



Exploring Gender Involvement in Solid Waste Management in Ibadan, Nigeria: Roles, Challenges, and Opportunities for Sustainable Development

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Abstract

Solid waste management practice in Ibadan has been largely focused on the technical issues of waste disposal with little or no attention paid to the gender involved. This study examines gender involvement in solid waste management in Oluyole local government, Ibadan, Nigeria. Gender activities play an important role in solid waste management as there is clear understanding of the perceptions of both men and women that is required in waste management. Data analysis was based on 374 households/shop owners and 2 waste management companies by survey questionnaire and analyzed using SPSS. Results showed that waste management practices are influenced by the demographic factors such as income level. The result also shows that both gender handles solid waste effectively but the women participation are found to be higher than that of men in some areas of waste management practices. The study concludes that proper integration of both men and women into the existing solid waste management can lead to sustainable management practices and possibly alleviate poverty. Based on this research results, recommendations are made to improve gender involvement in solid waste management for sustainable development in Ibadan, Nigeria.

Keywords: Keyword 1: Solid waste management,

Keyword 2: gender,

Keyword 3: participation

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I. INTRODUCTION

Solid waste can be defined as the useless, unwanted and discarded material resulting from day to day activities in the community. Solid waste management may be defined as the discipline associated with the control of generation, storage, collection, transfer, processing and disposal of solid waste. The management of solid waste continues to be a major challenge in urban areas throughout the world particularly in the rapidly growing cities of the developing world [1]. A high rate of population growth and increasing per capita income have resulted in the generation of an enormous volume of solid waste, which poses a serious threat to environmental quality and human health [2]. Access to sanitation services and clean adequate water are therefore regarded as crucial to the health and wellbeing of people. As more cities become industrialized, the congenital problem of waste management comes along with it. Technological and economic advancement has made the types and kinds of solid waste very diverse and their management much more complex. Furthermore, the changing economic trends and rapid urbanization complicate solid waste management (SWM) and generation in developing countries. Consequently, solid waste is not only increasing in composition but also changing in quantity from a few kilograms to tonnage proportions [3]. Women's and men's individual decisions are shaped by a combination of societal roles and expectations; hence, "waste" is not a (gender) neutral concept. Waste is defined as "something that has no more value"[4]. The very definitions of waste and discarded materials may be influenced by the gender of the person making the judgment. What look like junk to women may be motorcycle parts to men; what looks like dirt to men may be compost or fertilizer to women. As men and women participate (or not) in managing waste within the community, their relationship to discarded

materials may depend on who they are, as much as or more than on what they do. Knowledge of waste issues is different across gender and age. Women, men, and children are almost certain to have different (and not always overlapping) knowledge of waste disposal places in their neighborhoods. There are different types of waste: municipal waste (including household and commercial waste), industrial waste (including manufacturing), hazardous waste, construction and demolition waste, mining waste, waste from electrical and electronic equipment, biodegradable municipal waste, packaging waste, and agricultural waste. Waste recently is more considered as a resource rather than garbage of no value [5]. Waste as a resource, refers to resource recovery that can be converted into other material and energy.

Solid waste generation is a continually a growing problem at global, regional and local levels. Solid wastes are those organic and inorganic waste materials produced by various activities of the society, which have lost their value to the first user. Improper disposal of solid wastes pollutes all the vital components of the living environment (i.e., air, land and water) at local and global levels. Urban society rejects and generates solid material regularly due to rapid increase in production and consumption. The problem is more acute in developing nations than in developed nations, as their economic growth as well as urbanization is more rapid. This necessitates management of solid waste at generation, storage, collection, transfer and transport, processing, and disposal stages in an environmentally sound manner in accordance with the best principles of public health, economics, engineering, conservation, aesthetics and environmental considerations. The world generates 2.01 billion tons of municipal solid waste annually, with at least 33 percent of it not managed in an environmentally safe manner. Waste generated per person per day worldwide averages 0.74 kilogram but ranges widely, from 0.11 to 4.54 kilograms. Though they only account for 16 percent of the world's population, high-income countries generate about 34 percent, or 683 million tons, of the world's waste. When looking forward, global waste is expected to grow to 3.40 billion tons by 2050, more than double population growth over the same period. The East Asia and Pacific region is generating most of the world's waste, at 23 percent, and the Middle East and North Africa region is producing the least in absolute terms, at 6 percent. However, the fastest growing regions are Sub-Saharan Africa, South Asia, and the Middle East and North Africa, where, by 2050, total waste generation is expected to be more than triple, double, and double respectively. In these regions, more than half of waste is currently openly dumped, and the trajectories of waste growth will have vast implications for the environment, health, and prosperity, thus requiring urgent action.

