FACTORS INFLUENCING THE UTILISATION OF PRIVATE REFUSE COLLECTORS AMONG RESIDENTS IN IBADAN NORTH LOCAL GOVERNMENT AREA, OYO STATE

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DEDICATION

This dissertation is dedicated first; to Almighty Allah, the Most Gracious and the Most Merciful who in His Infinite mercies saw me through the course successfully and to my late mother, Madam S. A. OPAESAN.

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ABSTRACT

Improper solid waste management contributes to the spread of communicable diseases. Private Refuse Collectors (PRC) are critical to proper solid waste management. Factors influencing the utilisation of PRC have not been adequately documented in Oyo State. Therefore, this study was aimed at determining the factors influencing the utilisation of PRC among residents of Ibadan North Local Government Area, Ibadan, Nigeria.

The study was cross-sectional in design using a four-stage sampling technique to select 450 respondents from the wards, communities and houses located in the LGA. A pre-tested semi-structured, interviewer-administered questionnaire was used to obtain information on socio-demographic characteristics, perceived health hazards of poor waste management, methods of waste disposal and factors influencing utilisation of private refuse collectors. Knowledge of proper waste management and perception of health hazards associated with poor waste management were assessed on a 15-point scale each. Knowledge scores were categorised into poor (0-5), fair (>5-10) and good (>10) while perception scores of <12 and ≥12 were rated as negative and positive perception respectively. Data were analysed using descriptive statistics, Chi-square test and logistic regression at 5% level of significance.

Respondents' age was 36.5±11.1 years, 72.9% were females, 69.8% were married while 32.0% completed tertiary education. Seventy two percent lived in rooming apartments, household size was 4.4±2.1 and about 35.6% earned monthly income of ₦20,100. More than half (53.6%) disposed their refuse in government approved dumpsites, 33.8% employed PRC for disposing their refuse, 18.0% burned their refuse while 3.1% disposed their refuse into rain water run-off. Knowledge score was 12.4±1.5 and 90.7% had good knowledge of waste management. Perception score of health hazard of poor waste management was 12.7±1.3, with 95.1% having positive perception. Majority (84.2%) were of the opinion that there were health hazards associated with poor waste management. Also, 28.0% stated that the fees charged by the PRC were exorbitant and 70.9% of the respondents were of the view that passive or non-enforcement of sanitation laws could impede patronage of PRC. More than one-fifth (23.8%) of the respondents

considered the use of government refuse collectors as the best way to dispose their household refuse. No significant association existed between monthly income of the respondents and use of PRC. A significant association existed between good knowledge of waste management and the use of PRC. Respondents who lived in rooming apartments were less likely to use PRC (OR=0.09, CI=0.05-0.21) compared to those who lived in either flat or self-contained apartments. Respondents who completed tertiary education were more likely to use PRC (OR=3.83, CI=2.65-7.17) compared to those with no formal education.

High level of education, good knowledge of waste management and type of apartment which signifies poor socio-economic status influenced the use of PRC. Strategies such as public enlightenment and social marketing are needed to improve the acceptance and utilisation of private refuse collectors who should charge moderately.

Keywords: Private refuse collectors, Waste management, Rooming apartments
Word counts: 169

CERTIFICATION

I certify that this research work was carried out by Ramota Faramade OLAWOYE in the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria under my supervision.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

GLOSSARY OF ABBREVIATIONS

SW	-	Solid Waste
USW	-	Urban Solid Waste
MSW	-	Municipal Solid Waste
SWM	-	Solid Waste Management
MSWM	-	Municipal Solid Waste Management
RCRA	-	Resource Conservation and Recovery Act
PPP	-	Public – Private Partnership
UNEP	-	United Nations Environmental Programme
UNDP	-	United Nations Development Programme
LAs	-	Local Authorities
WDI	-	World Bank Indicators
CMC	-	Colombo Municipal Council
LGs	-	Local Governments
NGOs	-	Non-Governmental Organizations
MOH	-	Medical Officer of Health
PHI	-	Public Health Inspector
AEPB	-	Abuja Environmental Protection Board
PRECEDE	-	Predisposing, Reinforcing and Enabling Causes in Educational Diagnosis and Evaluation
PRCs	-	Private Refuse Collectors

DEFINITION OF TERMS

Waste or refuse: is an unwanted or undesired material or substance

Solid waste: is the useless and unwanted product in the solid state derived from the activities of and discarded by society. It is produced either by - product of production processes or arise from the domestic or commercial sector when objects or materials are discarded after use.

Waste Management: is all those activities and action required to manage waste from its generation to its final disposal. It involves the storage, collection, transportation, recovery and treatment of waste to the final disposal site.

Solid waste management: is the systematic control of generation, collection, storage, transport, source separation, processing, treatment, recovery and disposal of solid waste.

Private Refuse Collectors: These are the set of waste management workers that carry out the collection of refuse from household on commercial basis.

Utilisation: This is the act of using something.

Rooming Apartment: This is a type of building that is divided into single rooms which people rent to live in.

CHAPTER ONE

INTRODUCTION

The term solid wastes include garbage (food waste), rubbish (paper, plastics, wood, metal, empty containers and glass), demolition products (bricks, masonry, pipes), sewage treatment residue (sludge and solids from the coarse screening of domestic sewage), carcasses, manure and other discarded materials. It is obvious that all biological organisms must essentially generate waste. It follows therefore that, regardless of the social and economic status, mankind must inevitably generate waste of various forms which include gas, liquid and solid on a daily basis, no matter the geographical location they live in (Omoleke, 2004). Solid waste, which is one of the sources and causes of environmental pollution, has been defined under Resource Conservation and Recovery Act (RCRA) as any solid material discarded from industrial, commercial, mining or agricultural operations and from community activities (Matthew and Diana, 2010). Solid waste also includes garbage, construction debris, commercial refuse, sludge from water or waste treatment plants or air pollution control facilities and other discarded materials.

Solid waste management has to do with handling of solid waste from their sources of generation through storage, collection, transportation, recovery and treatment processes to final disposal site. Poultry and piggery wastes also contribute to environmental pollution and nuisance which are hazardous to human lives. In order to protect human health and the environment from the potential hazards of inappropriate waste disposal and environmental pollution, a systematically supervised and controlled handling of these wastes is a necessity (Omoleke, 2004). Solid waste management systems are an essential component of the environmental infrastructure in human settlements. These systems encompass all the activities undertaken from the point of waste generation up to the final disposal. In most of Africa's urban areas, solid waste management is ultimately the responsibility of Municipal Councils, while among most of the rural populations, the wastes are handled at the household level. Thousands of tons of solid waste are generated daily in Africa and most of this ends up

in open dumps and wetlands, thus contaminating surface and ground water, and posing major health hazards (Mugagga, 2006).

Waste generation rates for selected cities and regions are approximately 0.5 kg per person per day. While this seems modest compared to the 1-2 kg per person per day generated in developed countries, most waste in Africa are not collected by Municipal Collection Systems, because of poor management, equipment failure and/or inadequate waste management budgets. Though, high and low-value recyclables are normally recovered and reused, these make up only a small proportion of the total waste stream. The majority of the waste (approximately 70%) is organic. This could be converted to compost or used to generate biogas, but in situations where rudimentary solid waste management systems barely function, it is difficult to promote innovation, even when it is potentially cost-effective to do so. In addition, hazardous and infectious materials are discarded along with general waste throughout the continent. This is especially a dangerous condition that aggravates the waste management problem in Africa (Mugagga, 2006).

1.1 Statements of the problem

The low waste collection levels of Government have triggered widespread illegal open dumping and backyard open burning. This has created negative environmental impacts and increased the health risk of the residents. Open waste dumps are prime breeding sites for houseflies, rodents, mosquitoes and other vectors of communicable diseases such as fever, dysentery, diarrhoea, cholera and malaria. Fumes from burning waste cause respiratory disorders and the odour makes the environment intolerable. The leachate from the dumpsite pollutes underground water that is useful for the residents. Loose papers and plastics blown by wind result in an aesthetic intrusion of the surrounding environment (Alexio, 2005).

The inability of government owned agencies to adequately cope with the upsurge in the volume of municipal solid waste generated led to the creation of a "vacuum" in the collection, transportation, recovery, recycling and disposal of solid waste in the state under study. This vacuum that was created was filled by both the formal and informal private sectors in solid waste management. The formal private sector is made up of Registered Companies/enterprises that have the financial strength, some level of technical know-

how/experience and are generally mechanised. The informal private sector on the other hand is made up of the locals (that is those who construct carts in large quantities for rentals), the cart pushers (who are involved in house-to-house waste collection, transportation and recovery), the waste pickers (this group is involved in the on-site waste recovery or scavenging), the resource merchants (this group is involved in the purchase of all recovered recyclables and re-usable waste materials) and the recyclers (these are micro and small scale recyclers that convert recovered materials like paper, aluminium, animal by-products, plastics, metals etc; to valuable materials and raw materials for the consumption of the industrial sector (Adebola, 2006).

Factors that militate against hygienic environment in Ibadan include lack of urban planning, which has created slum conditions and violation of town planning regulations. Most houses in the city centre have no toilet facilities hence, human faeces and other waste are thrown into streams. This lends credence to a clustered configuration which inhibits mechanised solid waste collection: As a result, a high proportion of solid waste is dumped into drains and stream channels which often results in dogging and flooding (Omoleke, 2004).

In most urban settlements in Nigeria such as Ibadan, waste collection and disposal is frequently inadequate, with a preponderant proportion of the refuse generated heaped and left for weeks and with large parts of the city particularly the low income areas, receiving little or no attention. The onus is often on the local government to provide a service for solid waste management. However, the fundamental deficiency of this system is the government's failure to assume basic responsibility in raising sufficient funds to provide acceptable levels of service (Mahmoud and Belel 2013). For health reasons, waste in tropical regions should be collected daily. This makes the challenges even more daunting.

It is generally the city centre and the wealthier neighbourhoods that receive the necessary service when it is available. In poorer areas, heaped waste kept at road sides is burnt by residents, or is disposed of in illegal dumps which blight neighborhoods and harm public health. Where private refuse collectors are present, manual street sweeping by municipal employees or shopkeepers may help reduce these effects in most public places. Unless more

effective urban waste management programmes and public water supply systems are put in place, outbreaks of cholera and typhoid become increasingly common. With respect to solid waste, the deterioration of the urban environment resulting from heaps of uncollected refuse in neighbourhoods and public places, coupled with the apparent inability of the government to respond effectively to the challenge, necessitated the search for other options such as private refuse collectors. Therefore, government should strengthen the monitoring and enforcement activities within the LGA.

1.2 Justification of the study

Improper solid waste management has led to substantial negative environmental impacts such as pollution of air, soil and water. It may also result to health and safety problems such as disease spread by insects and rodents via garbage heaps and unsanitary disposal sites. Municipal (local authorities) are charged with the responsibility of providing solid waste management services together with other municipal services. However they find it increasingly difficult to play this role. The difficulty has been aggravated by lack of effective legislation, inadequate funds, inadequate facilities and poor leadership within the municipality.

Changing lifestyles such as use of canned soft drink, mobile phones, and disposable diapers pose special solid waste management challenges. This is because solid waste management systems in developing countries are incapable of frequent adjustment to match these lifestyle changes. Ibadan is an urban center which is growing at a fast rate in terms of population and economy. Equally the solid wastes are produced at an alarming rate. If this condition is not checked environmental health issues particularly diseases will increase; for instance incidences of malaria, dysentery, and respiratory infections due to open dump site may increase.

Diseases such as cholera may lead to closure of institutions and other businesses such as hotels hence a decline in productivity. Solid wastes, when treated, can be turned into a valuable resource, but most of the wastes generated seem not to undergo any treatment before their final disposal. They are seen in heaps at illegal dump sites within the town for

weeks and this creates unhygienic environment that emits foul odour and, worst of all, contribute to transmission of sanitation-related diseases. Solid wastes generated in Ibadan are most often disposed of in open areas, gutters, and at the back of or in between buildings, probably due to the inadequate solid waste management equipment or the long distances to the dump sites. The business people especially market vendors also leave their wastes in piles for days before they are finally collected and taken to dump sites for disposal. The above problems make it clear that the Local Government is unable to cope with this problem.

According to Oyo State Solid Waste Management Authority Law (2004) assented to by the then Executive Governor of Oyo State on 28th of January, 2008 which says that "the authority shall have power to register the refuse contractors subject to rules and regulations as may be made from time to time. This authority also has the power to fix necessary amount as registration fees which shall be renewable annually and also subject to review from time to time. Moreover, the authority shall charge reasonable amount as operational fees from the refuse contractors in respect of facilities provided and it shall be the responsibility of the authority to regulate the activities of the refuse contractors through the zoning system of operation for effective maintenance and cost effectiveness". Therefore, this research sought to find out why the residents are not patronising private refuse collectors and the factors contributing to this problem, despite the fact that government encourages public – private partnership (PPP).

1.3 Research questions

1. What is the knowledge of community members on proper waste management?
2. What is the perception of the respondents on poor waste management?
3. What are the methods of waste disposal in this study community?
4. What are the factors influencing the utilisation of private refuse collectors?

1.4 Broad objective

The broad objective of this study is to determine factors influencing the utilisation of private refuse collectors among residents in Ibadan North Local Government Area, Ibadan, Oyo State, Nigeria.

1.5 Specific objectives

The specific objectives of the study are to:

1. assess the knowledge of community members on proper waste management
2. assess the respondents' perception on poor waste management
3. identify different methods of waste disposal in the community
4. determine factors (level of education, culture, equipment, amount charged, passive or non-enforcement of sanitation laws, etc;) which influence the utilisation of private refuse collectors by the community members

1.6 Research Hypotheses

1. There is significant relationship between monthly income and the use of private refuse collectors.
2. There is significant relationship between knowledge of proper waste management and the use of private refuse collectors.
3. There is significant relationship between respondents' perceived health hazards associated with poor solid waste management and the use of private refuse collectors.

CHAPTER TWO

LITERATURE REVIEW

2.1 General overview

Urban solid waste has become a big crisis as a result of rapid urbanisation. More than half of the world's population is living in urban areas or towns. Cohen (2004) found that, at the beginning of the twentieth century, just 16 cities in the world contained a million people or more. Report of United Nations Environmental Programme (UNEP) states that all over the world, nearly 3,000 million people live in urban areas and everyday approximately 160,000 people join them (Global Environment Outlook, 2000). Today, almost 400 cities contain a million people or more, and about 70 percent of them are found in the developing world. In the year 2025, worldwide urban population is expected to rise to 60 percent and it is projected that 90 percent of this growth will occur in developing countries, especially in Asia and Africa (U.S Roads, 1998).

Over the last 20 years, many urban areas in developing nations have experienced dramatic growth in urbanization, as a result of rapid population growth. Due to the devastation of rural economies and neglect of agriculture, people migrate to cities with the hope of a better life. Opportunities in urban areas such as job availability, education and health are the major reasons for rapid urban population growth in developing countries. As the population becomes more urbanized, the number and size of the cities increase (Cohen 2004) as well as production rate of urban solid waste (USW) or municipal solid waste (MSW). MSW is defined as a waste which is generated by households, commercial enterprises such as offices, hotels, supermarkets, shops, schools, institutions and municipal services such as street cleaning. This MSW does not include the waste from mining, construction or destruction activities and industrial manufacture (Ngoc and Schnitzer, 2009).

Increase in the generation rate of solid waste has necessitated population to manage their waste in a way that will protect and preserve their health as well as improve it. 'Waste Management' however, includes, waste collection, transport, sorting, recycling or disposal,

and monitoring of waste materials and includes the actors, people and organizations engaged in these processes (Baud *et.al*, 2004). According to a survey carried out by United Nations Development Programme (UNDP, 1997) in 151 cities around the world, the second most serious problem that city dwellers face (after unemployment) is insufficient solid waste disposal. Typically, one to two-thirds of the solid waste that is generated is not collected (UNDP 1997, Zhou *et.al*, 2007).

Global Waste Management Market Report (2007) estimated that 2.02 billion tons of solid wastes were generated in 2006 with seven percent annual increase since 2003. The report further noted that from 2007 to 2011, global MSW increased by 37.3 percent with approximately 8 percent annual increase rate. The failure of Municipal Solid Waste Management (MSWM) has resulted in serious health problems and environmental degradation. For instance, due to deficient collection services, waste not collected is dumped on the streets and in drains, thereby contributing to flooding, breeding of insect and rodent vectors, and spreading of diseases. Furthermore, some collected waste is disposed off in uncontrolled dumpsites or burnt openly (Zhou *et.al* 2007). These have been identified to cause environmental, economic, social and cultural problems.

