates that informal waste collection is financially rewarding, given adequate patronage, essential modern operational tools and the ability to work longer hours and at odd times. The financial reward of the job, therefore, partly explains why the respondents are in the business.

Table 11: Pearson's correlation coefficients

Socio-economic Variables		Waste Collection
Sex of respondent	Correlation coefficient	-.084
	Sig. (2-tailed)	.183
	N	103
Age of respondent	Correlation coefficient	-.003
	Sig. (2-tailed)	.964
	N	103
Marital status	Correlation coefficient	-.047
	Sig. (2-tailed)	.455
	N	103
Level of education	Correlation coefficient	-.093
	Sig. (2-tailed)	.143
	N	103
Income per month from waste business	Correlation coefficient	-.113
	Sig. (2-tailed)	.075
	N	103
Religion	Correlation coefficient	.109
	Sig. (2-tailed)	.089
	N	103
Nationality	Correlation coefficient	-.049
	Sig. (2-tailed)	.450
	N	103
Ethnic group	Correlation coefficient	-.109
	Sig. (2-tailed)	.088
	N	103
State of origin	Correlation coefficient	-.031
	Sig. (2-tailed)	.058
	N	103
Waste servicing as primary occupation	Correlation coefficient	-.048
	Sig. (2-tailed)	.476
	N	103

Correlation is significant at the 0.05 level (2-tailed)
All nominal and ordinal variables were transformed before analysis

To further determine the influence of the socio-economic factors on participation in informal waste collection, a hypothesis was formulated as follows: Participation in informal waste collection is a function of socio-economic characteristics. The hypothesis was analysed using multinomial logistic regression. Participation in informal waste collection was regressed against socio-economic variables which are gender, age, marital status, religion, income and ethnicity. The multinomial regression model derived from the analysis is given as: $Y = 58.025 + 79.461x_1 - 42.315x_2 + 30.632x_3 + 23.319x_4 + 61.524x_5 + 44.184x_6$.

The -2 log likelihood of the model, which is 61.035, indicates a direct positive relationship between the independent and predictor variables. The Nagelkerke pseudo r^2 of 0.714 shows that the six independent variables accounted for 71% of the variation in the participation in informal waste collection. All the predictors in the model, except age with at 42.315, exert positive influence on the respondents' participation in informal waste collection. Gender at 79.461 influences participation most. This is followed by income at 61.524 while ethnicity, marital status and religion which have values of 44.184, 30.632

and 23.319, respectively exert moderate positive influences on the respondents' participation in informal waste collection (Table 12). Thus, given the nature of informal waste collection, a unit increase in any of the independent variables will lead to an increase in participation and vice versa. However, the negative association of age with informal waste collection indicates that the older the waste collectors grow, the less likely they will continue with the business.

A number of waste management researchers have applied multinomial logistic regression in their researches. Afon (2012) applied multinomial logistic regression in his analysis of the socio-economic characteristics of waste scavengers in Lagos, Nigeria. All the socio-economic variables (age, gender, income, education and religion) correlated positively to engagement in waste scavenging. In another study by Challcharoenwattana and Pharino (2018), a multinomial logistic regression analysis of the influence of people's socio-economic attributes on their participation in community-based waste recycling programmes in Thailand was carried out. The study found that income, gender, education and age strongly and positively influenced participation in

Table 12: Multinomial logistic regression results

Model Fitting	-2 Log Likelihood	Chi-square	df	Sig.
Intercept	226.320			
Final	61.035	205.224	224	1.000
Likelihood Ratio Tests				
Intercept	58.025a	0.000	0	
Gender	79.462b	7.569	14	.911
Age	-42.315b	11.899	18	.852
Marital status	30.632b	49.696	158	1.000
Religion	23.319b	4.482	6	.612
Income	61.524b	9.368	21	.936
Ethnicity	44.184b	19.503	28	.882
Pseudo R-Square				
Cox and Snell	.118			
Nagelkerke	.714			
McFadden	.793			

Source: Authors' analysis

community-based waste recycling programmes while social status and marital status were weak variables that positively influenced participation in community-based waste recycling programmes. The results of this paper appear to be in line these earlier studies.

It is important to note that given the immense benefits of informal waste collection to the participants, society and environment, its continuity must be sustained. However, the sustainability of informal waste collection is partly dependent on the continuous restructuring of the informal waste collection subsector and adoption of modern waste collection practices, including the use of modern waste collection equipment. The feasibility of adopting modern collection practices and equipment depend largely on the socio-economic attributes of the participants. The younger and educated the participants are, the more they are amenable to adopting modern practices, and the more sustainable the informal waste collection sector will be.

Conclusion

The study has empirically demonstrated that social and economic factors greatly influence the emergence, participation and expansion of informal waste collection in the Ibadan North East Local Government Area by establishing strong relationships between people's socio-economic background (most importantly gender and income status) and their tendency to engage in informal waste collection. Investigating the socio-economic factors engineering participation in informal waste collection was necessary for two reasons. First, to better understand the nature of informal waste collection to assist decision-makers in drawing up policies that will facilitate informal waste collectors' integration into the waste management scheme of the local government. Second, goal 11 of the Sustainable Development Goals harps on the need for countries all over the world to ensure the achievement of sustainable cities and communities by the year 2030. A critical component of this goal is to ensure a clean

environment that is devoid of waste. As earlier noted, while studies have shown the inability of formal waste collection systems to achieve total collection in the study area and other third-world cities, with the existence of informal waste collectors, the restructuring and integration of informal waste collectors into the waste management scheme will bring about the desired result of total collection. However, restructuring and proper positioning of the informal waste collection sector for effective waste collection requires adequate knowledge of the social and economic attributes of the actors in the sector. There is less research effort in this regard and this gap has been filled by this paper, by bringing to the fore the important socio-economic attributes of the informal waste collectors that influence their participation in the business. It is pertinent to note that socio-economic features constitute the primary variables that naturally set the template for the design of a scheme, whether formally or informally. In other words, the socio-economic structure largely determines the behaviour and mode of operation of informal waste collectors which invariably gives the municipal authorities reasons to either facilitate or reject their integration into the municipal waste management scheme. It should, however, be noted that while socio-economic attributes are important factors influencing informal waste collection, other factors also play great roles in the emergence and expansion of the business. This is a subject for future research. Identification of these other factors will ensure holistic appreciation of the factors influencing informal waste collector emergence and expansion into the informal waste management scheme.

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