Cities in Nigeria, being among the fast growing cities in the world [6] are faced with the problem of solid waste generation. The implication is serious when a country is growing rapidly and the wastes are not efficiently managed. Waste generation scenario in Nigeria has been of great concern both globally and locally. Of the different categories of wastes being generated, solid wastes had posed a hydra-headed problem beyond the scope of various solid waste management systems in Nigeria [7], as the streets experience continual presence of solid waste from commercial activities. Ibadan as one of the cities in Nigeria and the third largest is the capital of Oyo State. The population of the metropolitan area of Ibadan is estimated at close to 3.5 million [8]. The management of solid waste in Ibadan has been a challenge for decades. A large portion of the solid waste generated in the city is dumped on available plots of land, sidewalks, roads, streams, channels and drains – the collection rate is estimated at around 40% [9]. The clogging of drainage systems is a particular issue as Ibadan is highly exposed to flooding. The city has a history of deaths from floods caused by water channels being blocked with solid waste, and outbreaks of infectious diseases from human contact with improperly disposed and untreated waste tagged “*Omiyale*” meaning: “*everywhere is flooded.*”

The management of waste in urban areas of Nigeria is the responsibility of the city municipality. However, due to lack of adequate technology, human capital, institutional set up and financial constraints the sector has been mistreated [10]. Collecting and managing solid waste is an important challenge for countries across the world. In Nigeria, heaps of uncollected garbage pollute the environment and contribute to higher rates of diarrhea and acute respiratory infections among people, not only those living around the garbage dumps [11]. Recently, there has been an exceptional increase in the volumes of daily waste generation due to various reasons, such as an increase in population, urbanization, and industrialization, as well as economic progression. In Nigeria, 52% of the population live in urban areas and the average annual population growth rate is at 2.53% in 2020 [12]. Previous studies by [13] have shown that Nigeria generates well over thirty-two million tons of solid waste annually, of which only a low percentage (20–30%) is collected and recycled. The industrialization has metamorphosed waste management into an issue beyond control. The spate at which wastes are being generated has not been met with measures put in place by various governments. Furthermore, many urban regions lack a compelling waste management structure. As a result, most urban family units depend on indiscriminate practices like the careless dumping, burning, or burying of their solid waste within their vicinities.

In recent years the volume of waste has been increasing at an alarming rate, posing a formidable challenge to governments [14]. The complexities and enormity of the challenges become evident when considering other waste types to be managed and these include industrial solid waste, municipal wastewater, industrial wastewater, storm water and hazardous waste. Often, different government agencies are mandated to

manage different waste sectors. This fragmented approach to waste management, coupled with a lack of clear definition and delineation of the different waste types, makes an assessment of current waste management practices in most countries difficult[15]. Refuse disposal is one of the major environmental problems that developing countries are faced with. Health hazard, traffic congestion, unsightliness, unpleasantness and blockage of drainages are some of the problems caused by the lack of efficient waste management practice in Nigeria. The problem of waste management has two parts, that of collection and that of disposal. Communal collection, block collection, door to door collection and kerb side collection methods have been practiced by different societies. A lot of problems are faced in the collection process like climatic problems, public attitude, nature of waste, and transport condition. Disposal methods such as dumping sites, incineration, recycling, shipping and home garbage disposal units have been used in different societies. There are newer advances in disposal methods, such as pyrolysis, biodegradable containers and biodegradation. These have fewer functional problems but more feasibility problems such as initial and maintenance costs. The government as well as the citizenry has roles to play in adopting more suitable solutions to this problem. However, the study of gender is relevant not only to assess the degree of participation in connection with all aspects of waste but also to better understand how gender roles influence solid waste management. This brings additional clarity to the questions of why or in what way gender is to be considered when thinking about work to influence or change the sector. This study aims to revisit the issue of gender and how gender analysis can serve as a means to improve outcomes, rather than viewing gender as a challenge for policymakers. Women and men have different behaviors when it comes to generating waste, and their roles and tasks in households and communities vary when it comes to waste management and related activities. They also have different capabilities and access to opportunities when seeking employment in small waste enterprises. The objective is to assess gender involvement in municipal solid waste management by identifying gender roles in municipal solid waste management, evaluate gender perceptions of the concept of waste and waste management, and assess the degree of gender participation in municipal solid waste management. Different studies have shared different perspectives to solid waste management issues but the underlining factor that borders on gender involvement has not been dealt with. This study therefore engaged in the collective behavior concept of humans and the behavioral approach to waste management and unveils the involvement of the people of Oluoyole Local Government in Ibadan, Nigeria towards waste management. The focus was placed on employing public opinion, by understanding the public involvement and attitudes of people towards solid waste management practices.

Study Area

Ibadan comprises of 11 local governments with a population of almost 2.6 million according to the National Population Commission 2006 census. Oluoyole happens to be a Local Government Area in Oyo State, Nigeria and one of the oldest. Its headquarters are in the town of Idi Ayunre, old Lagos/Ibadan road. Notable landmarks in the LGA include institutions such as the Kamar industries and Rom oil. The Urban Section of the Local Government comprises such area like Alomaja, Podo, Idi Ayunre, Alomaja, Lagos/Ibadan Express Road, Old Lagos road, New Garage, OritaOdo Ona Elewe where many big companies were sited. Companies like; British America Tobacco (BAT), ROM Oil, Agrited Company, Black-Hors plastic company, Jubaili Agro-Limited, KAMAR Industries, Oriented foods and many others. Some Quarry companies flourishing in the area are Kopek Quarry at Olounde, RCC Quarry at Ekefa Village, Ratcon Quarry, Takol Quarry at Seko Village, CNC Quarry among others.