The rate of SW production is dependent on density of urban population, size of the urban habitation, consumption rate of commercial goods, income and lifestyles, degree of industrialization, institutionalism and commercialism, geographical location, energy resources, climate, living standards and cultural habits (Hope, 1998). Typically low income countries produce around 0.4 to 0.6 kg/person/day, whereas developed countries generate about 0.7 to 1.8 kg/person/day (Zerbock, 2007). The challenge of urban solid waste is particularly peculiar to developing countries, where resources are limited but urbanization is occurring rapidly (Ahmed and Ali 2004). The per capita of MSW generated daily in India ranges from about 100g in small towns to 500g in large towns. (Singhal and Pandey, 2001).

A report by the World Bank estimates that solid waste in urban areas of East Asia alone will increase from 760,000 tons/day to 1.8 million tons/day within 25 years, while waste management costs will almost double from US$ 25 billion to US$ 47 billion by 2025. The

SWM sector, therefore, deserves careful attention for striking a balance between quality of service and cost effectiveness. But due to institutional, regulatory, financial, technical, public participation shortcomings and inadequnte collection facilities, most of the cities are facing difficulties in managing the SWM problem.

In many developing countries, especially in Asian developing countries, Local Authorities (LAs) or some private sectors collect the waste. The main reason for the SW problem faced by developing countries is that, authorities do not collect the waste effectively (Zurbrugg, 2002). Furthermore, of the total waste generated, about 20 percent is used for recovery and recycling and nearly 37 percent remains spread out and left lying around on roadsides, open spaces and in drains (UNEP, 2001).

Generally, municipal authorities in developing countries collect their SW in limited areas especially residential areas where rich people are located or where they find more political influence (Zurbrugg, 2002). As a result, only some parts of the cities in developing countries are relatively clean. Slums or low income settlements are usually not reached by certain methods of transport vehicles due to the small roads, slopes and overcrowding. As if that is not bad enough, the municipal authorities dump the waste close to slumps or common places where people in the low income bracket live making these areas very filthy. The reason for this may be that central municipal budget is not enough to cover the entire city. In order to reduce the waste, developing countries follow specific waste management or disposal methods. These methods include burning, composting, incineration, land filling, reuse and recycling. Unfortunately, still in most of the developing nations, it can be observed that waste is dumped through uncontrolled methods without any environmental control measures (Zurbrugg, 2002).

Open dumping is therefore a common waste disposal method in developing nations. Land filling is not a common disposal method in these countries. According to Visvanathan and Glawe (2006), sanitary land filling or engineered land filling of MSW is misunderstood in the developing countries. Third world countries also have inadequate incineration facilities, although burning is used to reduce the smell of dumped or uncollected waste in such nations

(Eawag, 2008). But this method has been identified to negatively impact on the environment by its contribution to the depletion of the Ozone Layer in the atmosphere and its attendant consequences of global warming. Biodegradation of organic waste is used for compost in developing countries. Some informal sectors are also engaged in recovery and recycling activities (Beukering *et al*, 1999).

However, it has come to the notice of many that still; lots of waste is left carelessly in public places and this causes environmental and health problems to the people. Hence in an attempt to reduce SW problems in recent years, developing nations find public - private partnership as an alternative solution.

2.2 Solid waste management

Waste management is regarded as a public service where efficient collection and safe disposal of waste are essential to public health and environmental protection (Cointreau-Levine, 1994). It has evolved from the simple transportation of waste to landfills to complex systems, including waste prevention and waste recycling as well as several waste treatment and landfill technologies (Salhofer *et al*., 2007). While developed countries have achieved the first aim of waste management of providing protection to human beings and the environment and are battling resource conservation, the health and well-being of humans still suffer from inadequate waste management systems in developing countries and the first objective still remains a main priority (Brunner and Fellner, 2007). "Waste management has evolved from the simple transportation of waste to landfills to complex systems, including waste prevention and waste recycling as well as several waste treatment and landfill technologies" (Salhofer *et al*., 2007). This is in response to the increasing quantity and complexity of the composition of waste generation all over the world.

According to the United Nations consultative meeting in Tokyo, the main challenge regarding waste management has changed perspective to the manner in which discarded resources will be handled such that future generations are not deprived of some or all of its value (Chandak, 2010). This is a shift from the older view of ensuring minimum damage to public health and environment in the process of handling waste (Chandak, 2010). "A current

trend in developed countries is closing the loop, moving from the concept of 'end-of pipe' waste management towards a more holistic resource management" (Wilson, 2007).

In the recent past, the inability of member countries in the European Union to decouple waste growth from economic growth has imposed economic and environmental cost on society and created a pressing need to increase levels of effective waste minimization and management (Fatta and Moll, 2003). The trend in the UK has been a decline in waste growth for the past two years with the waste quantities consistent in the five years prior to 2008 (Defra, 2004). However, the cessation of waste growth persists for reasons that remain elusive and not clearly attributed to the sole efforts of waste minimization and management schemes (Fell, 2010). Waste management is regarded as a public service and those who do not pay are not totally excluded from the service generally. This is because efficient collection and safe disposal of waste, at the minimum, are essential to public health and environmental protection (Cointreau-Levine, 1994).

2.3 Solid waste management in Nigeria

In Nigeria, there is a steady increase in waste quantity and variety due to population growth and industrialisation (Imam *et al.*, 2007) while the basic solid waste management system based on collection, transportation and disposal remains highly inefficient and ineffective, especially in the urban centres (Ayotamuno and Gobo, 2004). Nigeria is the most populous and the tenth largest country in Africa with a population of over a hundred and fifty million people across a landmass of 923,768 square kilometres (WDI, 2010). This increase is especially steep in cities with an urban population growth rate of 5.5% against a general growth of 2.3% per annum in the nation (World Bank indicators, 2008; Imam *et al.*, 2008). The inability of authorities to respond to the challenge of such waste generation has resulted in the deterioration of the urban centres that are characterized by heaps of uncollected refuse around cities (Ogu, 2000; Imam *et al.*, 2007).

2.4 Legislation on solid waste management in Nigeria

Nigeria operates a three-tier system of government made up of federal, state and local governments with distinct functions accorded to each tier based on the constitution (Afon,

2007). The milestone Federal legislation on environmental protection in Nigeria was Decree 58 of 1988, which established the Federal Environmental Protection Agency (FEPA) to control the growing problem of waste management and pollution in Nigeria (Walling *et al.*, 2004; Imam *et al.*, 2008). Solid waste management is constitutionally the responsibility of the local government but the state government steps in to complement their efforts especially in state capitals such as Kaduna, Lagos and Port-Harcourt (Afon, 2007). Despite their effort, the solid waste management scheme in Nigeria is characterized by a system fraught with lack of accountability and refuse filled spaces, drains and roads (Dauda and Osita, 2003; Walling *et al.*, 2004).

2.5 Waste generation and composition

The importance of reliable information on both the quantity and composition of municipal solid waste for the effective planning of waste handling infrastructure has long been recognised. It shows the percentage of waste that can be recycled, reused, composted, and biologically stabilized (Dennison *et al.*, 1996). The total solid waste generation in Nigeria is rising steadily due to increase in population while scarcity of reliable data has made the per capita waste generation trend inconclusive (Wilson *et al.*, 2009). The estimate of waste generated per person in a day is 0.49 kg with households accounting for 90% of the urban waste (Solomon *et al.*, 2009). The generation per person in cities at particular time intervals varies from 0.13 in Oyo (Afon and Okewole, 2007) 0.25 kg/day (Dauda and Osita, 2003) in Maiduguri to 0.47 kg in Makurdi (Sha'Ato *et al.*, 2007) and at the top of the range Abuja with 0.57 average according to the waste audit report (2004).

This is within the range of per person waste quantities in developing countries of 0.1 kg/day to 1.2 kg/day. Solid waste generation is strongly influenced by time of year, traditions, personal income (Al-Jarrah and Abu Qdais, 2006; Imam *et al.*, 2008), household size (Bandara, 2007) and environmental awareness and concern (Afroz, 2010).

A study by Afroz et al. (2010) found that individuals with higher income generated more waste than lower income people and respondents that were concerned about the environment generated less waste. In another study, the highest generation of waste was recorded in

December due to festivities in the southern city of Ogbomosho in Nigeria illustrating the influence of time of year and traditions (Afon, 2007). Larger households have been found to produce less waste than smaller households (Poll, 2004; Jones *et al.*, 2008).

2.6 Temporary Storage

Waste is temporarily stored without separation at the point of generation within households or at communal disposal sites in urban cities in Nigeria. It is a key aspect of the management strategy as it determines to a large extent the efficiency and effectiveness of collection. Within and around households, waste is stored in various sizes of bins and bin bags by the more affluent population and in used baskets and buckets by the less affluent (Abdullahi *et al.*, 2008). Unlike Abuja, the capital city of Nigeria, most environmental agencies have not made provision for specified collection containers (Imam *et al.*, 2008). More than 50% of the population in the cities uses communal disposal sites as temporary storage. Waste is transferred from point of generation to these sites situated within each area by household members or contracted private collectors (Dauda and Osita, 2003). The communal disposal sites are open dumps characterized by uncontrolled emissions, presence of rodents and strong odour.

2.7 Collection and transportation

Collection and transport involve separate or co-mingled collection of solid waste and recyclables; and the transportation to processing and disposal facilities. Collection covers the emptying of bins or/and bin bags within or around the settlement area; and transport refers to the haulage of the collected waste to the disposal facility or treatment plant (Den Boer *et al.*, 2007). Collection is carried out in various ways in different areas in Nigeria. This includes direct collection by the state or local government or indirect collection by appointed private contractors and/or informal waste managers for a fee. The various ways include:

(i) Kerbside collection – waste is collected from kerbs of households, where the households are responsible for bringing out the waste to the kerbsides on or before collection days (Abdullahi *et al.*, 2008; Imam *et al.*, 2008; Agunwamba, 1998).

(ii) Receptacle or communal centre collection – The communal centre is usually an open

space of shallow trench where waste is dumped directly on the ground or in a few cases equipped with large bins into which the waste is discharged and eventually collected (Imam *et al.*, 2008; Dauda and Osita 2003).

(iii) Door-to- door or house-to-house pick up – The waste is kept temporarily within the properties concerned and generally collected from within the premises on a contract basis between householders and private organisations (Abdullahi *et al.*, 2008; Sangodoyin 1993).

Waste is typically transported by lorries, tippers, loaders, trucks and tractors by formal sector (Dauda and Osita, 2003; Imam *et al.*, 2008) and using hand pushed carts and wheel barrows by the informal sector. Collection is generally irregular in most cities with communal dumps staying for months without evacuation in many instances (Dauda and Osita, 2003), while kerb side collection ranges from once a week to none at all (Abdullahi *et al.*, 2008). The result of this ineffective and inefficient collection system is uncontrolled emissions of leachate and landfill gases that end up contaminating land and soil as well as polluting the air. This is in addition to nuisance of odour and destruction of landscape from waste heaps along streets and roads.

2.8 Waste treatment and disposal

The waste disposal option in Nigerian cities is predominantly open dumping followed closely by open burning (Osita and Dauda, 2003; Ogwueleka, 2009). The formal treatment of waste on the disposal site is usually open burning to reduce the quantity (Imam *et al.*, 2008). Waste collected by the private sector directly from households and evacuated from communal dumpsites is transported to final disposal sites where it is dumped in shallow pits or open grounds. This disposal route accounts for about 50% of the total generated waste. The rest of the waste ends up in watercourses, drains, roadside spaces, underneath bridges, undeveloped properties, abandoned wells, pit latrines and pits around cities (Sangodoyin, 1993; Ogu, 2000, Dauda and Osita 2003; Barton *et al*. 2008; Abdullahi *et al*., 2008; Imam *et al.*, 2008) where it is left to rot, serving as a breeding ground for flies, rats, mosquitoes and other pests. Disposal sites are generally enclosed areas (Agunwamba, 2003) with or without site officials and guards and situated on the outskirts in some of the cities such as Kaduna and Abuja and

space of shallow trench where waste is dumped directly on the ground or in a few cases equipped with large bins into which the waste is discharged and eventually collected (Imam *et al.*, 2008; Dauda and Osita 2003).

(iii) Doorto- door or house-to-house pick up – The waste is kept temporarily within the properties concerned and generally collected from within the premises on a contract basis between householders and private organisations (Abdullahi *et al.*, 2008; Sangodoyin 1993).

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within a short distance in many others. The sites are managed by a crew of five in some landfill sites to a non-existent crew in many open dumpsites all over the country except for waste depositors and visiting personnel (Agunwamba *et al.* 1998). The crew includes foremen, security men, record keepers, maintenance staff and operators.

2.9 Solid waste generation and management elements

The estimated waste generated per person in a day is 0.49 kg with households accounting for 90% of the urban waste (Solomon *et al.*, 2009). It has a high organic content consistent with waste generated in developing countries such as Ghana, China and Jordan and Palestine (Qdais, 2007; Al - Khatib *et al.*, 2010; Zhang *et al.*, 2010; Fobil *et al.*, 2010). The composition of waste in Nigeria suggests a recyclable content of over forty percent with recycling rate estimated at 8-22%, carried out by the informal sector (Wilson *et al.*, 2009). Other disposal options are open dumping, open burning and composting (Dauda and Osita, 2003; Imam *et al.*, 2008; Ogwueleka, 2009). The waste is temporarily stored within households or at communal disposal sites in various sizes of bins. bin bags, baskets, buckets and directly on the ground at communal sites (Abdullahi *et al.*, 2008). Highly irregular collection of co-mingled waste is carried out by the state/local government directly, via contractors and/or informal waste managers (Sangodoyin, 1993; Agunwamba, 1998; Dauda and Osita 2003; Abdullahi *et al.*, 2008; Imam *et al.*, 2008).

More than 50% of the population disposes waste at communal sites, which are basically open dumps (Dauda and Osita, 2003). Collection and transportation accounts for between 70-80% of total waste management cost in Nigeria (UNDP, 1998) mainly funded by the government. Irregular collection and transportation of waste is partly attributed to frequent breakdown of vehicles and inadequate facility and equipment (Dauda and Osita, 2003; Imam *et al.*, 2008; Adewole, 2009).

2.10 Role of public sector in waste management

Public sector actors sometimes try to fulfil their responsibility in waste management system due to their mandate and obligation or due to the power and patronage conferred on the governments or its representatives. However, they cannot do it properly because of unclear

objectives, poor institutional structure, lack of trained staff, inflexible work schedules, inadequate supervision and strong workers' unions (Klundert and Lardinois, 1995). So, it is generally said that government is weak in management and operations. Anyhow, the public sector cannot make necessary changes in their work procedures and thus changes are necessary to work with the private sector (Massoud *et al.*, 2003).

2.10.1 Challenges of public sectors in waste management

The public sector plays a key role in solid waste management and in several countries; it faces many problems to manage waste. These problems can be identified as follows:

2.10.1.1 Public funding

The public sector faces the challenge of funding to manage solid waste. This means, their income is not enough to provide solid waste management services. Due to this special reason, they fail to manage solid waste in entire cities or have limitations in meeting public demand (Ahmed and Ali, 2004).

2.10.1.2 Competence of public sectors in waste management

Normally, the public sector employs a substantial number of people but, most of them are not well - trained. So, public sector staff work with inadequate managerial skills (Ngowi, 1999). In general, government appoints several labourers for solid waste management but due to lack of skills and training, the public sector still does not have a good workforce. As a result of this, municipalities face problems and, to handle the problems, they have to appoint more skilled workers in solid waste management, for example, the Colombo Municipal Council (CMC). In Sri Lanka, 22.9 percent of the total municipality workers of 10,715 worked in solid waste department in early 2000 (Horen, 2004). In addition, many developing nations face problems of lack of mechanics. Levine (1994) reported that in developing nations, several municipalities have one mechanic for 10 – 15 vehicles. It is difficult to repair around 15 vehicles by one mechanic and if the municipality wants to buy a spare part for vehicles, they have to wait until they get permission from an upper manager. Therefore, many vehicles take about 2 – 6 days for minor repairs (Levine, 1994). The writer further noted that if the

spare part for the vehicle has to be ordered from a foreign supplier, then it takes 3 – 6 months to repair and due to these reasons, nearly 25 – 50 percent of the vehicles remain in disrepair for a long time in developing nations. Municipalities consequently fail to collect the waste properly.