Figure 1: Pictorial view of Oluoyole local government

II. LITERATURE REVIEW

1. Definition and types of Solid waste

Solid waste can be defined as the useless, unwanted and discarded material resulting from day to day activities in the community. Solid waste management may be defined as the discipline associated with the control of generation, storage, collection, transfer, processing and disposal of solid waste. A high rate of population growth and increasing per capita income have resulted in the generation of an enormous volume of solid waste, which poses a serious threat to environmental quality and human health [16]. The word “waste” refers to something that is “no longer serving a purpose”, something “without value” (The Concise Oxford Dictionary). On the other hand, [17] viewed waste as, “any material which has no value to the producer and must therefore be disposed of”. The basic point of agreement between the two definitions is therefore on the issue of value; they both agree waste must be defined by the owner or producer of the waste. The definition by the EU Framework Directive on Waste (91/156/EEC) defines waste as “any substance or object which the holder discards or intends to discard and which falls into one of the following categories:

- Production or consumption residue.
- Product whose date for appropriate use has expired.
- Contaminated or soiled materials.
- Substances that no longer performs satisfactorily” [18].

Generally, solid waste can be classified into three categories. They are municipal solid waste, industrial solid waste and hazardous solid waste [19].

Municipal solid waste (MSW) are defined to include refuse from households, nonhazardous solid (not sludge or semisolid) waste from industrial and commercial establishments, and refuse from institutions (including non-pathogenic waste from hospitals), market waste, yard waste and street sweepings. Sometimes, construction and demolition debris is also included [19]. Article 2(b) of the European Union Landfill Directive [20] broadened the definition further by defining MSW as waste arising from households as well as other wastes, which because of their nature and composition are similar to waste from households [21]. This implies that MSW may often include biodegradable components such as paper, wood, textiles, food and garden waste, as well as non-degradable fractions such as glass, plastics, tyres and bottles. The various sources of these wastes in any community may include: residential houses, institutions, commercial organizations, municipal services, allotments and treatment sites [22]. In essence, MSW would normally include all wastes from the neighborhood except industrial, agricultural and hazardous wastes [23].

Industrial waste is generally referred to as a material from a manufacturing process that has no value to the manufacturer and that has to be disposed of in some manner. With rising economic standards and with many imported consumer goods (particularly food items), Nigerians increasingly have access to packaged goods, often using plastics, which makes waste disposal difficult. The development and widespread use of new packaging substances such as plastics have improved the standards of living for millions, but they have also introduced new threats to the environment, as typified by the histories of dichlorodiphenyltrichloroethane (DDT) and polychlorinated bi-phenyls (PCBs). Thus, industrial development also brings in its wake problems of environmental pollution that often need abatement.

Hazardous Waste is a special class of waste known as hazardous waste, mostly discharged into the environment from industrial and related sources attracts special attention and management considerations because of their harmful nature to man and other components of the ecosystem. A waste classified as hazardous waste, by definition and convention usually has one or more of the following four characteristics: ignitability, corrosively, reactivity and toxicity. These definitions show that a wide range of substances of different physical forms (liquid, gaseous, solid, or in solution) fall into the class of hazardous materials which may become waste. Hazardous wastes have been known to cause serious environmental and epidemiological disasters as a result of the lack of or inadequate handling and management of these wastes [12].

2. Solid Waste Generation and Disposal

Waste generation: Waste generation is primarily a function of people's consumption patterns and thus is based on their socioeconomic characteristics. Waste generation rates have been increasing rapidly due to urbanization and industrialization. As a result of population growth and urbanization in developing countries, overall volumes of waste generation is much higher than most developed countries and the industrial waste generation rates are also very high as most of the industries are primary industries producing raw materials for industrial production. Furthermore, due to improved living standards, improved healthcare and due to globalization, a number of new waste streams have emerged, especially e-waste and hazardous waste. [15] Human nature is such that waste generation cannot be avoided. The volume of waste generated is also dependent on the economic status of the people. This is buttressed by the fact that higher incomes result in increased consumption patterns and further generation of more waste.

Disposal Methods of Solid Waste is often desirable to use an integrated approach to solid waste management that includes components of recycling, composting, incineration and land filling. All of these are often proposed as the solution. Both composting and incineration leave substantial amounts of waste that must be land filled. By far the most common method of disposal is land filling, as it is apparently the cheapest and easiest [24]

The Solid Waste Management Hierarchy: Municipal solid waste management (MSWM) practices between countries are distinct; in most however, relevant services are rendered by the (local) government or private service providers and may be carried out by employing the hierarchy of waste management [15]. The hierarchy is regarded as one of the important foundations of contemporary MSWM systems and has been popularly adopted for the development of policies related to waste management both on regional and national level, especially in developed countries [16]. The hierarchy of waste management is defined by the 3Rs - reduce, reuse and recycle- stratifies options of waste management and focuses on maximum utilization of resources with minimum generation of resultant waste[15]. The 3Rs refer to the reduction in the amount of waste being generated, the reuse of items prior to their being commissioned as waste, and the recycling of items once they become waste. An expounded version of this in the waste management hierarchy includes- waste prevention/reduction, reuse, recycling & composting, energy recovery, and finally landfilling. The hierarchy function is to aid in the management of waste whilst ensuring little impact on the environment. In most nations, prioritization of components in the hierarchy is alike giving preference first to waste prevention, then reuse, recycling (including composting and material recovery), energy recovery and reduction of waste via methods such as incineration and finally landfilling.

Waste Prevention and Reduction: Waste Prevention occupies the topmost rung in the waste management hierarchy. It refers to the activities undergone with an item prior to being perceived as waste; these involve: decrease in the amount of waste produced via the prolongment of such item life span and its re-use; decrease in associated environmental and public health impacts from waste produced; and decrease in quantity of noxious substances contained in products [25]. The concept of waste prevention cuts across the entire process a product undergoes- right from its obtainment in raw form, its manufacture, distribution, to its utilization and end of its useful life. While prevention or minimization may not be isolated to a certain stage in any product life time, the more efforts directed at waste prevention in the earlier stages of a product lifetime, the less impact they have on the latter stages.

Reuse: Following the hierarchy, the next best option for SWM is re-use and this encompasses the utilization of an item after its initial use, either for a purpose similar to that which it was intended or for an entirely new one. This is exemplified in the reutilization of bottles (of beverages) or plastic bags from stores [26]. According to the [25], reuse refers to “any operation by which a product or its components, having reached the end of their first use, are used for the same purpose for which they were conceived, including the continued use of a product which is returned to a collection point, distributor, recycler or manufacturer, as well as reuse of a product following refurbishment;” As such, the reduction of solid waste extends to reuse as the latter slows down the entrance of an item into the waste stream, as well as prevents the amount of items that eventually become waste [25].

Recycling: MSW materials which arise following consumption may be recovered and processed into useful items, bearing in mind the cost effectiveness, marketability and environmental impact it may have[26]. The recycling process includes collection, segregation and processing of waste with productive value[27] as such inorganic fractions of MSW (paper, metal, plastic, glass materials) may be recycled [26]. Recovery of inorganic materials from MSW has been identified as a key component in the management of waste [28]. In some developed parts of the world, recycling activities have been reported to be quite high. The rates in Germany and Austria for example, go beyond 25%, with Austria being reported to have maintained composting rates of about 40% since the early 90s[29] and Brazil having material recovery rates as high as approximately 41% [30].

Composting: Organic components in MSW (i.e. waste of food and garden origin) are considered useful composting material[26]. Composting is a process which could decrease MSW by an average of almost 68 % of its original volume [28]. The process has been defined as the: “biological decomposition of biodegradable solid waste under controlled predominantly aerobic conditions to a state that is sufficiently stable for nuisance-free storage and handling and is satisfactorily matured for safe use in agriculture” [16]. The end product, compost, may be utilized in the conditioning of soils meant for agricultural purposes; its use in this manner gives the soil a stable nutrient source (nitrogen, potassium and phosphorus) that is gradually tapped from, and aids its water retention capacity.

Energy Recovery: MSW contains organic components which are combustible. Thus, energy could be gained from incineration of waste or landfill gas combustion, which may be used to generate electric power (from steam under high thermal conditions) or produce heat for buildings (through boilers) (Williams, 2005). As such, the process of converting solid waste of organic nature into other useful forms such as gas, heat, steam and ash

residues via combustion is referred to as incineration and such process is carried out in places often referred to as Waste-to-Energy plants [14].

Landfilling: Landfilling is the deposition of waste either in a specific land area with the goal of preventing such waste from impacting negatively on the environment[31].

3. Municipal Solid Waste Collection in Nigeria.

According to [32] the collection of solid waste is the most difficult and expensive aspect of solid waste management in developing countries. As a result of the unplanned nature of most cities in Nigeria, this task can sometimes be daunting. Ineffective collection systems often leads to waste accumulation, creating nuisance and odour problems, environmental pollution, fire hazards and generally threatening the physical well-being of the populace. Survey of existing literature reveals that two primary collection methods are obtainable in Nigeria: "Door to door" and "Depot", or community disposal, method

Door to Door Waste Collection: Standard waste collection receptacles are rarely available at household level in most parts of sub-Saharan Africa [33]. In Nigeria particularly, many low and middle income households use whatever container that is readily available, such as baskets, cans, buckets, open drums and sometimes black bin bags for waste collection. As a result of the high organic and moisture contents and high prevailing temperature, waste collected in such sub-standard receptacles decay rather rapidly giving rise to undesirable environmental consequences. In contrast however, most upper income households and government offices use standard receptacles, with covers, for collection of their waste.

Door to door waste collection requires good planning and management. Collection crews come on specified days to empty the bins for transfer to dumpsites and this is where gender comes into play. This system demands a minimum outlay of manpower and equipment as well as accessibility. Where these are not readily available the system readily collapses.

Depots/Communal Collection Facilities:

In neighborhoods where access is constrained, waste from households are brought to communal collection facilities sometimes called bring banks. Bring banks may be in the form of skips or other purpose built structures. Collection crews from the local government department or private waste management agencies come on set days to empty the facility. Bring banks are usually centrally located for easy access to the entire community and collection crews. In many cases inadequacies in design and location of bring banks compel some residents to either misuse or not to use bring bank facilities at all, where this happens fly tipping results.