2.10.1.3 Infrastructure and/or Resources

Public sector workers in charge of waste disposal work with inadequate equipment. They have to work slowly with old vehicles and equipment. Most of the vehicles are very difficult to operate, maintain and in bad condition or old (Zurbrugg, 2002). Generally municipalities encounter many problems to buy new vehicles and they also face problems in repairing old or broken down vehicles. Availability of vehicles and conditions of the vehicles are also some of the reasons why waste is abandoned in public places. This means collectors cannot follow the collection schedule due to lack of vehicles or conditions of the vehicles (Kassim and Ali, 2006). Kassava and Mbulingwe (2005) found out that, many SW collection trucks in Dar es salam city, Tanzania are in bad condition. Even in Sri Lanka, it has been observed that the collection trucks are not in good condition. Jayasinc (no date) noted that Colombo Municipal Council in Sri Lanka has 38 compactor trucks, 50 tractors and trailers, 323 loaders and handcarts and several waste compactors, bull dozers, tippers and skip hoist trucks but Colombo municipality faces problems to collect waste effectively in entire cities due to the bad state of the vehicles. Due to Local Governments' (LGs) lack of budgetary allocation for SW, the public sector finds it difficult to improve their service delivery with new technologies and also train stuff.

Lack of vehicles or bad conditions of the vehicles and old equipments force the public sector to collect waste from selected areas or sides. Ahmed and Ali (2004) found in their research on Private - Public Partnership in Solid Waste Management in developing nations that the public sector does not have the skills or incentive to change the traditional mode of service delivery and build partnership with the private sector and citizens, They also do not have finances for experimentation along this line. So, they have to do most of their work manually such as street sweeping, loading and unloading and drain cleaning and the public sector has to provide the service with lots of workers (Ahmed and Ali, 2004).

2.10.1.4 Political interference

This also affects public sector activities. Massoud *et al* (2003), argue that the public sector or local governments are motivated by political interests. Due to regular changes in the politicians in power, the public sector faces problems in implementing some projects regularly. This means that if any politician in power embarks on a project, it can be implemented when the same politician is in power. However, when a new political party comes into power through an election, the new ruling political party does not usually continue to implement the same project embarked upon by the previous political party.

2.11 Private sector participation

The ineffectiveness of collection by the public sector in Nigeria, with uncollected waste of approximately 50%, has led to the birth of both formal and informal private sector participation (Kofoworola, 2007; Afon, 2007). Private sector participation is normally driven by the need to provide a solution to inadequate and/or overly expensive service provision (Cointreau-Levine, 1994; Ogu, 2000; Afon, 2007). The reason for adopting any one of the two options of formal or informal service usually depends on affordability and convenience (Afon, 2007).

2.11.1 Formal private sector

The formal private sector service provision is generally characterized by cleaner collection methods from source of waste generation and proper disposal to final dumpsites. They operate under four types of participation; contracting, concession, franchise and open competition (Cointreau-Levine, 1994; Ogu, 2000). The services associated with the formal sector include street sweeping, collection and transportation of waste from households and evacuation from communal dumps usually without recycling or other treatment options carried out (Ogu, 2000; Hussain, 2008; Nacodibe, 2009). Awareness and generally poor attitude towards waste management is recorded in literature (Imam *et al*., 2008, Adewole 2009). Uhuo and Zavodska, 2010, observed that the local and state governments responsible for raising awareness on solid waste management issues often adopt inclusion of environmental management topics in Junior Secondary School syllabus. This is in addition

to seminars, conferences, workshops and training sessions as the most common techniques in creating awareness on the necessity for timely waste disposal.

2.11.2 Strength of private sector in waste management

The private sector is profit-oriented. As a result of this, normally they do not tackle their problems with adequate budget. "Contracting-out service delivery to the private sector helps the government to reduce costs because the private contractors are free from civil service requirements and thus have greater flexibility to hire and fire workers" (Ketti, 1993; Helmsing, 1997).The formal private sector's main goal is to generate profit from their investment (Klundert and Lardinois, 1995). To get back returns from their investment most of the time, they provide capital, management and organizational capacity, labour and technical skills for the public sector (Schübeler, 1996). Also, the private sector has the ability for good management with controlling costs by using technology and skilled workers (Massoud *et al.* 2003).

The formal private sector enters directly into contracts with individuals, neighbourhood associations or business establishments for collection services and then buys the waste from them (Schübeler, 1996; Klunden and Lardinois, 1995). They especially carry out these activities to continuously generate income. Also generally, the formal private sector collects reusable or recyclable goods and tries to make something from recyclable or reusable waste (Post *et al*; 2003). This activity creates a chance to recover valuable materials and to generate more income. Under partnership, each of the actors think about benefits, but this does not mean equality among them (Post *et al*. 2003). Other fiscal arguments are that, if public services are provided by the private sector, governments will be able to reduce subsidies to loss-making public agencies, increase tax revenue from private operators and reduce public borrowing by encouraging the private financing of capital expenditure (Awortwi, 2004)

2.11.3 Efficiency of private sector in waste management

Commercial establishments, industrial enterprises and institutions are also interested in waste management. Due to their interests, they co-operate with government and/or specialized private enterprises (Schübeler, 1996). Ngowi (1999) states that relatively speaking, the

private sector is more effective and efficient than the public sector. The private sector is generally identified to be better at design, construction, and operations Massoud *et al*. (2003) corroborates this by saying that 'they can make decisions fast and be creative in approach, design and the use of technologies'. Ngowi (1999) states that compared with the public agencies, the private sector is more dynamic, flexible, creative, innovative and vibrant in their work.

Moreover, the private sector usually meets certain performance criteria, while the public sector does not benchmark their own performance (Massoud *et al*. 2003). In PPPs, Awortwi, (2004) remarks that, "while the public sector has the ultimate responsibility for providing services, actual delivery becomes the responsibility of the private sector under contractual arrangements". Literature shows that the purpose for entering into partnerships with private contractors was to improve service delivery (Awortwi, 2004). For example several SWM activities in developing nations show that after the contribution of the private sector, SWM facilities have increased.

2.11.4 Flexible work schedule

The private enterprises have wavering work schedules with better management (Ngowi, 1999). Moreover they do not want to wait for decisions to come from higher office managers and they can respond faster. Furthermore, they have clear objectives in their work. In the same vein, Massoud *et al*. (2003) also state that, due to flexible work schedule, fast decision making process and clear objectives, the private sector works better than the public sector. Their greater flexibility leads them to buy or sell their products (which they produce from waste) quickly (Ngowi, 1999). For example, they can get facilities soon, such as if they do not have enough vehicles to collect waste or if they want to repair a vehicle, they can repair it in a few days with good workers (Levine and Coad, 2010).

2.12 Weakness of private sector in waste management

As urbanization continues to take place, the management of solid waste is becoming a major public health and environmental problem in urban areas of many developing countries. This

led to the involvement of Private Refuse Collectors in solid waste management. Despite this fact, the Private Refuse Collectors also have their weaknesses which are:

2.12.1 Infrastructure

In developing countries, municipalities and the private sector use different kind of vehicles to collect waste such as tractors and compactor trucks. Most of the municipalities do not have enough vehicles to collect the waste in the entire city. This explains why Jayaratne (no date) notes that, in Colombo area that there still remains uncollected waste on road sides. But the private sector can support by providing vehicles to collect waste and they prefer using vehicles which are in good condition. If the vehicles break down, the private sector operators are able to repair them as soon as possible because they make decisions fast and do not have to wait for permissions from the higher level managers. Studies show that private sector involvement helps to reduce the service cost by half in Latin American cities with higher labour and vehicle productivity (Levine and Cond, 2000).

Lack of physical infrastructure creates problems particularly in respect of waste collection in the city areas. In Sri Lanka it has been observed that the collection trucks are not in good condition. Jayaratne (no date) discussed that Colombo Municipal Council, in Sri Lanka has 38 compactor trucks, 50 tractors and trailers, 323 loaders and handcarts and several waste compactors, bull dozers, tippers and skip hoist trucks. However, it is reported that, in Colombo area, heaped waste still remains on road sides. Studies show that even in Sri Lanka, most waste collection vehicles are well past their useful lives and are in need of repair or replacement. Available vehicles are also inadequate for current necessities (Vidanaarachchi, Yuen and Pilapitiya, 2006).

In addition to these, householders and shop owners throw their waste in community containers which are placed on the roadsides. Municipalities collect this waste by using carts or vehicles. Sometimes, municipalities use open trucks to collect the waste. As a result of this, bad odour is spread everywhere. Garg *et al.*, (2007) also report after their research that workers carry out the collection services without any safety equipment for example, without gloves or boots. Unsafe working conditions expose them to health hazards and many

developing countries face some problems of lack of some important equipment to collect waste properly. The equipment which they already have is old and ill-maintained. For example, Eeeberger (2006) reports that Sri Lanka uses old and ill- maintained equipment for solid waste management.

2.12.2 Labour

Another problem faced by the municipality is lack of skill of municipal workforces (Asian Development Bank Institute, 1998). In developing nations, lots of people engage in SWM processes-related work. Generally, training is given to senior staff (Asian Development Bank Institute, 1998). However, most of them are not well-trained labour thus, they cannot work well. Notable also is high absenteeism levels among municipal waste collectors. This absenteeism negatively affects the SWM processes. This means municipalities cannot plan their work thereby reducing their efficiency. In Sri Lanka, the Medical Officer of Health (MOH) and the Public Health Inspector (PHI) also lack technical knowledge and most of the time; they concentrate on other public-oriented duties. Due to this, MOH and PHI reduce their waste management duties by sharing them with the untrained staff (Vidanaarachchi *et al.*, 2006).

Due to lack of skilled labour, even if the municipalities get expensive technologies, they face lack of human resources (experts) to use them. If the technologies are used in an incorrect way by unskilled labourers, then the technology and the finance go to waste. Furthermore, most of the current workers are not aware of the negative environmental and health problems created by waste. Also due to poverty, some workers carry out their work using old equipment. That is why Schübeler (1996) noted that workers are exposed to hazardous situations. But, the private sector has skilled workers who are aware of the problem and knowledgeable in the aspect of high technologies needed to handle the waste.

2.13 Factors affecting the utilisation of private sector in waste management

2.13.1 Awareness

The waste management service providers i.e. the local and state governments are responsible for raising awareness on solid waste management issues. In Abuja, the Abuja Environmental Protection Board (AEPB) is currently performing this task by promoting environmental clubs

in schools, engagement in formal education as well as dissemination of information through print and electronic media (Abdullahi *et al.*, 2008). This is further enhanced by impacting knowledge through television which is specific to Abuja as indicated by Imam *et al.* (2008). The main process of creating awareness in Nigerian cities focuses on organizing seminars, conferences, workshops and training sessions as suggested by practitioners in the course of the survey in this study. This is in addition to including topics on environmental management in established subjects such as Integrated Science and Social Studies in Junior Secondary Schools where teachers are unprepared to achieve the desired outcome of instilling awareness and knowledge and end up giving it insignificant attention (Uhuo and Zavodska, 2010).

With a literacy rate of 68% and over 13% of children out of school at the Junior Secondary level (World Bank Indicators, 2008), a percentage of the population has lost out on environmental education while the method for the adult awareness programmes requires more than basic literacy in understanding the message of waste management issues and options being given. Babayemi and Dauda (2009) in their report suggest a high awareness level of some aspects of solid waste management such as waste disposal options and waste management regulations with females showing a better understanding of issues than males. However, effective awareness alone cannot sustain a good environmental quality, which can only be achieved in conjunction with many other factors such as provision of facilities, equipment and capacity building that is lacking at present.

2.13.2 Attitude

Imam *et al.*, (2008) in their study came out with the finding that, public awareness and attitude can affect all stages in the waste management process. This has an impact on household waste storage, waste segregation, recycling, collection frequency, littering and fly-tipping, willingness to pay for waste management services, and the level and type of opposition to waste treatment and disposal facilities. Nigerians generally have a poor attitude to waste that is unsupportive of effective waste management (Agunwamba, 2003; Walling *et al.*, 2004; Adewole, 2009). Most people perceive environmental quality as the sole responsibility of the government and the individual has only an unimportant role of disposing waste from their immediate surroundings (Adewole, 2009).

Common occurrences in many over-populated cities are the throwing away of small items of waste from cars and by pedestrians onto the streets and the use of streets as toilets (Adewole, 2009). Creation of illegal communal dumps for convenience of residents is also a widespread practice. According to Imam *et al.* (2008), transporting household waste is normally regarded as the duty of children and people who handle the waste are often regarded as dirty and poor. In addition to this negative attitude, lack of facilities also prompts improper disposal of waste (Dauda and Osita, 2003). A protective orientation and custodial attitude toward the environment has been identified among the critically missing components in current waste management initiatives in urban Nigeria (Nwakwo 1995; Ogu 2000).

2.13.3 Quality of the services by the private sector

The private sector needs more money to handle waste. When the private sector handles the waste, the people are more willing to pay for a good environment. However, MSW management is the responsibility of every inhabitant and waste is an unavoidable product from human activities. So if people need a good environment and healthy life, they may be willing to pay for SWM. For instance, in Nairobi, 47 percent of the city dwellers pay US$ 1.25 per month for good waste management services (Henry, 2006). But if people do not cooperate with the public sector then it is very difficult to manage the garbage well and the private sector cannot ensure a clean environment.

2.13.4 Level of Education

People's participation is very important for better solid waste management. Most of the people in developing countries are not well-educated and they are not aware of issues related to solid waste in general, most of them do not cooperate with the private sector to manage waste. Rathi (2006) states that those people in the communities who do not participate in solid waste disposal issues create problems for Community Based Organizations (CBOs) and Non- Governmental Organizations (NGOs). Kassim and Ali (2006) noted that people's participation, awareness of the problem and satisfaction level of the service has an influence on service delivery. If there are more non-participants in the society, managing waste becomes very difficult.

2.14 Social sustainability of solid waste management

A priority of waste management is social sustainability to ensure human health and well-being in this generation and generations to come. It also includes involving society in waste management processes by engaging members of the society in joint work with the aim of achieving short and long term goals (Imam *et al.*, 2008).

2.14.1 Health

A major cause of disease is improper management of solid waste in many developing countries with associated negative impacts on the economy. This is due to lost workdays, cost of treatment and mitigating activities (Joseph, 2006). These health effects include spread of diseases such as typhoid fever and Lassa fever by flies and rodents; and malaria from mosquitoes that use waste heaps and blocked drainages as breeding grounds (Joseph, 2006). This is in addition to health issues resulting from direct contact with waste such as injuries, infected cuts, respiratory and skin infections (Rogers, 2002; Joseph, 2006). However, evidence from other studies indicates that the link between people working with being susceptible to more infections is inconclusive. Health effects are investigated in two main ways according to DEFRA (2004):

(i) Epidemiological studies – these are studies of the distribution (or pattern) and determinants (or causes) of disease in human populations.

(ii) Emission-based studies – which measure emissions being released into the environment from one or more sources. Based on this, human exposures to emitted substances can be estimated, and the risks to human health can be assessed.

Emission-based studies are undertaken because the health impacts arise mainly from exposure to toxic chemicals through air, water and soil media; exposure to infection and biological contaminants; stress related to odour, noise, vermin and visual amenity; risk of fires, fire explosions, and subsidence; spills, accidents and transport emissions (Cairncross and Feachem, 1993). While the sophistication of the waste hierarchy is driven by environmental awareness, protection of public health provides the underlying motivation for waste management practices and is satisfied through the collection and sanitary disposal of the waste (Hayward and Gaskin, 2005).

2.15 Conceptual Framework: The PRECEDE model

Green, Kreuter, Deeds and partridge (1980) developed the PRECEDE framework which is a behavioml antecedent model that is helpful in diagnosis of any health problem or phenomena. The term itself is an acronym for Predisposing, Reinforcing and Enabling Causes in Educational Diagnosis and Evaluation. The term framework is used to denote that PRECEDE combines key concepts from other theories and models. PRECEDE was designed to be helpful in both diagnosing and planning/solving of health problems. The model assumed that most health problems are behaviourally-related and for such problems to be solved, those related behaviours must be modified, dropped and extinguished. The model looks at the factors that contribute or are related to the prevailing health situation. These factors, or behavioural antecedents, are the following: predisposing factors, enabling factors and reinforcing factors as depicted in Figure 2.1.

Predisposing factors are antecedents to the behaviour that provides rationale, motivation or sustenance of the health-related behaviour like knowledge, perceived benefits, beliefs and culture, unwillingness to pay, awareness of private refuse collectors.

The enabling factors are antecedents to behaviour that relate to the health situation and allow for that behaviour, motivation of aspiration to be realized and they include factors like resources, supervisions, skills, prevailiag conditions, and amenities. Ajani, 2007, found, for example that amount charged for waste collection is a determinant factor for using public waste collection services in Ibadan. Also, Babayemi and Dauda 2009, reported that in Abeokuta, waste collection was initiated by both public and private sectors, although the effectiveness of this is largely a function of location; and where the collection is done by private sectors, it is a function of income of the owner of the waste to be able to pay the amount charged. Furthermore available resources, supportive policies, reduced cost, free of charge, level of education, level of income etc could contribute to enabling factors for the public to utilise private refuse collector for disposing of their solid waste.

The reinforcing factors relate to the behaviours that provide the continuing rewards, incentives, reinforcement, motivation, support, sanctions, punishment etc; which are contributory to the sustenance or extinction of the health behaviours. These factors include the roles of significant others, for example, the motivation to use private refuse collectors for the disposal. These factors also encourage repetition or persistence of behaviours by providing continuing rewards or incentives. Public enlightenment, campaigns, public awareness, enforcement of environmental sanitation laws etc; might all be considered reinforcing factors.

2.15.1 Adaptation of PRECEDE Framework

The PRECEDE framework provides a framework for understanding the facets that are contributory to a health situation. It also provides a guide to outline some health education strategies for the prevention or alleviation of such a health situation. Taking for example the concept of initiation of private refuse collector utilisation for refuse disposal, the PRECEDE model provides a framework for a holistic understanding of the behavioural and non-behavioural factors associated with it, the educational diagnosis of the factors that influenced those behaviours and provided strategies that could be directed to increase public initiation and continuation of private refuse collector utilisation.

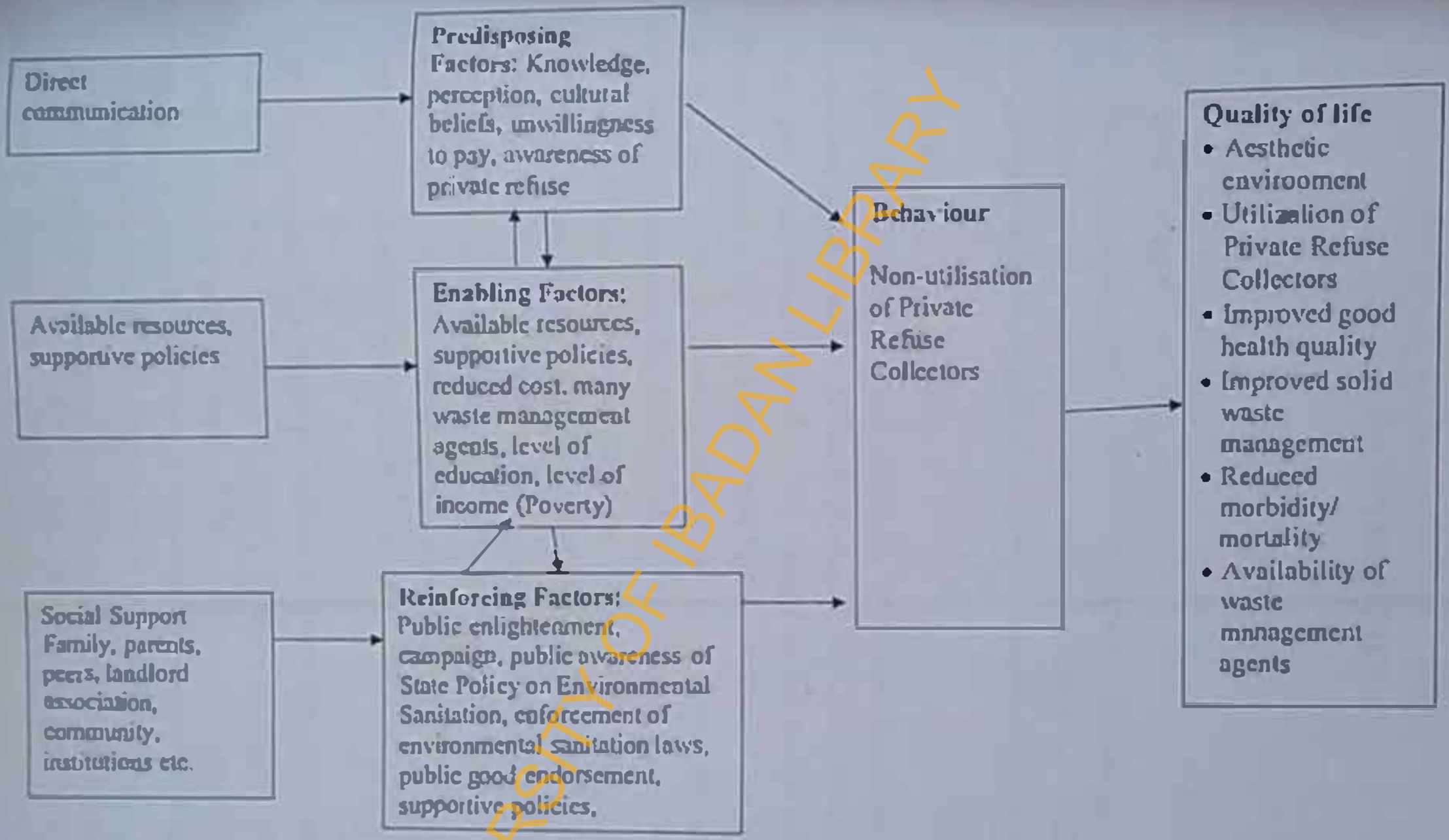

Figure 2.1: PRECEDE framework on factors influencing the utilisation of private refuse collectors

CHAPTER THREE

METHODOLOGY

3.1 Study design

The study was descriptive and cross-sectional in design. The study probed into method of data collection to determine factors influencing the utilisation of private refuse collectors among residents in Ibadan North Local Government Area, Ibadan, Nigeria.

3.2 Description of study area

The study was carried out in Ibadan North Local Government Area of Oyo State. The Local Government, which comprises of twelve (12) wards, was carved out of the defunct Ibadan Municipal Government in September, 1991 during President Ibrahim Babangida's Military Administration. It is the second largest Local Government Area in Oyo State and is bounded in the North by Orogun River/Akinyele Local Government Area; in the East by the Lagos/Ibadan Expressway and Lagelu Local Government Area, Idi – Ape/Basorun road and Ibadan North East Local Government Area; in the West by Ibadan North West Local Government Area and Ido Local Government Area; in the South by Beere Roundabout, Ibadan South East Local Government Area and Ibadan South West Local Government Area. As at the time of creation of the Local Government, Bodija was gazetted as the Headquarters of the Local Government, but presently, the seat of Government is located in the former second Mechanised Division of Nigerian Army, Agodi Gate.

The Local Government is majorly populated by the Yoruba people with other ethnic groups and foreigners with a population of 306,795, of which 153,039 are males and 153, 756 females (Federal Republic of Nigeria, 2006). The Local Government is the seat of the popular Bodija market, Sango, Oje and Mokola markets and two major higher institutions - University of Ibadan and The Polytechnic, Ibadan in Ibadan, Oyo State.

There are many public and privately-owned primary and secondary schools in the Local Government. Majority of the residents of the Local Government are civil servants, traders and technicians.

The Local Government was chosen for this study on the following premises:

(a) Ibadan North Local Government is the most populous and cosmopolitan local government within Ibadan metropolis plus having the largest and highly patronized market (Bodija market) where their waste generation is much.

(b) It represents a typical community that has peripheral, transitory and indigenous characteristics compared with other local government area that is urban or rural.

(c) The local government also consists of high, medium and low density areas.

(d) Accumulation of un-evacuated refuse by Private Refuse Collectors as at when due can precipitate spread of diseases.

(e) Lack of access road and grossly undefined urban planning development of the core areas within the LGA hinders smooth operation and patronage of Private Refuse Collectors

(f) Poor economic status of inhabitants within the core areas of the LGA is also a barrier against effective patronage of Private Refuse Collectors

(g) The Oyo State Solid Waste Management Authority Law 2004 clearly stated the functions of the Private Refuse Collectors.

Table 3.1: List of communities in each LGA ward

Wards	Communities
1	Oke –Are, Kanaike, Agbadagbudu etc;
2	Inalende, Okeseni etc
3	Yemetu Adeoyo, Oke – Aremo, Yemetu Police station etc;
4	Oke – Apon, Yemetu Igosun, NTA etc;
5	Akingbola, Basorun, Inu Koko etc;
6	Saba, etc;
7	Oke – Itunu, Opposite Cocacola area, Sobande avenue etc;
8	Sango, Iso pako, Alunuyo, Ijokodo etc
9	Mokola Cultural Centre etc;
10	Cocacola, Bodija Housing Estate, Bodija Housing Estate Extension, Ikolaba, etc;
11	Sawonda, University of Ibadan, Abadina, Polytechnic Ibadan etc;
12	Bodija market, Agbowo. Barika, Aba Apata, Agbegba, Ansar –ul deen Express, Olorungbede, Agbowo Shopping Complex etc;

3.3 Study population

The study population was adult residents of Ibadan North Local Government Area while the target population was the adults of all marital status and categories residing in the randomly-selected communities within the Local Government Area.

3.4 Sample Size Determination

The size of the population in Ibadan North Local Government is large, hence, the sample size was calculated using the assumption that the number of residents who utilize private refuse collectors is 50% while those that do not utilize private refuse collectors is 50%. Since no prior value or prevalence was available on the study, the sample size was calculated using the following formula:

$$n = \frac{Z^2 Pq}{d^2}$$

where:

n = Sample size

z = Confidence interval

p = Proportion of Households which patronize private refuse collectors (50%)

q = Proportion of Households which do not patronize private refuse collectors (50%)

d = Level of significance (0.05)

$$n = 1.96^2 \frac{(0.50 (1 - 0.50)}{0.05^2}$$

$$= 3.8416 \frac{(0.50 \times 0.50)}{0.0025}$$

$$= 3.8416 \times \frac{0.25}{0.0025}$$

$$= \frac{0.9604}{0.0025}$$

$$= 384.18$$

Having known the minimum sample size calculated to be 384, incomplete response rate of 15% (which is equal to 67) of the sample size was added. This increased the sample size to 451. Therefore, 450 respondents were studied.

3.5 Sampling procedure

A 4-stage random sampling technique was used in selecting respondents for the study.

Stage 1: The 12 wards were stratified into 3 based on population density from the National Population Census (2006). These comprised of high, medium and low density.

Stage 2: Two wards were randomly selected from each of the strata, making a total of 6 wards. Three communities each were randomly selected from each of the wards.

Stage 3: A total of One hundred and fifty (150) houses were proportionately selected from each of the 3 selected communities (localities) i.e. high, medium and low density area.

Stage 4: One household was randomly picked through balloting from each of the houses and 150 respondents who consented in each of the household in the selected high, medium and low density areas participated in the study.

3.6 Inclusion and exclusion criteria

The main criterion for inclusion in the study was that each participant must be a resident of the selected communities. In a household where more than one eligible respondent was available, the older was selected because of their experience and their role in providing support for the family.

3.7 Instrument of data collection

Only one validated instrument, a semi-structured, interviewer-administered questionnaire was used for data collectinn. The instrument was designed and pre-tested in Ibadan South West local government area, Ibadan.

3.7.1 The questionnaire

The semi-structured, interviewer-administered questinnnaire was divided into five sections. demographic characteristics, knowledge of solid waste and proper waste management, perceived health hazards associated with poor solid waste management, methods of waste disposal and factors influencing utilisation of private refuse collectors.

3.8 Validation of the instrument

A total of sixty questionnaires was pretested in Ibadan South West local government area, Ibadan. Further modifications were done based on observations and experiences from respondent's reaction to the questions. Also the questionnaire was modified based on the pre-tested findings. The modifications were the following: In-house review of the instrument was done among experts in the field of health promotion and education in the College of Medicine, University of Ibadan. Thereafter, the instrument underwent the scrutiny of the researcher's supervisor. The suggestions were used to modify the instrument.

3.9 Reliability of the instrument

The reliability of the instrument was tested with administering 10% of the questionnaire to respondents from a similar community and analyse the data to determine the Alpha Cronbach's reliability test. The value of the Alpha Cronbach's reliability test was 0.8, i.e 80%. Questions that were not well framed were identified for recasting.

3.10 Recruitment and training of research assistants

Five (3 female and 2 male) research assistants who were university graduates and conversant with social science research were recruited and trained by the researcher to ensure that they had adequate understanding of the instrument before the commencement of data collection. The training focused on the objectives and significance of the study, sampling procedures, how to secure respondents' informed consent, how to handle refusal, honesty and confidentiality throughout the data collection period and how to review questionnaires to ensure completeness. Also, they were trained on effective conduct of interviews and interpersonal relationship with respondents.

Adequate clarifications were made to ensure proper understanding before field work commenced. The research assistants were involved in the pre-testing of the questionnaire in order to create opportunity for them to acquire practical interviewing skills.

3.11 Data collection

3.11.1 Questionnaire administration

The validated semi-structured questionnaire was self - administered. Four hundred and fifty (450) questionnaires were administered to the respondents and data were collected over a period of two weeks. The investigator closely supervised and monitored the process of the whole data collection, both on the field and through daily reviews at the beginning and end of each day.

3.12 Data processing

3.12.1 Data processing involved:

1. Questionnaire administration: the questionnaires administered on a daily basis were reviewed and edited to ensure completeness and consistency.
2. Questionnaire verification: all the questionnaires (450) verified were completely filled and were numbered serially and used to develop the coding guide.
3. Development of coding guide: coding was assigned to responses in the questionnaire and it was used to develop data dictionary.
4. Data entry: coded data was entered into the computer through the Statistical Package for Social Sciences (SPSS) for analysis
5. Data Storage: all the questionnaires were packed according to serial numbers and kept in a safe box to ensure safety and maintain confidentiality. The data was also kept for reference purposes.

3.12.2 Knowledge scale

Knowledge was assessed on a 15-item knowledge scale. Correct responses were coded one (1) while wrong responses were assigned zero (0). The total obtainable score was 15.

Qualitative assessment of knowledge score:-

(i) A score of between 0 – 5 = Poor Knowledge - (Code = 1)

(ii) A score of between >5 – 10 = Fair Knowledge - (Code = 2)

(iii) A score of between >10 = Good Knowledge - (Code = 3)

3.12.3 Perception scale

Perception section comprised of 15-item perception scale. Some questions in the questionnaire were reversed coded which means if the correct response is "agree" that is assigned 1, therefore "undecided and disagree" would be assigned 0. In the same vein, if the correct response is "disagree, it indicates, "agree and undecided" are wrong answers and were assigned 0. Therefore, the correct respooses were later categorized into positive perception (i.e. any score equal or above 12 points) and wrong answers were regarded as negative perception (i. e. any score below 12 points). The total obtainable score was 15.

Qualitative assessment of perception score:-

(i) A score of < 12 (the mean score) = Negative perception - (Code = 1)

(ii) A score of ≥ 12 (the mean score) = Positive perception - (Code = 2)

3.13 Data analysis

Data were analysed using descriptive statistics, t-test, ANOVA, Chi-square test and Logistic regression analysis at 5% level of significance.

3.14 Study limitation

Limitations are conditions beyond the control of the researcher that may place restrictions on the conclusion of the study and their application to other situations. The researcher will not be able to control the attitude of the respondents as they respond to the questions. This is because the respondents sometimes give socially acceptable responses which may affect the validity of the findings. This was overcome by thorough assurance of confidentiality of information provided and such information would not be used against them in any way.

There were some difficulties in accessing some respondents in the peripheral areas due to the fact that some are working class or traders as they were off to work on week days and were available only on weekends. This also elongated data collection time.

The study also faced the challenge of limited fund which reduced the sample to the calculated size. Moreover, limited literature review was found on the study thereby limiting the scope of the study.

3.15 Ethical consideration

Ethical Approval for the conduct of the study was obtained from Research Ethical Review Committee of Oyo State Ministry of Health, Ibadan, before the commencement of the field work. The purpose of the study was explained to the participants and informed verbal consent obtained before interview. Participation was made voluntary and no form of coercion was adopted. There was no undue influence on the participants. Participants were assured of confidentiality of all information obtained from them and respondents' names were not written on the questionnaire in order to ensure anonymity.

CHAPTER FOUR

RESULTS

This chapter presents the findings of this study. It consists of socio-demographic characteristics, knowledge of solid waste and proper waste management, perceived health hazards associated with poor solid waste management and factors influencing utilisation of private refuse collectors.

4.1 Socio-demographic characteristics

Overall, 450 respondents were studied. The mean age was 36.6±11.2 years with 164 (36.4%) in the 31-40 years age group. Majority of the respondents, 328 (72.9%) were females, 314 (69.8%) were married while 287 (63.8%) were Christians. Most of the respondents (372) (82.7%) were Yorubas. 167 (37.1%) had completed secondary education while 214 (47.6%) engaged in trading (figure 4.1). Majority of the respondents, 279 (62.0%) had nuclear family type, 324 (72.0%) lived in rooming apartment while 160 (35.6%) earned an average monthly income of ₦ 20,001.00 and above as shown in table 4.1. Mean household size of the respondents was 4.4±2.1 while 334 (74.2%) had 1-5 people living in the same household as depicted in figure 4.2. Several, (195) (43.4%) of the respondents had 11-20 people living in the same house or compound with a mean of 16.5±9.4 as shown in figure 4.3.