4 Solid waste management in Ibadan, Oyo State.

Waste generation has been on the increase since 1960 in Ibadan. The rate of waste generation increased from 0.37 kg/capita/day in the late 1960s/early 1970s ([34]; [35][36] to 0.55 kg/capita/day between 2012 and 2015 [37]; [38]; [39]; [40]). In 2012, about 635,000 tons, approximately 0.55 kg/person/day quantity of waste was generated in the city ([37]Odewumi et al., 2016). [41] disaggregate the waste generated in the city of Ibadan into organic waste (accounting for 42% by weight), paper (10%), textile (2%), glass (4%), metal (5%), wood (3%) and plastics (9%). Some of the wastes are hazardous, flammable, or non-biodegradable. Without adequate provision for residential solid waste management, a diverse range of disease vectors will likely breed or feed within and around houses and residential neighbourhoods, reducing quality of life, wellbeing and hindering sustainable development [42]; [43]; [44].

The responsibility for solid waste management in the city currently lies with the Oyo State Government, Ministry of Environment and Water Resources, Oyo State Solid Waste Management Authority (OYOWMA) and local governments. Each organ of government has different roles and responsibilities. In terms of waste management, OYOWMA is the statutory body established in 1997 by the state government to undertake waste collection, processing and disposal [45]. It has the direct and operational responsibility for residential solid waste management in the city. The Ministry of Environment and Water Resources performs a supervisory role over the Oyo State Solid Waste Management Authority. The Oyo State Solid Waste Management Authority is charged with the responsibility of collecting wastes along major roads, markets, inner city areas and other areas not covered by private waste contractors. Prior to Edict No. 8 of 1997 establishing OYOWMA, municipal solid waste collection and disposal were undertaken by the Ibadan Solid Waste Management Authority. The authority was functioning under the Ibadan City Council and later when Ibadan Municipal Government was created, the responsibility was transferred to Ibadan Municipal Council. Later, Ibadan city and its environs were constitutionally divided into eleven local government areas (LGAs) to shoulder the responsibility of collecting, transporting and disposing of municipal solid wastes [45]; [46]. The idea of involving the private sector in residential solid waste management started in 1985. According to [47], the collection service by licensed private contractors was initiated in 1985 when private franchise of residential waste collection in high income residential layout areas was implemented.

Obviously, certain people in certain circumstances consider waste materials as a resource for their family, their livelihood, or their enterprise. For example, oily milk packages may be used as fuel; leftover food may be fed to pigs and goats; discarded cardboard may serve as walls and roofs of houses. If that is the case, one can expect that men and women re-value waste materials differently and see their usefulness for different purposes, such as domestic utility, saving on household expenditures, earning money, or other purposes.

5. Solid waste management and gender involvement

The term gender was first used about 30 years ago to describe the characteristics of men and women which are socially decided in contrast to those characteristics which are biologically defined. Gender refers to women and men socially defined roles and characteristics, which are shaped by historical, economical, religious, cultural and ethnic factors. What is women work in one society might be men in another society. People are born female or male, but learn to be girls and boys who grow into women and men. They are taught what the appropriate behavior and feelings, roles and activities are for them and how they should relate to other people. This learned behavior is what makes up the gender identity and decides the gender roles [48]. Gender roles for women and men differ a lot from one culture to another and from one social group to another within the same culture. Race, class, economic circumstances, age all of this influence what is considered appropriate for women and men. Culture changes over time and so does gender patterns. Sudden crisis, like war or famine, can totally and quickly change what men and women do. Some times for a short period, but also some times forever. Also, in relation to human rights, culture and religion we find different roles for men and women determined by the society. Once we realize the difference between biological roles (which cannot be changed) and the gender roles (which can be changed), we are able to look in a new way at our own life and our role in society. Becoming aware of gender roles and understanding its reasons and roots give us a better possibility and choice for changing some gender roles and accepting others [48].

6. A Gender Definition of Waste

It has been stated above that women and men play different roles in society, and that each has a gender-specific combination of roles, shaped by a host of determinants (cultural, economic etc.). The word "waste" refers to something that is "no longer serving a purpose", something "without value" (The Concise Oxford Dictionary). The very definitions of waste and discarded materials may be influenced by the gender of the person making the judgment. What look like junk to women may be motorcycle parts to men; what looks like dirt to men may be compost or fertilizer to women. As men and women participate (or not) in managing waste within the community, their relationship to discarded materials may depend on who they are, as much as or more than on what they do. Knowledge of waste issues is different across gender and age. Women, men, and children are almost certain to have different (and not always overlapping) knowledge of waste disposal places in their neighborhoods. Obviously, however, certain people in certain circumstances consider waste materials as a resource for their family, their livelihood, or their enterprise. For example, oily milk packages may be used as fuel; leftover food may be fed to pigs and goats; discarded cardboard may serve as walls and roofs of houses. If that is the case, one can expect that men and women re-value waste materials differently and see their usefulness for different purposes, such as domestic utility, saving on household expenditures, earning money, or other purposes.

III. METHODS

Type of Data and Methods of data collection

Data needed for the study were obtained from primary sources. According to [49], primary data is the data which the researcher himself or herself collects and are thus original in character. This data is first hand because they are usually collected from respondents using questionnaires, interviews, surveys, direct observations, and experiments. Primary data in this case was obtained randomly in households/shops from four areas in the urban sector of Oluyole local government which are Idi Ayunre, New garage, Podo and Alomaja.

Methods of data collection

This research adopted aspects of both quantitative and qualitative approaches. In this study the quantitative approach involved questionnaire survey to understand the nature of the relationship between gender and solid waste management practices. The qualitative approach, namely, Key Informant Interview (KII) was used to generate other useful supporting data so as to strengthen quantitative evidence. The guide was developed to gather information from management of the waste companies. Questions on sustainability of waste management as well as gender roles were asked.

Questionnaire was designed in such a way to gather information from respondents based on their demographic information, general information about waste, problems of waste collection, gender activities in terms of their involvement, shopping awareness activity as well as perception. The questionnaires were

administered directly to the respondents. Questionnaires were administered with two different sections, firstly to the residents and shop-owners in the community of the research and secondly to the waste company administrators. The questionnaire administered to the waste companies aimed at collecting information on the quantity and type of waste used, strategies to enhance contribution of men and women in waste management, waste collection practices and gender involvement in waste practices. The questionnaire directed at residents and shop owners aimed at determining their perception on men and women towards solid waste management.

Sample size

The sample size was 374 households drawn from four urban areas of Oluyole Local Government (New garage, Podo, Alomaja and Idi Ayunre). Reason for choosing these areas was because of its closeness to the recycling companies/depot.

The sample size for this study will be determined using Yaro Yamane’s formula:

$$n = N / [1 + (Ne^2)]$$

Where: ‘n’ is the required sample size,

‘N’ is the population size,

‘e’ is the error limit at 5% (standard value of 0.05) and

‘1’c is the constant value.

$$N = 5877 / [1 + (5877 * 0.05^2)] \quad N = 374$$

Table 1

Areas	Population
Idi Ayunre	1553
Alomaja	1144
Podo	1030
New Garage	2150
Total	5877

Source: city-facts.com

Data analysis: Data obtained were analysed using descriptive statistical technique like tabulation and percentages, frequencies and cross tabulation. In addition, Microsoft Excel programme was used for drawing some charts with multiple responses so as to simplify interpretation of the data collected. Data which were gathered through key informant interviews were transcribed and organized thematically. Important responses pertaining to the study objectives were extracted in order to generate relevant themes. All data were analysed in conformity with the study objectives.

IV. RESULTS AND DISCUSSION

Demographic characteristics of the study population

The demographic characteristic of the respondents in the study population was related to gender, age, marital status, level of education, family size, income range and type of accommodation. It was expected that such demographic variables could influence respondents to participate in the management of solid waste. The findings of the study indicated the gender of the respondents in relation with their age in Table 2. Table 2 below also illustrates that out of 374 respondents, 8 (2.0%) were from the age group above 60 years, while age group of 41 - 60 years were 26 (7.3%). Out of 203 total female respondents, the age group 26-40 years had more respondents 137 (67.5%) and followed by the age group of 15-25 years which had 58 (28.5%) respondents. Likewise, out of the 171 total male respondents, in the age group of 26-40, the number of male respondents was more 136 (79.5%) followed by the age group 41-60 which had 26 (7.3%) respondents. The age group of 15-25 years had a few number of respondents in male 9 (5.3%).

The study shows the distribution of the respondents by marital status as one of the variable that might influence gender involvement in solid waste management. Table 2 shows the distribution of respondents by marital status. Table 2 indicates high proportion of the respondents were single 256 (68.4%), followed by 118 (31.6%) which represents married. Education level was considered as among the variable to measure the level of gender perception on the concept of waste. Table 2 shows the findings of the respondents involved in the study. The findings in Table 2 revealed that majority of the respondents 192 (51.3) had degree, followed by 171 (45.7) respondents that had post graduate while 11 (2.9%) of respondents reported to have secondary education.

Income is one of the factors that influence increase in waste, the higher your income, the higher the waste you produce and vice versa. 45.2% (169) of the respondents have an income range of #30,000-100,000 while those who earn more than #100,000 have a percentage of 30.2% (113). 23.0% (86) earn in-between #30,000-100,000 while 1.6% (6) earn less than #7,500. Family size was one of the variables measured in the study, which was related to various factors that might influence the amount of solid waste generated as well as its management.

Table 2: Demographic distribution of respondents

Distribution of the Respondents by age and gender					
Age/Gender	15-25 (%)	26-40 (%)	41-60 (%)	61above(%)	Total (%)
Male	9 (5.3)	136 (79.5)	26 (7.3)	0 (0.0)	171 (45.7)
Female	58 (28.5)	137 (67.5)	0 (0.0)	8 (2.0)	203 (54.3)
Total	67 (17.9)	273 (82.0)	26 (7.0)	8 (2.1)	374 (100)
Distribution of the Respondents by marital status					
Marital Status	Frequency		Percentage (%)		
Single	256		68.4		
Married	118		31.6		
Total	374		100		
Distribution of the Respondents by Education level					
Education level	Frequency		Percentage (%)		
Secondary	11		2.9		
Degree	192		51.3		
Postgraduate	171		45.7		
Total	374		100		
Distribution of the respondents by income					
Income (in naira)	Frequency		Percentage (%)		
< 7500	6		1.6		
>7500-30,000	86		23.0		
30,000-100,000	169		45.2		
>100,000	113		30.2		
Distribution of the Respondents by Family Size					
Family size	Frequency		Percentage (%)		
1	104		27.8		
2-4	169		45.2		
5-7	96		25.7		
8-10	5		1.3		
Total	374		100.0		

Source: Researcher data, 2023.