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Table 4.1: Socio-demographic characteristics of the respondents (N=405)

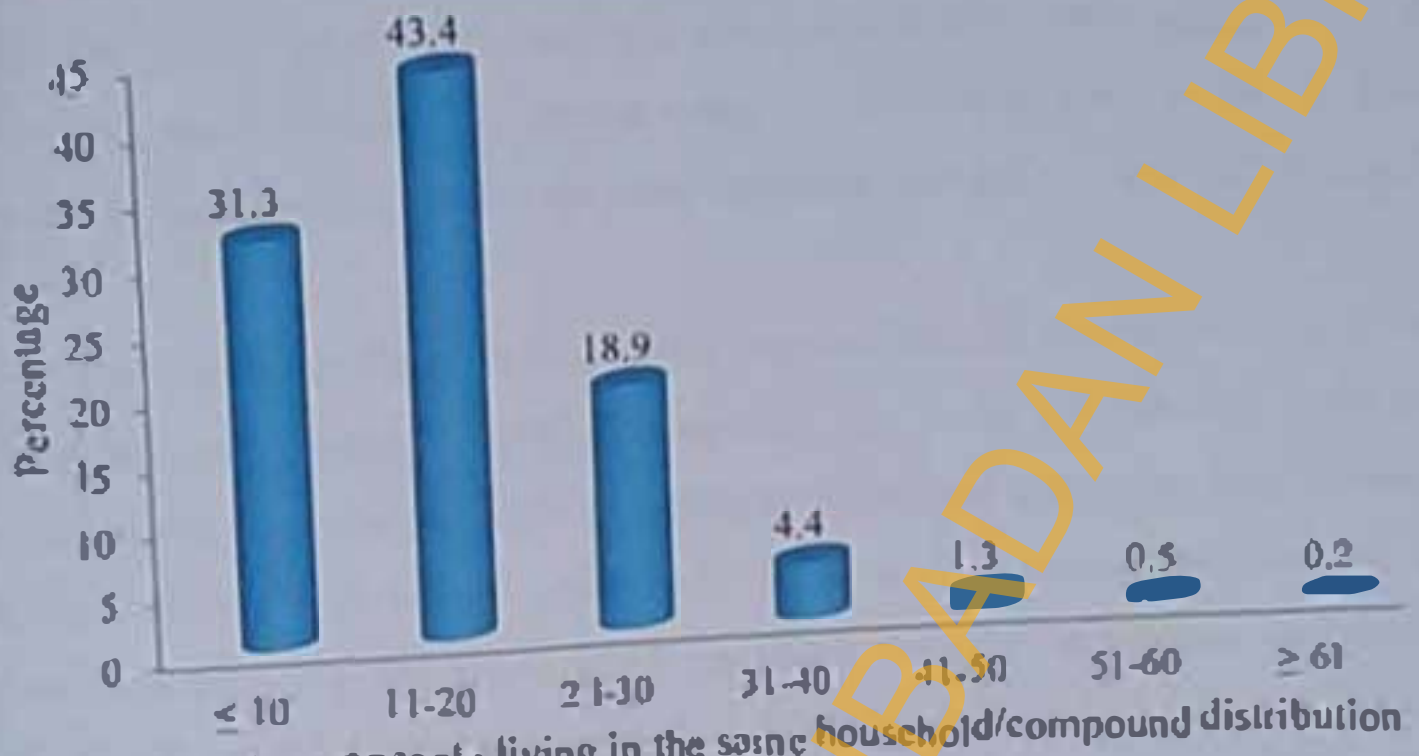
Demographic characteristics	No	%
Sex		
Male	122	27.1
Female	328	72.9
Marital status		
Single	101	22.4
Cohabiting	8	1.8
Married	314	69.8
Divorced	2	0.4
Widowed	25	5.6
Religion		
Christianity	287	63.8
Islam	163	36.2
Ethnic group		
Yoruba	372	82.7
Ibo	31	6.9
Hausa	24	5.3
Others*	23	5.1
Highest level of education		
No formal education	30	6.7
Some primary education	19	4.2
Completed primary education	53	11.8
Some secondary education	37	8.2
Completed secondary education	167	37.1
Tertiary education	144	32.0
Type of family		
Nuclear family	279	62.0
Extended family	107	23.8
Single	64	14.2
Type of building		
Flat	88	19.6
Rooming apartment	324	72.0
Self-contained	38	8.4
Monthly income		
Less than ₦5,000.00	41	9.1
₦5,001.00 - ₦10,000.00	86	19.1
₦10,001.00 - ₦15,000.00	82	18.2
₦15,001.00 - ₦20,000.00	64	14.2
₦20,001.00 and Above	160	35.6
No response	17	3.8

*=Isoko, Bendel, Delta, Edo, Guinea, Kogi and Ijaw

Figure 4.1: Respondents' occupation

Mean± SD = 4.4±2.1

Figure 4.2: Number of people in the same household



Mean± SD = 16.5±9.4

Figure 4.3: Number of people living in the same house/ compound

4.2 Knowledge of solid waste and proper waste management

Majority, 433 (96.2%) of the respondents stated that household waste should be kept in a covered waste bin, 431 (95.8%) reported that waste generated from each house breeds vectors of diseases while more than half, 260 (57.8%) of the respondents said household waste should be thrown away on a daily basis was not true as seen in table 4.2. Majority, 275(61.2%) of the respondents said household waste should be thrown away on alternate days (i.e. every other day) was not true, 331(73.6%) were against the statement that household waste should be thrown away on a weekly basis whereas 271(60.2%) said household waste should be thrown away when the dust bin is filled-up was not true.

More than three hundred (70.0%) of the respondents did not support that household waste should be burnt always. 438 (97.3%) reported that waste left unkempt could be a source of hazard to the community while 441 (98.0%) supported that waste left unkempt constitutes nuisance during rainy season. Most, 443 (98.5%) of the respondents revealed that improper waste disposal can breed germs which can result in morbidity (disease causation). More than 438 (97.3%) of the respondents said every household shall be responsible for the disposal of waste generated while 446 (99.2) reported that a dirty environment is the breeding site for disease vectors as presented in table 4.2.

Table 4.2: Respondents' knowledge statements of solid waste and proper waste management

Knowledge statement	(N=450) True (%)	False (%)
Household waste should be kept in a covered waste bin	433(96.2)	17(3.8)
Waste generated from each house breeds vectors of diseases	431(95.8)	19 (4.2)
Household waste should be thrown away on a daily basis	190(42.2)	260 (57.8)
Household waste should be thrown away on alternate days (i.e. Every other day)	164(36.4)	286 (63.6)
Household waste should be thrown awayon a weekly basis	119(26.4)	331(73.6)
Household waste should be thrown away when the dust bin is filled –up	179 (39.8)	271(60.2)
Household waste should be burnt always	135(30.0)	315(70.0)
Waste left unkempt could be a source of hazard to the community	438(97.3)	12(2.7)
Waste left unkempt constitutes nuisance during rainy season	441(98.0)	9 (2.0)
Improper waste disposal can breed germ which can result in morbidity (disease causation)	443 (98.5)	7 (1.5)
Every household shall be responsible for the disposal of waste generated	438 (97.3)	12(2.7)
A dirty environment is the breeding site for disease vectors	446(99.2)	4(0.8)
State and Local Government have roles to play in the management of refuse	427 (94.9)	23(5.1)
Refuse management involves the storage and collection of waste	323(71.8)	127(28.2)
Refuse management involves transportation and final disposal of waste	421(93.6)	29(6.4)

Respondents' mean knowledge score to waste management was 12.4±1.5 while 90.7% had good knowledge of waste management as shown in table 4.3. A comparison of the mean knowledge score of the respondents' by demographic characteristics are presented in table 4.4. The age categories of 51 years and above had mean knowledge of 12.9±1.2 compared to 11.9±2.3, 12.2±1.6, 12.5±1.5 and 12.6±1.3 for age group ≤ 20 years, 21-30 years, 31-40 years and 41-50 years respectively with a significant difference ($p<0.05$). Also, respondents' mean knowledge score by sex showed that male had a mean knowledge score of 12.6±1.5 while female had 12.4±1.5 as their mean knowledge score with no significant difference ($p>0.05$).

The comparison of the respondents' mean knowledge score by highest level of education revealed that those with tertiary education had a mean knowledge score of 12.7±1.6 compared to those with no formal education (12.4±1.3); some primary education (11.8±2.2); completed primary education (12.4±1.4); some secondary education (12.2±1.7) and completed secondary education (12.4±1.3) respectively with no significant difference. Respondents with nuclear family type had a mean knowledge score of 12.5±1.5 compared to those in extended family type, 12.3±1.5 and single family, 12.4±1.4 with no significant difference.

Respondents who lived in flat building apartment had a mean knowledge score 12.9±1.3 compared to those who lived in rooming apartment, 12.2±1.5 and self contained building, 12.5±1.7. A comparison of the mean knowledge score by respondents type of building showed that a significant difference exists in the mean score ($p<0.05$) as presented in table 4.4.

Table 4.3: Knowledge of respondents on proper solid waste management

Knowledge grade	Frequency	Percentage
Poor (0 - 5)	0	0.0
Fair (>5 -10)	42	9.3
Good (>10)	408	90.7
Total	450	100.0

Table 4.3: Knowledge of respondents on proper solid waste management

Knowledge grade	Frequency	Percentage
Poor (0 - 5)	0	0.0
Fair (>5 -10)	42	9.3
Good (>10)	408	90.7
Total	450	100.0

Table 4.4: Comparison of mean knowledge scores of respondents by demographic characteristics

Demographic characteristics	N	X̄	SD	F/t Statistics	p-Value
Age Range (In years)				2.892	0.022
≤20	9	11.9	2.3		
21-30	157	12.2	1.6		
31-40	164	12.5	1.5		
41-50	66	12.6	1.3		
≥51	54	12.9	1.2		
Sex				1.265	0.206
Male	122	12.6	1.5		
Female	328	12.4	1.5		
Highest level of education				1.643	0.134
No formal education	30	12.4	1.3		
Some primary education	19	11.8	2.2		
Completed primary education	53	12.4	1.4		
Some secondary education	37	12.2	1.7		
Completed secondary education	167	12.4	1.3		
Tertiary education	144	12.7	1.6		
Type of family				0.888	0.412
Nuclear family	279	12.5	1.5		
Extended family	107	12.3	1.5		
Single	64	12.4	1.4		
Type of building				7.584	0.001
Flat	88	12.9	1.3		
Rooming apartment	324	12.2	1.5		
Self-contained	38	12.5	1.7		

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≥51	54	12.9	1.2		
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Type of building				7.584	0.001
Flat	88	12.9	1.3		
Rooming apartment	324	12.2	1.5		
Self-contained	38	12.5	1.7		

4.3 Perceived health hazards associated with poor solid waste management

Most, 421 (93.6%) of the respondents disagreed that waste generated from various households could be thrown around the main building, 255 (56.7%) agreed that it is beneficial to throw waste on the refuse dump site while 253 (56.2%) agreed that private refuse collectors are competent in handling domestic waste generated from various households as shown in table 4.5. Several, 212 (47.1%) of the respondents agreed that waste management should be the responsibility of an individual and not that of the government. Four Hundred and Forty-five (98.9%) agreed that indiscriminate refuse disposal may cause ill-health/diseases whereas 443 (98.4%) of the respondents stated that disposing waste into unauthorised places may make the place filthy and unsightly.

Most, 448 (99.6%) of the respondents agreed that foul odour from waste dump can be irritating. A total of 441 (98.0%) agreed that indiscriminate dumping and disposal of waste into drainage may cause flooding while a high proportion of respondents i.e. 429 (95.3%) agreed that indiscriminate disposal of waste may lead to pollution of both underground and surface water supplies. Four hundred and thirty-six (96.9%) of the respondents agreed that indiscriminate disposal of waste may lead to air pollution (obnoxious odour). More than four hundred i.e. 445 (98.9%) of the respondents said poor waste disposal can serve as breeding places for disease vectors whereas 346 (76.9%) agreed that indiscriminate disposal of refuse may lead to fire outbreak/accidents. Most, 441 (98.0%) of the respondents agreed that improper refuse disposal can contaminate sources of water and food, 9 (2.0%) disagreed, 429 (95.3%) agreed that insects and other animals that feed on refuse can transmit diseases to human beings while 269 (59.8%) said illegal dumping of refuse is a problem in their Local Government as presented in table 4.5.

Table 4.5: Perceived health hazards associated with poor solid waste management (N=450)

Perceived health hazards statements	Agree (%)	Disagree (%)
Waste generated from various households could be thrown around the main building	29 (6.4)	421 (93.6)
It is beneficial to throw waste on the refuse dump site	255 (56.7)	195 (43.3)
Private refuse collectors are competent in handling domestic waste generated from various households	253 (56.2)	197 (43.8)
Waste management should be the responsibility of an individual and not that of the government	212 (47.1)	238 (52.9)
Indiscriminate refuse disposal may cause ill-health /disease	445 (98.9)	5 (1.1)
Disposing refuse into unauthorized places may make the place filthy and unsightly	443 (98.4)	7 (1.6)
Bad odour from refuse dump can be irritating	448 (99.6)	2 (0.4)
Indiscriminate dumping and disposal of refuse into drainage may cause flooding	441 (98.0)	9 (2.0)
Indiscriminate disposal of refuse may lead to pollution of both underground and surface water supplies	429 (95.3)	21 (4.7)
Indiscriminate disposal of refuse may lead to air pollution (obnoxious odour)	436 (96.9)	14 (3.1)
Poor refuse disposal can serve as breeding place for disease vectors	445 (98.9)	5 (1.1)
Indiscriminate disposal of refuse may lead to fire outbreak/ accidents	346 (76.9)	104 (23.1)
Improper refuse disposal can contaminate sources of water and food	441 (98.0)	9(2.0)
Insect and other animals that feed on refuse can transmit diseases to human beings	429 (95.3)	21 (4.7)
Illegal dumping of refuse is a problem in my local Government	260 (59.8)	181 (40.2)

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Insect and other animals that feed on refuse can transmit diseases to human beings	429 (95.3)	21 (4.7)
Illegal dumping of refuse is a problem in my local Government	269 (59.8)	181 (40.2)

Respondents' mean perceived health hazard score was 12.7±1.3 while 84.2% had positive perception on health hazard associated with poor solid waste management as shown in table 4.6. Comparison of respondents perception score by demographic characteristics are presented in table 4.7. The age categories of 51 years and above had mean perception of 12.8±1.1 compared to 12.4±1.2, 12.6±1.3, 12.8±1.2 and 12.7±1.4 for age group ≤ 20 years, 21-30 years, 31-40 years and 41-50 years respectively. There is no significant difference between mean perception score and age group ($p>0.05$). Also, Male respondents had a mean perception score of 12.8±1.3 while that of female was 12.7±1.2 with no significant difference ($p>0.05$).

Respondents' with tertiary education had a mean perception score of 12.8±1.1 compared to those with no formal education (12.5±1.2); some primary education (12.6±2.3); completed primary education (12.8±1.2); some secondary education (12.5±1.1) and completed secondary education (12.8±1.4) respectively with no significant difference. Likewise, those with nuclear family type had a mean perception score of 12.8±1.1 compared to those in extended family type, 12.8±1.2 and single family, 12.5±1.5 with no significant difference.

Respondents who lived in flat building apartment had a mean perception score of 12.8±1.2 compared to those who lived in rooming apartment, 12.7±1.3 and self contained building. 12.7±1.2. Comparison of the mean perception score by respondents type of building showed that no significant difference exists ($p>0.05$) as presented in table 4.7.

Table 4.6: Perception of respondents on proper solid waste management

Perception grade	Frequency	Percentage
Positive perception (≥ 12)	379	84.2
Negative perception (< 12)	71	15.8
Total	450	100.0

Table 4.7: Comparison of mean perception scores of respondents by demographic characteristics

Demographic characteristics	N	X̄	SD	F/t Statistics	p-Value
Age Range (In years)					
≤20	9	12.4	1.2	0.483	0.748
21-30	157	12.6	1.3		
31-40	164	12.8	1.2		
41-50	66	12.7	1.4		
≥51	54	12.8	1.1		
Sex					
Male	122	12.8	1.3	1.081	0.280
Female	328	12.7	1.2		
Highest level of education					
No formal education	30	12.5	1.2	0.603	0.693
Some primary education	19	12.6	1.3		
Completed primary education	53	12.8	1.2		
Some secondary education	37	12.5	1.1		
Completed secondary education	167	12.8	1.4		
Tertiary education	144	12.8	1.1		
Type of family					
Nuclear family	279	12.8	1.1	1.412	0.245
Extended family	107	12.8	1.2		
Single	64	12.5	1.5		
Type of building					
Flat	88	12.8	1.2	0.396	0.673
Rooming apartment	324	12.7	1.3		
Self-contained	38	12.7	1.2		

4.4 Respondents' methods of waste disposal

Eighty one (18.0%) of the respondents reported that they burn their waste. 440 (97.8%) did not bury (sanitary composting) their waste while 400 (88.9%) did not dispose of their waste beside the road or on river bank as seen in table 4.8. Only 152 (33.8%) employed Private Refuse Collectors for the purpose of collecting waste. 14 (3.1%) dispose of waste into rain water run -off when it rains while 218 (48.4%) stated that there is a Government approved dump site very close to their neighbourhood. Slightly more than half i. e. 241 (53.6%) of the respondents disposed of waste in Government approved dump sites while eighty nine (19.8%) believed that every compound should have its backyard dump site. 361 (80.2%) did not believe so while 355 (78.9%) believed that every compound should have roadside mammoth bins as presented in table 4.8.