Table 2 narrates the findings. Majority of the respondents 169 (45.2%) being in the family size ranging between 2-4 people, followed by 104 (27.8%) being in the family size of 1 person. Few respondents 5 (1.3%) reported to belong in the family size ranging between 8-10 people. Generally, the findings revealed that 369 (98.7%) of the respondents being in the family size between 1 to 7 people per family, while 5 (1.3%) reported to belong in the family size ranging between 8 – 10 people per family.

Assessment of the degree of gender participation in municipal solid waste management environmental awareness

The study revealed that 64.7% (242) of the sample responded that they are aware of the recycling program in the community. Among them, the question asked was on the average, do you visit the recycling depot, and 45% said yes they visit the recycling depot in which 35% are females while 10% are males. Also, among the total sampled population, 76.5% responded that they do reuse household solid waste where we have 124 males and 162 females while 23.5% (88) do not reuse. For the questions, what was the main reason for not reusing household waste, in an answer the respondents indicated that the main reason for not recycling waste is because they don't have time separating waste, other reasons are they haven't been taught about it as well as unable to transport/high cost of transportation. 15% they don't have time separating waste, 9% said they haven't been taught about it while 10.7% said it was due to high cost of transportation to the site.

Gender activities in waste disposal

In table 3, 48.9% (197) of the sample responded that they dispose their waste through private sanitation agencies in which 27.1% are males while 22.4% are females. Also, among the total sampled population, 11.1% (44) responded that they make use of other means such as cart pushers; waste porters etc. Also, (36) 9.6% make use of dumpsites/road sides where 5.6% are females and 4.0% males. 8.3% burn, 7.4% use the state sanitation agencies, 5.8% sell to waste companies and scavengers while 8.0% of the respondents use burning method to dispose their waste.

Gender and what they use in storing waste

From findings, nylon is the most used in storing waste which gives a total of 45.7% with males having 16.8% and female having 28.9%, followed by container with lid which has a total of 24.3%. From the table 4 below it is seen that to evaluate gender perception towards waste and waste management, women have a higher

percentage of 54.3% sure while men take 45.7%. Figures 2 & 3 also show the methods of storing wastes by respondents in the study area.

Table 3: Gender activities in waste disposal

Disposal method/ Gender	dumpsites/roadsides	near by drainage	private sanitation agencies	state sanitation agencies	sell it to waste companies/cavengers	Burning	dumpsites+burning	Dumpsites+sell waste companies+burning	dumpsites+driane+burning	Others	private sanitation agencies+burning	Total
Male	15 4.0%	1 0.3%	100 26.7%	20 5.3%	8 2.1%	13 3.5%	1 0.3%	0 0.0%	0 0.0%	13 3.5%	0 0.0%	171 45.7%
Female	21 5.6%	7 1.9%	83 22.2%	8 2.1%	14 3.7%	18 4.8%	12 3.2%	5 1.3%	3 0.8%	28 7.5%	4 1.1%	203 54.3%
Total	36 9.6%	8 2.2%	183 48.9%	28 7.4%	22 5.8%	31 8.3%	13 3.5%	5 1.3%	3 0.8%	41 11.0%	4 1.1%	374 100.0%

Source: Researcher data, 2023

Table 4: Gender and what they use in storing waste

Storage of waste / Gender	Nylon (%)	Sack (%)	container with lid (%)	container without lid (%)	Others (%)	Nylon+sack (%)	Nylon+container without lid (%)	Nylon+container with lid (%)	Nylon+sack+container without lid (%)	Nylon+sack+container with lid (%)	Total (%)
Male	16.8	4.6	15.5	1.3	2.4	1.3	0.0	1.9	1.3	0.5	45.7
Female	28.9	2.1	8.8	2.4	0.0	3.5	1.3	3.7	1.3	2.1	54.3
	45.7	6.7	24.3	3.7	2.4	4.8	1.3	5.6	2.6	2.5	100.0

Source: Researcher data, 2023

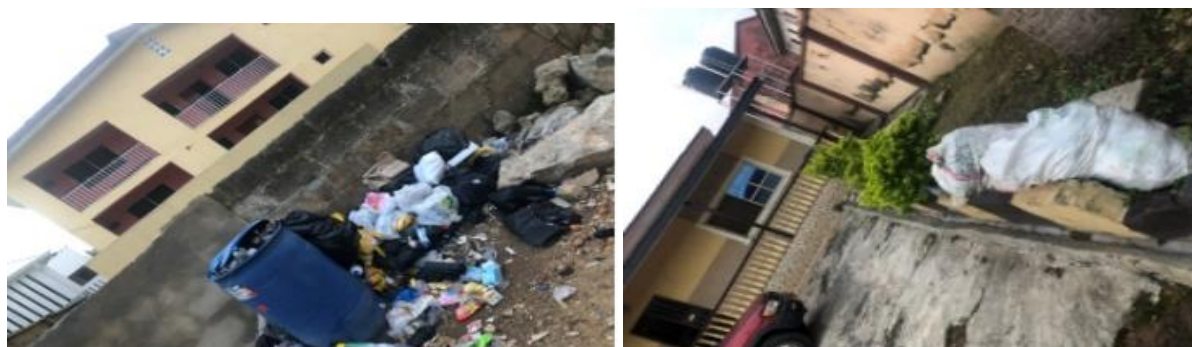


Figure 2: views of what household use in storing waste at Oluyole local government



Figure 3: view of what shop owners use in storing waste around Oluyole local government

Household waste separation

From the total sampled population, 133 (35.6%) responded that they carry out waste separation in their household while 241 (64.1%) do not separate waste in their household (See Table 5).