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Table 4.8: Methods of waste disposal

Methods of waste disposal	(N=450) Yes (%)	No (%)
Burning of refuse	81 (18.0)	369 (82.0)
Burying (sanitary composting) of refuse	10 (2.2)	440 (97.8)
Dispose refuse beside the road or on river banks	50 (11.1)	400 (88.9)
Employ Private Refuse Collectors for the purpose of collecting refuse	152 (33.8)	298 (66.2)
Dispose refuse into rain water run -off when it rains	14 (3.1)	436 (96.9)
There is a Government approved dump site very close to my /or in my neighbourhood	218 (48.4)	232 (51.6)
Dispose refuse in Government approved dump sites	241 (53.6)	209 (46.4)
Believe that every compound should have its backyard dump site	89 (19.8)	361 (80.2)
Believe that every compound should have roadside mammoth bins	355 (78.9)	95 (21.1)

The use of Private Refuse Collectors (PRC) was compared with the respondents' highest level of education and it was found that several (43.1%) of those who had acquired tertiary education used PRC compared to those that had acquired other educational qualifications as presented in table 4.9. The association between use of Private Refuse Collectors (PRC) and highest level of education was statistically significant ($p<0.05$). In addition, logistic regression analysis revealed that respondents who had completed tertiary education are more likely to use PRC (OR=3.83, 95% CI=2.65-7.17) compared to those with no formal education.

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Table 4.9: Comparison of respondents' highest level of education and use of Private Refuse Collectors (PRC)

(N=450)

Highest level of eduction	Use Private Refuse Collectors			OR (95% CI)
	Yes (%)	No (%)	Total	
No formal education	11 (4.2)	19 (10.0)	30	0.16 (0.07-0.38)
Some primary education	4 (1.5)	15 (7.9)	19	0.07 (0.02-0.24)
Completed primary education	26 (10.0)	27 (14.2)	53	0.27 (0.14-0.54)
Some secondary education	17 (6.5)	20 (10.5)	37	0.24 (0.11-0.52)
Completed secondary education	90 (34.6)	77 (40.5)	167	0.33 (0.20-0.53)
Tertiary education	112 (43.1)	32 (16.8)	144	3.83 (2.65-7.17)
Total	260	190	450	

$\chi^2 = 44.406$ df= 5 p value = <0.001

Likewise, use of Private Refuse Collectors (PRC) was compared with the respondents' building type using cross tabulation as seen in table 4.10. Most (88.9%) of the respondents who live in rooming apartment did not use PRC compared with 7.4% and 3.7% of those who live in flats and self contained apartments respectively. A significant association exists between use of Private Refuse Collectors (PRC) and respondents' building type. Respondents who lived in rooming apartments were less likely to use private refuse collectors (OR=0.09, 95% CI=0.05-0.21) compared to those who lived in either flats or self-contained apartment as shown in table 4.10.

Table 4.10: Comparison of respondents' building type and use of Private Refuse Collectors (PRC)

(N=450)

Building type	Use Private Refuse Collectors			OR (95% CI)
	Yes (%)	No (%)	Total	
Flat	74 (28.5)	14 (7.4)	88	1.19 (0.44-3.24)
Rooming apartment	155 (59.6)	165 (88.9)	32[illegible]	0.09 (0.05-0.21)
Self contained	31 (11.9)	7 (3.7)	38	2.27 (1.14-4.54)
Total	260	190	450	

χ^2 = 46.918 df = 2 p value = <0.001

Also, association between use of Private Refuse Collectors (PRC) and respondents' family type was established using cross tabulation as seen in table 4.11. Majority (62.3%) of the respondents who are members of the nuclear family use PRC compared with 20.4% and 17.3% of those who had extended and single family types respectively. A significant association exists between use of Private Refuse Collectors (PRC) and respondents' family type. In addition to this, respondents who are members of the extended family were less likely to use private refuse collectors (OR=0.41, 95% CI=0.22-0.79) compared to those who are members of nuclear and single family types as shown in table 4.11.

Table 4.11: Comparison of respondents' family type and use of Private Refuse Collectors (PRC)

(N=150)

Family type	Use Private Refuse Collectors			OR (95% CI)
	Yes (%)	No (%)	Total	
Nuclear family	162 (62.3)	117 (61.6)	279	1.59 (0.34-3.51)
Extended family	53 (20.4)	54 (28.4)	107	0.41 (0.22-0.79)
Single family	45 (17.3)	19 (10.0)	64	2.02 (1.81-5.98)
Total	260	190	450	

$\chi^2 = 7.113$ df = 2 p value = 0.029

4.5 Factors influencing utilisation of private refuse collectors

Most, 411(91.3%) of the respondents disagreed that only the literates should utilise Private Refuse Collectors. Some of the respondents 128 (28.4%) revealed that the fee charged by the Private Refuse Collectors is too exorbitant while a high proportion of the respondents 391 (86.9%) were against the factor that our culture does not permit us to pay for waste disposal as presented in table 4.12. Only 75 (16.7%) of the respondents revealed that there are lots of public refuse dump sites in their area whereas 180 (40.0%) said that the money that will be used for refuse disposal can be used for other purposes or options. Majority, 308 (68.4%) of the respondents stated that people can use other means of waste disposal since the use of Private Refuse Collector is optional. Minority, 85 (18.9%) of the respondents reported that they only generate leaves and materials that can be decomposed easily in their environment without using Private Refuse Collectors while more than half of the respondents 296 (65.8%) said that ill–equipment of refuse collectors can make waste collection ineffective. Majority, 319 (70.9%) of the respondents said passive or non-enforcement of sanitation laws can impede patronage of PRC while 288 (64.0%) of the respondents reported that the dump sites are approved by the Local or State Government.

Table 4.12: Factors influencing utilisation of Private Refuse Collectors (PRC)

Factors	(N=450) Yes (%)	No (%)
Only the literate should utilise Private Refuse Collector	39 (8.7)	411 (91.3)
The charges of the Private Refuse Collector are high	128 (28.4)	322 (71.6)
Our culture does not permit us to use money to dispose refuse	59 (13.1)	391 (86.9)
There are lots of public refuse dump sites in our area	75 (16.7)	375 (83.3)
The money that will be used for refuse disposal can be used for other purposes or options	180 (40.0)	270 (60.0)
Since the use of Private Refuse Collector is optional, people can use other means	308 (68.4)	142 (31.6)
We only generate leaves and materials that can be decomposed easily in our environment without using Private Refuse Collector	85 (18.9)	365 (81.1)
Ill – equipment of refuse collectors may make refuse collection ineffective	296 (65.8)	154 (34.2)
Passive or non – enforcement of sanitation laws can impede patronage of refuse collectors	319 (70.9)	131 (29.1)
The dump sites are approved by the Government/Local/State	288 (64.0)	162 (36.0)

Table 4.12: Factors influencing utilisation of Private Refuse Collectors (PRC)

Factors	(N=450) Yes (%)	No (%)
Only the literate should utilise Private Refuse Collector	39 (8.7)	411 (91.3)
The charges of the Private Refuse Collector are high	128 (28.4)	322 (71.6)
Our culture does not permit us to use money to dispose refuse	59 (13.1)	391 (86.9)
There are lots of public refuse dump sites in our area	75 (16.7)	375 (83.3)
The money that will be used for refuse disposal can be used for other purposes or options	180 (40.0)	270 (60.0)
Since the use of Private Refuse Collector is optional, people can use other means	308 (68.4)	142 (31.6)
We only generate leaves and materials that can be decomposed easily in our environment without using Private Refuse Collector	85 (18.9)	365 (81.1)
Ill – equipment of refuse collectors may make refuse collection ineffective	296 (65.8)	154 (34.2)
Passive or non – enforcement of sanitation laws can impede patronage of refuse collectors	319 (70.9)	131 (29.1)
The dump sites are approved by the Government/Local/State	288 (64.0)	162 (36.0)

The major ways suggested by respondents to dispose of waste include government refuse collectors 122 (22.9%); disposal in mammoth bins 94 (17.7%) and private refuse collectors 88 (16.5%). 107 (23.8%) of the respondents consider government refuse collectors as the best way to dispose of their household waste as presented in table 4.13.

Table 4.13: Suggested ways of disposing household waste

Suggested ways	No	%
Suggested ways to dispose household refuse*		
Dispose in mammoth bin	94	17.7
Government refuse collector	122	22.9
Roadside dump	5	0.9
Government approved dumpsite	64	12.1
Private refuse collector	88	16.5
Recycling	4	0.8
Burning	53	10.0
Riverside	10	1.9
Composting	1	0.2
Incinerator	4	0.8
Bush	1	0.2
Dust bin	6	1.1
Burying	1	0.2
No response	78	14.7
Total	531	
The best way considered to dispose household refuse		
Government refuse collector	107	23.8
Private refuse collector	100	22.2
Mammoth bin	66	14.7
Government approved dumpsite	61	13.6
Burning	27	6.0
Recycling	4	0.9
Incinerator	1	0.2
Covered refuse drum	2	0.4
No response	82	18.2
Total	450	

Note: *Multiple responses

4.6 Test of hypotheses

Hypothesis One: There is significant relationship between monthly income and the use of private refuse collectors

Average monthly income of the respondents and use of private refuse collectors were cross-tabulated to determine if average monthly income had an influence on the use of private refuse collectors. The level of significance was set at 0.05. Table 4.14 revealed that there was significant relationship between average monthly income of the respondents and use of private refuse collectors ($p>0.05$). This is an indication that average monthly income of the respondents had influence on the use of private refuse collectors. The alternative hypothesis which stated that there is significant relationship between the average monthly income of the respondents and use of private refuse collectors was therefore rejected.

4.6 Test of hypotheses

Hypothesis One: There is significant relationship between monthly income and the use of private refuse collectors

Average monthly income of the respondents and use of private refuse collectors were cross-tabulated to determine if average monthly income had an influence on the use of private refuse collectors. The level of significance was set at 0.05. Table 4.14 revealed that there was significant relationship between average monthly income of the respondents and use of private refuse collectors ($p>0.05$). This is an indication that average monthly income of the respondents had influence on the use of private refuse collectors. The alternative hypothesis which stated that there is significant relationship between the average monthly income of the respondents and use of private refuse collectors was therefore rejected.

Table 4.14: Test for Hypothesis 1 - There is significant relationship between monthly income and the use of private refuse collectors

Monthly income	Use Private Refuse Collectors		Total
	Yes (%)	No (%)	
Less than ₦5,000.00	22 (8.5)	19 (10.0)	41
₦5,001.00 - ₦10,000.00	49 (18.8)	37 (19.5)	86
₦10,001.00 - ₦15,000.00	45 (17.3)	37 (19.5)	82
₦15,001.00 -₦20,000.00	30 (11.5)	34 (17.9)	64
₦20,001.00 & Above	106 (40.8)	54 (28.4)	160
No response	8 (3.1)	9 (4.7)	17
Total	260	190	450

$\chi^2 = 9.217$ df = 5 p value = 0.101

Hypothesis Two: There is significant relationship between knowledge of proper waste management and the use of private refuse collectors

The second hypothesis which stated that there is significant relationship between respondents' knowledge of waste and proper waste management and use of private refuse collectors was tested. Table 4.15 shows the cross tabulation using chi square test statistics There was a significant relationship between respondents' knowledge of waste and proper waste management and use of private refuse collectors ($p<0.05$). Knowledge of waste and proper waste management has a role to play in the use of private refuse collectors, thus the alternative hypothesis was not rejected.

Table 4.15: Test for Hypothesis 2 - There is significant relationship between knowledge of proper waste management and the use of private refuse collectors

Knowledge category	Use Private Refuse Collectors		Total
	Yes (%)	No (%)	
Fair knowledge (6-10)	15 (5.8)	27 (14.2)	42
Good knowledge (11-15)	245 (94.2)	163 (85.8)	408
Total	260	190	450

χ^2= 9.244 df= 1 p value = 0.002

Hypothesis Three: There is significant relationship between respondents' perceived health hazards associated with poor solid waste management and use of private refuse collectors

Role of perception of health hazard associated with poor solid waste management in the use of private refuse collectors was verified using chi square test statistics. It is evidently shown that no significant relationship exists between respondents' perception of health hazard associated with poor solid waste management and the use of private refuse collectors ($p>0.05$) (table 4.16). Respondents' perception of health hazard associated with poor solid waste management has a role to play in the use of private refuse collectors. The alternative hypothesis which stated that there is relationship between respondents perception of health hazard associated with poor solid waste management and the use of private refuse collectors was therefore rejected.

Table 4.16: Test for Hypothesis 3 - There is significant relationship between respondents' perceived health hazards associated with poor solid waste management and use of private refuse collectors

Perception category	Use Private Refuse Collectors		Total
	Yes (%)	No (%)	
Negative perception (6-10)	43 (16.5)	28 (14.7)	71
Positive perception (11-15)	217 (83.5)	162 (85.3)	379
Total	260	190	450

$\chi^2 = 0.268$ df= 1 p value = 0.605

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

The findings from this study were discussed in this section based on the following set objectives which are knowledge of solid waste and proper waste management, perceived health hazards associated with poor solid waste management, respondents' methods of waste disposal and factors influencing the utilisation of private refuse collectors. This chapter also includes implication of the findings for Health Promotion and Education, conclusion, recommendations and suggestions for further studies.

5.1 Knowledge of solid waste and proper waste management

Most of the respondents stated that household waste should be kept in a covered waste bin. They also reported that waste generated from each house breeds vectors of disease. This perhaps might be as a result of the fact that almost everybody understands that improper keeping of waste can translate into breeding zones for vectors like mosquitoes and flies which can cause diseases like cholera and malaria etc. This is similar to the report of Momoh and Oladebeye, (2010) that indiscriminate dumping of household solid waste on our streets, rivers and drainages has contributed in no small measure to drainage blockage, flooded roads and the spread of offensive odours and diseases.

Moreover, most of the respondents disagreed that household waste should be disposed of on alternate days (i.e. every other day) and on a weekly basis, but rather agreed that waste disposal should be on a daily basis. This is an indication that most of the participants are aware of the ugly effect of improper disposal of waste on people's health. The findings emphasised the report of studies that proper and effective management of waste through sanitary disposal, will be a pointer to a healthful environment and increase in the quality of life in the community, thereby reducing the prevalence of diseases such as parasitic infections, tetanus, hookworm infestations, cholera, diarrhoea, malaria, and typhoid etc. (Federal Ministry of Housing and Environment, 2004; Nwankwo, 1995).

In a study, Kalu *et al.*, (2009) reported that most percentage of urban waste in developing countries are deposited on the roads, or road sides, unapproved dump sites, in water ways, drainage system, or in open sites, which adversely affects environmental friendliness. However, majority of the participants in this study agreed that household waste should be disposed of immediately the dust bin is filled up. This is an indication that most of the participants usually dispose of waste hygienically as soon as dust bin is filled up in order to avert the possible health threat from indiscriminate waste disposal. It also showed that through this mode of waste disposal, most of the participants are trying to avoid the breeding of vectors through improper management of waste. A huge proportion of the respondents disagreed that household waste should be burnt always. This corroborates the report of Oyelola *et al.*, (2009) that cases of several diseases have been recorded as a result of contact with smoke from burning of solid wastes and gaseous emission from dumpsites. This shows that most of the respondents may be aware of the health and environmental effects of open burning of waste.

A greater percentage of the respondents mentioned that waste left unkempt can be a source of hazard to the community. This is in accord with the reports of Isu (2005), that indiscriminate solid waste disposal is actually a menace and embarrassment to the nation where heaps of refuse litter most parts of the city. Majority of the respondents revealed that improper waste disposal can breed germs which can result to morbidity (disease causation). Most of the participants (97.3%) were of the opinion that every household should be responsible for the disposal of waste generated. This shows that almost every study participant agreed that households should take part of the responsibility of proper solid waste disposal.

The study also revealed that most of the respondents had a good knowledge of solid waste management. This agrees with the study of Adeyemo *et al.*, 2013, which revealed that the respondents are knowledgeable about waste management. This is in line with the result of Yadavannavar, Aditya and Jagirdar (2010), which attributes good knowledge of majority of the respondents to their tertiary education. The knowledge score is significantly different between respondents' age categories but not significantly different between respondents' sex.

This is an indication that only age has effect on respondents' knowledge of waste management but sex does not.

In addition, knowledge score is not significantly different between respondents' level of education and family type. This shows that neither level of education nor family type had effect on respondents' knowledge of waste management. In conuast, respondents who live in flats are more knowledgeable compared to those who live in either rooming apartments or self- contained buildings. This shows that respondents' type of building had a significant effect on the knowledge of waste management.

5.2 Perceived health hazards associated with poor solid waste management

It was established that positive perception about health hazards associated with poor solid waste management facilitates proper waste management. A large proportion of the respondents disagreed that waste generated from various households can be thrown around the main building. This is similar to the findings of studies that have reported the threat of inappropriate waste disposal method to the environment, i.e. deterioration of environmental quality, e.g. air and water pollution (Chien and Shih, 2007; Asase *et al.*, 2009). This indicates that most of the study participants were aware of the health implications of poor waste management. Moreover, more respondents affirmed that throwing solid waste on the waste dump is beneficial and 56.2% agreed that private refuse collectors are competent in handling domestic waste generated from various households. This finding may be an indication that only more than half of the study participants utilise private refuse collectors in disposing of their waste in the study setting.

Most people believed that solid waste disposal is a responsibility of the government alone but women are often involved in the disposal of household waste materials in many developing countries (Ezebilo and Animasaun, 2011) if solid waste management system is ineffective. Interestingly, 47.1% of the respondents reported that waste management should be the responsibility of an individual and not that of the government. This corroborates the findings of Mudenrisogiu and Altaular, (2011) that, women participate more in recycling products because they are often the first to be hit by the waste disposal problems. Moreover, the findings revealed that every individual now realizes that waste disposal is also a

responsibility of each household and not that of the government alone. A great proportion of the participants were of the opinion that indiscriminate waste disposal may cause ill-health/disease and 98.4% of the respondents' stated that disposing of waste into unauthorised places creates filthy environment and unsightliness. This finding established that most of the participants perceived improper waste management as a threat to the health of the populace.

It is noteworthy to mention that 99.6% of the respondents considered foul odour from improper solid waste dumping as obnoxious. This corroborates the findings of Achankeng. (2003) that uncollected or illegally dumped solid waste constitutes a disaster to human health and leads to environmental degradation. This could be the conclusion of most of the participants about the experience of foul odour emanating from degradation of waste through the action of microorganisms. Also, a high percentage reported that, indiscriminate dumping and disposal of solid waste into drainages may cause flooding. In a study, Ojo, (2014) reported that, blocked drainage channels as a result of improper dumping of waste can cause flooding. Also, Folorunso and Awosika (2001) in a study conducted in Lagos State, Nigeria link flooding to clogging of drainage channels by dumped solid waste. Findings from this study indicated that most of the participants have experienced flooding around their areas which was caused by blockage of drainage through indiscriminate solid waste disposal.

Most of the respondents agreed that indiscriminate disposal of solid waste may lead to pollution of both underground and surface water supplies. Moreover, the study found that, most of the respondents agreed that indiscriminate disposal of solid waste may lead to air pollution (obnoxious odour). Most of the respondents also mentioned that, poor solid waste disposal can serve as breeding place for disease vectors and 76.9% of the participants affirmed that indiscriminate disposal of solid waste can lead to fire outbreak/ accidents. This is similar to the findings of Monioh and Oladebeye. (2010) where it was reported that indiscriminate dumping of household solid waste on our streets, rivers and drainages has contributed in no small way to drainage blockage, flooded roads and the spread of offensive odours and diseases and also poses environmental threats to nearby properties. A large proportion of the respondents ascertained that improper solid waste disposal can contaminate

sources of water and food supplies. This evidently shows that respondents perceived improper disposal of solid waste as a threat to water and food safety in their locations.

In a study, Ojo (2014) revealed that, unsanitary methods of solid waste disposal can constitute a nuisance, ugly sight, produce obnoxious odour, and create a breeding ground for pests and diseases. In this study, most of the participants agreed strongly that insects and other animals that feed on solid waste can transmit diseases to human beings. This indicates that, respondents' had a positive perception of health hazard associated with poor solid waste management. A study conducted by Olorunfemi, (2009) indicates that socio-economic characteristics like age, marital status, household size, education, occupation and length of stay in an area are associated with people's knowledge, attitude and perception of health hazards from indiscriminate solid waste disposal.

This study found that, the perception scores is not significantly different between respondents' ages, sex, highest level of education and family type. This is an indication that neither age, sex, highest level of education nor family type has any effect on the respondents' perception of health hazard associated with poor solid waste management score. It was revealed that respondents who live in flats have more perception of health hazard associated with poor solid waste management compared to those who live in rooming apartments and self contained buildings. This shows that type of building has a significant effect on perception of the respondents.

5.3 Respondents' methods of waste disposal

It has been revealed from several studies that the major solid waste disposal option in Nigerian cities is predominantly open dumping followed closely by open burning (Ogwueleka, 2009). This study also found that 18.0% of the respondents reported that they burn their waste, though, the proportion is small; there is the tendency for the entire populace to share from the health effect of burning waste within residential settings. This however may contribute to respiratory infections especially among children and those allergic to particulates from smoke. Slightly more than one-third (33.8%) of the respondents employed Private Refuse Collectors for the purpose of collecting waste. This contradicts the findings

of Batagarawa, (2011) where about 50% of household generated waste is collected by the private sector directly from households and transported to final disposal sites where it is dumped in either shallow pits or open grounds. This is evident that a low proportion of the participants patronised private refuse collectors as agents of solid waste disposal in the study setting.

In addition to these, several studies reported that, the rest of the waste generated within households especially in developing countries ends up in watercourses, drains, roadside spaces, underneath bridges, undeveloped properties, abandoned wells, pit latrines and borrow pits around cities (Sangodoyin, 1993; Ogu, 2000; Barton *et al.*, 2008; Abdullahi *et al.*, 2008; Imam *et al.*, 2008) where it is left to rot, serving as a breeding ground for flies, rats, mosquitoes and other pests. This study revealed that, 3.1% of the respondents dispose of waste into rain water run -off when it rains. This proportion may be negligible but it can lead to a global disaster. Disposing of solid waste into rain water run-off can lead to blockage of water run-off channels, causing water to channel its way through another means, consequently leading to flood. However, if flooding occurs, it claims lives, properties and leaves various disease episodes which pose heavy burdens on the government and individuals for correction, prevention and rehabilitation.

Slighly more than half of the respondents disposed of waste in government approved dump sites. This may be as a result of their closeness to the said approved dumpsites. A greater percentage believed that every compound should have roadside mammoth bins. The study found a significant association between use of Private Refuse Collectors (PRC) and highest level of education. In a study, Ekrampoush and Moghadan (2005) attributed better than moderate knowledge of waste management of majority of students studied to their high level of education. In this study, logistic regression analysis proved that respondents who had completed tertiary education are more likely to use PRC compared to those with no formal education. This is an indication that respondents who have acquired tertiary education have utilised Private Refuse Collectors (PRC) more compared to those that have acquired other educational qualifications.

A large percentage of respondents who live in rooming apartments did not utilise Private Refuse Collectors compared to those who live in flats and self-contained apartments with a significant association. The study also found that, respondents who live in rooming apartments are less likely to utilise private refuse collectors compared to those who live in either flats or self-contained buildings. This apparently shown that type of building of the respondents has an influence on utilisation of private refuse collectors. Expectedly, the study revealed that participants who live in rooming apartments do not patronise private refuse collectors for their solid waste disposal compared to those who live in flats and self-contained apartments. Also, a significant association was observed between respondents' family type and utilisation of Private Refuse Collectors (PRC).

Similarly, it was found that respondents whose family type is the extended one were less likely to use private refuse collectors compared to those who are nuclear and single in family type. This suggested that respondents' attachment to either nuclear or single family type increases their private refuse collector utilisation.

5.4 Factors influencing utilisation of private refuse collectors

Data from this study revealed that most of the respondents disagreed that only the literates should utilise Private Refuse Collectors. This is an implication that both the literates and illiterates should form a habit of patronising private refuse collectors for solid waste disposal. Babayemi and Dauda (2009), reported in a study conducted in Abeokuta that waste collection is initiated by both public and private sectors. Although the effectiveness of this is largely a function of location; and where the collection is done by private sectors, it is a function of income of the owner of the waste to be able to pay the amount charged (Achi *et al.*, 2012).

This study found that, less than one-third (28.4%) of the fee charged by the Private Refuse Collectors is too exorbitant. This forms a substantial proportion of the participants whose opinion is that, private refuse collectors' charges are too exorbitant. A greater percentage is against the factor that culture does not permit one to pay for waste generated. This might be as a result of the location of the study site which is an urban local government. People in this type of environment are aware of the menace caused by poor management of waste coupled

with urbanisation which has claimed all the bushes around that could have served as temporary dump sites, if the study setting had been a community of a rural local government. This study established the fact that, culture does not have anything to do with the use of money to dispose of waste.

Several participants revealed that the money that will be used for waste disposal can be used for other purposes or options. Majority of them stated that, people can use other means of waste disposal since the use of Private Refuse Collectors is optional. This is an indication that there are other options apart from private refuse collectors in disposing of waste. However, this unhygienic practice of waste disposal can lead to environmental pollution by the release of obnoxious gases which ultimately can contribute locally to global warming effect (Seo, *et al.*, 2004). A large proportion of the respondents ascertained that, ill-equipment of private refuse collectors may cause waste collection ineffective. This shows that those private refuse collectors plying their trade within the study settings are ineffective in the discharge of their duty. This might be as a result of aged vehicles, inadequate number spare parts and lack of finance to maintain their operations and improve on their service delivery.

According to this study, most of the respondents 70.9% were of the opinion that, passive or non-enforcement of sanitation laws can impede patronage of Private Refuse Collectors. This suggested that, there should be promulgation of active laws on proper waste management which will be enforced on the populace in order to improve patronage of private refuse collectors. According to National Bureau of Statistics, (2009) report, 48% of the waste generated in Nigerian urban centres is dumped in unauthorised places such as open spaces, drains, streams and roadsides with only 29% properly disposed through government facilities provided and private sector participation. In contrast, this study found that most of the respondents utilise government waste collectors as a major way of solid waste disposal. This established the fact that most of the participants rely on government waste collectors to dispose of their waste.

Several respondents considered government refuse collectors as the best way to dispose of their household waste. This might be as a result of non - payment for the service rendered by the said refuse collectors.

5.5 Conclusion

This study investigated factors influencing the utilisation of private refuse collectors among residents in Ibadan North Local Government Area, Oyo state. The study found that majority of the participants had a good knowledge of waste management but low utilisation of private refuse collectors.

Furthermore, the study revealed that, higher education contributed to the patronage of private refuse collectors. The result from the research also showed that, positive perception, about health hazards associated with poor solid waste management facilitates proper waste management. The study revealed that dumping of refuse indiscriminately into drainage channels can cause blockage and precipitate flooding episodes. Also, the result of the study shown that underground and water surface bodies are liable to cause pollution from indiscriminate waste disposal. Erroneously, from the study, respondents believed that only the literates should utilise private refuse collectors.

The study found that more than half of the respondents dispose of waste in government approved dump sites which is as a result of their closeness to the said approved dump sites. It was revealed from the study that waste generated from each household breeds vectors of diseases. Moreover, a high proportion of the respondents revealed that improper waste disposal can breed germs which can result to morbidity. The study also revealed that the fee charged by the private refuse collectors is too exorbitant. In the course of study, it was emphasised by the respondents that ill-equipment of private refuse collectors can cause ineffective waste collection while most of the respondents agreed that passive or non-enforcement of sanitation laws can impede patronage of private refuse collectors. The study documented that private refuse collectors plying their trade within the study settings are ineffective in the discharge of their duty.

5.6 Recommendations

The use of private refuse collectors requires the joint efforts of the policy makers, the refuse collectors and the community members. In order to reduce the spread of communicable diseases that may occur as a result of improper solid waste management, the following recommendations are made:-

(i) Proper storage of solid waste in covered waste bins to prevent insects and rodents' infestation.

(ii) Proper and effective management of solid waste from generation point to the final disposal site.

(iii) Encouragement of people on the proper solid waste disposal on a daily basis.

(iv) Avoidance of open burning of solid waste generated at household levels to prevent air pollution.

(v) Every household should be responsible for the solid waste generated starting from collection to the final disposal site.

(vi) Final dump sites should not be too far from primary storage bins.

(vii) The skip bins/mammoth bins used for temporary storage of solid waste before final evacuation to the dump sites should be emptied regularly.

(viii) Aggressive public enlightenment should be embarked upon by the government to ensure proper solid waste management and prevent hazards associated with poor solid waste management.

(ix) More efforts should be intensified by the private refuse collectors in the collection of solid waste from household level to the final disposal site.

(x) People should form the habit of patronising private refuse collectors for solid waste disposal.

(xi) Proper awareness on environmental sanitation education which should contain information on healthy waste management practices.

(xii) Adequate information on proper solid waste management should be embarked upon by the mass media.

(xiii) There should be collaboration between government and private refuse collectors.

(xiv) The public/community members should endeavour to partner with the private refuse collectors to maintain a healthy and aesthetic environment.

(xv) The private refuse collectors should try to charge moderate fees for solid waste collection and disposal.

(xvi) The private refuse collectors should be well-equipped to discharge their duty effectively and efficiently.

(xvii) The government should take over the responsibility of solid waste management in indigenous areas.

(xviii) Residents of both transitory and peripheral areas should be mandated to patronise private refuse collectors. This will improve Public Sector Participation (PSP) in solid waste manngement.

(xix) There should be collaboration between all stakeholders i. e. Government. Non-Governmental Organisations (NGOs), Private Refuse Collectors (PRCs) and the public to put in place adequate and sustainable municipal waste disposal management system.

(xx) Social marketing is required to improve the acceptance and utilisation of private refuse collectors.

5.7 Suggestions for further studies

The result obtained from this study is very useful in identifying the factors that influence the use of private refuse collectors in the selected area. Further studies can be carried out on effectiveness and efficiency of private refuse collectors in discharging their duties in another locality under Oyo State. Other researchers can study characterization of solid waste being collected by the private refuse collectors in a selected area of another state. Effects of improper solid waste disposal in a selected community in Oyo State can also be considered for a research work. Some other researchers can also study the role of the mass media in the use of private refuse collectors in another geo-political zone in Nigeria.

Research endeavours can also be undertaken on impact of culture, attitude and beliefs on the use of private refuse collectors in an indigenous community in any state of the Federal Republic of Nigeria. A case study can also be carried out on management of solid waste for sustainable development in any local government in Nigeria.

5.8 Implications of the findings for Health Promotioo and Education (HPE)

This study bas shown tbat majority of the participants had a good knowledge of waste management but low utilisation of private refuse collectors. The result also found that education had an influence on the utilisatioo of Private Refuse Collectors. Moreover, the study observed tbat participants who live in rooming apartment did not patronise private refuse collectors for their waste disposal compared to those who live in flats and self-contained apartments. Similarly, it was found that respondents with nuclear and single family types patronise private refuse collectors more than those with extended family type. It was also discovered that literacy and culture of the participants can not hinder utilisation of private refuse collectors.

The key element in the PRECEDE model used for this study is the Predisposing Factors which include knowledge, perception, cultural beliefs, and awareness of private refuse collectors. Although, most respondents had a good knowledge of solid waste management but they consider the use of government refuse collectors as the best way to dispose of their household waste because they are not paying for the services. They also claimed the use of government approved dump sites but most of the solid waste generated at household levels ends up in drainages, gutters, road sides and water ways.

Adequate efforts should be made to constantly re-orientate the public on the menace of indiscriminate solid waste disposal. In order to achieve this, proper awareness on environmental sanitation education should contain information about healthy waste management practice. This will go a long way in improving the utilisation of private refuse collectors by the public. The mass media can also render more assistance in this regard. They should make their messages more relevant to different target groups and it should reflect all aspects of proper solid waste disposal practices.

Adequate information from the mass media can also serve as a reinforcing factor towards the practices of proper solid waste disposal. More importantly, all stakeholders: Governments, Non Governmental Organisations (NGOs), private refuse management bodies and the public should collaborate to put in place adequate and sustainable municipal waste management disposal system within the municipalities.

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APPENDIX I

QUESTIONNAIRE – ENGLISH VERSION

Dear Respondent,

Greetings; I am a Post graduate student of the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan

This questionnaire is designed for the purpose of identifying the factors influencing the utilization of private refuse collectors as solid waste management agents in Ibadan North Local Government, Oyo State. The information collected will be kept confidential and all will be used for research purpose only. Please, kindly share your experience with me by providing responses in the boxes provided. Also be informed that there are no right or wrong answers, your clear and sincere response will be appreciated.

Thanks.

If you are willing to participate in this study, kindly tick this box ☐

Date: / /2013 Time:

Section A: Socio-Demographic Characteristics

Instruction: Please answer the following questions:

Location:

1. Sex: 1. Male ☐ 2. Female ☐
2. Age in years (last birthday) .....
3. What religion do you practice? 1. Christianity ☐ 2. Islam ☐
   3. Traditional religion ☐ 4. None 5. Others please ☐
   specify.....
4. Marital status: 1. Single ☐ 2. Cohabiting ☐ 3. Married ☐
   4. Separated ☐ 5. Divorced ☐ 6. Widowed ☐
5. Ethnic group: 1. Yoruba ☐ 2. Ibo ☐ 3. Hausa ☐ 4. Others ☐
   specify.....
6. Highest level of education: 1. No formal education ☐ 2. Some primary education ☐ 3. Complete primary education ☐ 4. Some secondary education ☐ 5. Complete Secondary education ☐ 6. Tertiary ☐ 7. Arabic ☐ 8. Others ☐
   please specify .....
7. Type of Building: 1. Flat ☐ 2. Rooming apartment ☐ 3. Self-contained ☐

8. Occupation: 1. Farming ☐ 2. Civil Service ☐ 3. Trading ☐
4. Artisan ☐ 5. Apprenticeship ☐ 6. Student ☐ 7. Housewife ☐
8. Unemployed ☐

9. Type of Family: 1. Nuclear family ☐ 2. Extended family ☐ 3. Single ☐

10. Total number of people living in the household (including the children).....

11. How many people live in the same house or compound where you stay?.....

12. Average Monthly income (Tick appropriately) √

1. Less than ₦5,000.00 ☐
2. ₦5,001.00 - ₦10,000.00 ☐
3. ₦10,001.00 - ₦15,000.00 ☐
4. ₦15,001.00 - ₦ 20,000.00 ☐
5. ₦20,001.00 & Above ☐

Section B: Knowledge of solid waste and proper waste management

S/N	Question	True	False	Don't Know
13.	Household waste should be kept in a covered waste bin			
14.	Waste generated from each house breeds vectors of diseases			
15.	Household waste should be thrown away on a daily basis			
16.	Household waste should be thrown away on alternate days (i.e. Every other day)			
17.	Household waste should be thrown away on a weekly basis			
18	Household waste should be thrown away when the dustbin is filled up			
19.	Household waste should be burnt always			
20.	Waste left unkempt could be a source of hazard to the community			
21.	Waste left unkempt constitutes nuisance during rainy season			
22.	Improper waste disposal can breed germs which can result in morbidity (disease causation)			
23.	Every household shall be responsible for the disposal of waste generated			
24.	A dirty environment is the breeding site for disease vectors			

25.	State and Local Government have roles to play in the management of refuse			
26.	Refuse management involves the storage and collection of waste			
27.	Refuse management involves transportation and final disposal of waste			
	Total Score = 15			
28.	Mark Obtained =			
29.	Codes - 0 – 5 = 1 > 5 – 10 = 2 > 10 = 3			

Section C: Perceived health hazards associated with poor solid waste management

Instruction: Please tick [√] as appropriate

NO.	STATEMENTS	AGREE	UNDECIDED	DISAGREE
30.	Waste generated from various households could be thrown around the main building			
31.	It is beneficial to throw waste on the refuse dump site			
32.	Private refuse collectors are competent in handling domestic waste generated from various households			
33.	Waste management should be the responsibility of an individual and not that of the government			
34.	Indiscriminate refuse disposal may cause ill – health /disease			
35.	Disposing refuse into unauthorized places may make the place filthy and unsightly			
36.	Bad odour from refuse dump can be irritating			
37.	Indiscriminate dumping and disposal of refuse in to drainage may cause flooding			
38.	Indiscriminate disposal of refuse may lead to pollution of both underground and surface water supplies			
39.	Indiscriminate disposal of refuse may lead to air pollution (obnoxious odour)			
40.	Poor refuse disposal can serve as breeding place for disease vectors			
41.	Indiscriminate disposal of refuse may lead to fire outbreak/ accidents			

42.	Improper refuse disposal can contaminate sources of water and food			
43.	Insects and other animals that feed on refuse can transmit diseases to human being			
44.	Is illegal dumping of refuse a problem in your Local Government?			
	Total Score = 15			
45.	Mark Obtained =			
46.	Codes - < 12 = 1 ≥ 12 = 2			

Section D: Methods of waste disposal

The followings are methods of waste disposal; please tick ☐ as appropriate

47. Do you burn your refuse? 1. Yes ☐ 2. No ☐

48. Do you bury (sanitary composting) your refuse? 1. Yes ☐ 2. No ☐

49. Do you dispose of your refuse beside the road or on river banks? 1. Yes ☐ 2. No ☐

50. Do you employ Private Refuse Collectors for the purpose of collecting your refuse?

1. Yes ☐ 2. No ☐

51. When it rains, do you dispose your refuse into rain water run-off?

1. Yes ☐ 2. No ☐

52. Do you have a Government approved dump site very close to you or in your neighbourhood? 1. Yes ☐ 2. No ☐

53. Do you dispose of your refuse in Government approved dump sites?

1. Yes ☐ 2. No ☐

54. Do you believe that every compound should have its backyard dump site?

1. Yes ☐ 2. No ☐

55. Do you believe that every compound should have roadside mammoth bins

1. Yes ☐ 2. No ☐

56. What other method/s do you employ in disposing your refuse (Please specify .....

Section E: Factors influencing utilization of private refuse collectors

The following are the factors influencing the patronage of private refuse collectors; please tick as appropriate [√]

NO.	STATEMENTS	YES	NO
57.	Only the literate should utilize Private Refuse Collector		
58.	The charges by the Private Refuse Collector is too much		
59.	Our culture does not permit us to use money to dispose refuse		
60.	There are lots of public refuse dump sites in our area		
61.	The money that will be used for refuse disposal can be used for other purposes or options		
62.	Since the use of Private Refuse Collector is optional, people can use other means		
63.	We only generate leaves and materials that can be decomposed easily in our environment without using Private Refuse Collector		
64.	Ill – equipment of refuse collectors may make refuse collection ineffective		
65.	Passive or non-enforcement of sanitation laws can impede patronage of refuse collectors		
66.	The dump sites are approved by the Government: Local/State		

67. Please suggest ways to dispose of your household refuse?

.....

.....

.....

.....

68. Which one do you consider the best way to dispose of your household refuse?.....

Thank you.

Name of interviewer.....

Signature.....

Date.....

APPENDIX II

QUESTIONNAIRE – YORUBA VERSION

ONKA IBEERE.....

IWE IBEERE

AWON OHUN TI ONSE OKUNFA LILO AWON AKOLE ALADANI GEGE BI ASOJU ILE – ISE TI O NMOJU TO ORO ILE KIKO NI IJOBA IBILE ARIWA IBADAN NI IPINLE OYO

Eyin Oludahun Ibeere,

Ikini. mo je nkeko imo ijinle keji ni eka ti won ti nko eko bi won se ngbe eto ilera laruge n i ile eko giga Fasiti Ilu Ibadan.

ABALA KINNI (SECTION A) – IBEERE NIPA ARA YIN

Itonisona: E ba wa dahun awon ibeere yi:

Adiugbo;

1. Ako nbabo - 1. Ako ☐ 2. Abo ☐
2. Omo odun melo ni eje ni ojo ibi ti o koja .....
3. Esin wo ni e nsin? 1. Igbagbo ☐ 2. Musulumi ☐ 3. Esin abalaye ☐
   4. Ko se esin Kankan ☐ 5. Iru esin miran ☐
4. Ipo Igbeyawo..... 1. Apon/wundia ☐ 2. Igbepo laisi Igbeyawo ☐
   3. Igbeyawo ☐ 4. Aigbepo ☐ 5.Ikosile ☐ 6. Opo ☐
5. Eya..... 1. Yoruba ☐ 2. Igbo ☐ 3.Hausa ☐ 4. Iru eya mimn. e salaye ☐
6. Iwe melo leka ..... 1. Ko kawe rara ☐ 2.Ile iwe alakobere ☐ 3.Iwe mefa ☐
   4. Die ninu iwe ile eko giga ☐ 5. Iwe girama mewa ☐ 6. Ile iwe eko giga ti gbogbo nise. eko oluko ati fusiti ☐ 7. Ile eko larubawa ☐ 8.Iru miran ojoo e salaye ☐
7. Iru Ile wo..... 1. Ile filati ☐ 2. Ile ko ju simi nko ju si o ☐ 3. Ile alodagbe ☐
8. Ise sise..... 1. Ise agbe ☐ 2. Ise ljoba ☐ 3. Owo sise ☐ 4. Ise owo ☐ 5.Omo ekose ☐
   6. Omo ile iwe ☐ 7. Iyawo ile ☐ 8. Eni ti o nwa ise ☐
9. Iru ebi wo.....1. Oko. Iyawo ati awon omo ☐ 2. Ebi ti opo ☐ 3.Apon/wundia ☐
10. Iye awon enlyan ti ngbe ninu idile kan.....
11. Iye enlyan melo ni o ngbe inu ile yin tabi agbo ile yin.....

12. Apapo owo ti e ma nri ni osu o to eelo? ....

1. Ko to egberun marun-un ☐
2. Okanle legberun marun-un si egberun mewa ☐
3. Okanle legberun mewa si egberun meedogun ☐
4. Okanle legberun meedogun si egberun ogun ☐
5. Okanle legberun ogun ati ju bee lo ☐

ABALA KEJI (SECTION B): IMO NI BI ATI NSE AMOJU TO AWON IDOTI WA

S/N	Ibeere	Beeni	Beeko	Mi o mo
13.	Idoti ile gbodo wa ninu ike idalenu ti o ni ideri			
14.	Awon ile idoti ti a nri ninu ile kookan nse okunfa kokoro ti o nfa arun.			
15.	Ile ti a nri ninu ile gbodo je didanu ni ojoojumo			
16.	Ile ti a nri ninu ile gbodo je didanu ni ojo keta sira won			
17.	Ile ti a nri ninu ile gbodo je didanu ni ose-ose			
18	Ile ti a nri ninu ile gbodo je didanu nigbati goro idalesi ba kun			
19.	Ile ti a nri ninu ile gbodo je sisun ni gbogbo igba			
20.	Ile idoti ti ako ba mojuto lee se okunfa ijamba fun agbegba agbegbe			
21.	Ile idoti ti ako ba mojuto lee fa ijamba nigba ojo.			
22.	Dida idoti nu ni ona ti ko to lee sokun fa awon kokoro kekeke ti o lee di ajakale arun			
23.	Idile kookan gbodo se amojuto ati da Idoti won nu			
24.	Agbegbe to doti lee se ~~okunfa arun~~ kokoro ti on fa aisan.			
25.	Ijoba ipinle tabi ijoba ibile ni ipa tau ko lori bi a o se man da ile idoti nu			
26.	Amojuto idoti nii se pelu bi a se n toju ati ko Ile wa			
27.	Amojuto idoti nii se pelu bi a se n gbe ile wa danu titi yio fi de akitan			
	Total Score = 15			

ABALA KETA (SECTION C): IHA TI AKO SI IJAMBA TI ON SE OKUNFA AILERA PELU AIMOJUTO IDOTI WA

Itoni sona: E fala si ✓

NO.	Gbolohun	Mo faramo	Mi o ke so	Mi o mo
28.	A lee da awon idoti inu ile wa si ayika ibugbe.			
29.	On se anfani ti a ba le da ile wa si akitan.			

30.	Awon akole aladani kunju osumwon lati mojuto ile didanu fun idile kookan			
31.	Amojuto idoti je ojuse patako eni kookan ti ko lowo ijoba ninu.			
32.	Ile dida laibikita lee se okunfa ailera			
33.	Dida ile si ibi ti ko leto lee se okunfa idoti ati aifojuri			
34.	Oorun ti ko dara lati inu idoti ile lee se okunfa irira.			
35.	Aibikita ile dida si oju agbara lee se okunfa omiyale			
36.	Aibikita i l edida lee se akoba fun omi erefe ati ti abe ile.			
37.	Aibikita ile dida lee se okunfa oorun buruku ti on ba afefe je.			
38.	Aibikita ile dida lee se okunfa ibugbe fun awon ohun elemi ti o nfa aarun			
39.	Aibikita ile didanu lee se okunfa ijamba jaa jijo			
40.	Aida ile wa nu ni ona ti o to lee ko ijamba ba ounje ati omi			
41.	Awon kokoro ati eronko ti o nje lori ile idoti lee sokunfa gbigbe aarun si ara eniyan			
42.	Nje aibikita ile didanu je isoro ni agbegbe yin			
	Total Score = 15			

ABALA KERIN (SECTION D): AWON ONA TI A NGBA DALENU

Awon ona wonyi ni an gba dalenu – e fun ni si

43. N je e ma nsun ile yin 1. Beeni ☐ 2. Beeko ☐
44. N je e ma ngbe koto bo ile yin 1. Beeni ☐ 2. Beeko ☐
45. N je e nda ile yin si egbe oju popo tabi eti odo 1. Beeni ☐ 2. Beeko ☐
46. Nje e gba awon akole aladani lati maa ba yin ko ile yin danu? 1. Beeni ☐
2. Beeko ☐
47. Nigbati ojo ba ro, nje eman n da ile yin si oju agbara? . 1. Beeni ☐ 2. Beeko ☐
48. Nje ijoba pese akitan ti e o maa da ile idoti si ni agbegbe yin? 1. Beeni ☐
2. Beeko ☐
49. Nje e maa da ile si ibi ti ijoba pese lati dale si? 1. Beeni ☐ 2. Beeko ☐

50. Nje e gbagbo wipe o ye ki gbogbo ile ni ibi ti won a da ile si ni eyin kunle ile won?

1. Beeni ☐ 2. Beeko ☐

51. Nje eni igbagbo pe gbogbo ile gbodo ni goro idalesi ni agbegbe? 1. Beeni ☐

2. Beeko ☐

52. Awon ona wo ni e tun-un lee lo lati da ile nu? Ejowo e salaye.....

ABALA KARUN-UN (SECTION E): AWON NKAN WOONI TI OLE JE KI ALO AKOLE ALADANI

Itoni sona: E fa ila si ☑

S/N	Cbolobun	Beeni	Beeko
53.	Awon olukowe oikan ni o leto lati lo akole aladani		
54.	Owo ti awon akole aladani ogba ni poju		
55.	Aso ibile wa ko gba wa laaye lati fi owo da ile nu		
56.	Opolopo akitan ni o wa ni agbegbe wa		
57.	A le lo owo ti a fe fi da ile idoti nu fun awon nkan miran		
58.	Nigbati o je wipe lilo akole aladani ko pon dandan, a le lo oun miran		
59.	Awon idoti ti a ni ni adugbo wa lee tete jere lailo akole aladani		
60.	Aini ohun elo ikole akole aladani ti o dena lee se okunfa aise deedee ile kiko		
61.	Ailo ofin kole-kodoti lee se idina fun idowopo pelu awon akole aladani		
62.	Ijoba ibile ati ipinle fi owo si lilo akitan		

63. E jowo e so awon ona miran ti a fi nda idoti inu ile nu .....

64. Ewo ninu awon ona wonyi ni elero pe o dara ju lati da idoti inu ile nu.....

E see pupo

Oruko Aiokun.....

Ifowo si.....

Ojo.....

APPENDIX III
ETHICAL APPROVAL

TELEGRAMS..... TELEPHONE.....

MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. _____

All communications should be addressed to the Honorable Commissioner quoting

Our Ref. No. AD 13/ 479/563 14th January, 2013

The Principal Investigator,
Department of Health Promotion And Education,
Faculty of Public Health,
College of Medicine,
University Of Ibadan,
Ibadan.

Attention: Olawuyi Kehinde E.

Ethical Approval for the implementation of your Research Proposal in Oyo State

This acknowledges the receipt of the corrected version of your Research Proposal titled: "Factors Influencing The Utilization Of Private Refuse Collectors as Solid Waste Management Agent in Ibadan North Local Government, Oyo State"

2. The committee has noted your compliance with all the ethical concerns raised in the initial review of the proposal. In the light of this, I am pleased to convey to you the approval of committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3. Please note that the committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusion of the findings as this will help in policy making in the health sector.

4. Wishing you the best.

Sola A...
Director, P... Research & Statistics
Secretary, Oyo State Research Ethical Review Committee