Table 5: Household waste separation

Waste separation	Frequency	Percentage (%)
Separated	133	35.6
Not Separated	241	64.1
Total	374	100

Source: Researchers data, 2023

Gender roles in municipal solid waste management

Table 6 shows that significantly a higher percentage of both men and women are involved in solid waste management. The percentage where both men and women are working is higher than where just a particular gender is working; these findings can then be said that both men and women play an important role in solid waste management around Oluyole local government

Table 6. Waste management activities by gender at Oluyole local government

Activities	Men (%)	Women (%)	Both (%)
who usually organize municipal solid waste	88 (23.5)	80 (21.4)	201 (53.7)
Who usually encourages to reduce waste	78 (20.9)	149 (39.8)	142(38.0)
Who does most of the house cleaning	30 (8.0)	213(57.0)	126 (33.7)
Who tries to purchase items with less packaging	151 (40.4)	100 (26.7)	118 (31.6)
Who mostly takes the rubbish out	71 (19.0)	173 (46.3)	125 (33.4)
Who encourages younger generation on waste management	74 (19.8)	76 (20.3)	219 (58.6)

Source: Researchers data, 2023

Table 6 shows that the participation of men and women (both) together account for 53.7%, men alone 23.5% and women alone 21.4%, these results shows that participation of men and women (both) who usually organize municipal solid waste is higher than participation of men and women alone. For who usually encourages younger generation on waste management, men and women (both) account for 58.6%, women alone 20.3% and men alone 19.8%. Apart from these two and percentage of who tries to purchase items with less packaging where men take the lead with 40.4%, the percentage of women alone in other activities such as who takes the rubbish out, who does most of the house cleaning is higher than that of men and both gender.

Gender waste separation

Table 7 shows that 4.3% household waste is separated by men, 10.7% is separated by women while 20.6% is separated by both men and women. Data shows that both men and women are actively involved in separating waste and going by a single gender, women alone are actively involved in separating waste than men alone, the difference in the proportion of men and women handling waste alone can be associated to different socioeconomic, occupational variables and other environmental awareness and attitudinal behaviors towards waste management of the respondents.

Table 7: Gender waste separation

Waste separation by gender	Frequency	Percentage (%)
Male	16	4.3
Female	40	10.7
Both	77	20.6
Total	133	35.6

Source: Researchers data, 2023

Relationship between waste generation and income level

According to Figure 4, the categorised household data analysis showed that higher income household waste generation rate is significantly higher than the lower income household. Income level is the most important factor influencing the quantity of waste generation rate at household level.

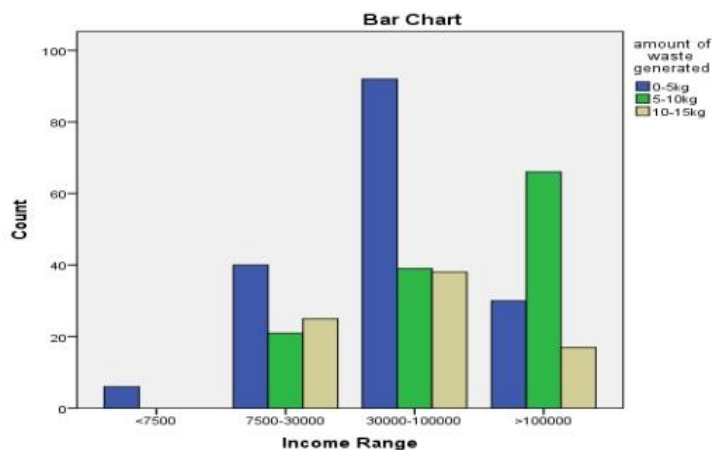


Figure 4: Relationship between waste generation and income level
 Source: Researchers data, 2023

Gender roles in municipal solid waste management

During the course of this study, a visit was made to two waste companies Elu Environs Tech. Company Limited, Podo and Om Waste Recycling Limited, Alomaja which are both cited at Oluyole local government, Ibadan, Oyo state. A one on one interview was done with the management of both companies separately, during conversation with these companies, gender roles are quite different even thou they have an equal percentage of gender bringing waste to the organization, this is showed in Table 6 (waste management activities by gender at Oluyole local government), the proportion of male/female working in the organization is about 70/30. The roles of the men in the organization are usually off loaders, operators, and drivers(See figure 5,6&7) while that of the women are usually secretaries, messengers, cleaners etc. Reason for this disparity in gender balance is because they deal with heavy equipment which they feel might be dangerous for women handling it. Another role they actively involved women in, is making sure they are actively involved in bringing waste to the companies. A quick inspection was also done at Oluyole local government dumpsite located at Ajakanga and as shown in Table 4 (Gender activities in waste management); the results indicated that 5.8% of the sample population dispose their waste to the waste companies. On getting there; the research team met with the management and few questions were asked as regards the gender roles at the dump sites. Even thou the dump site was going through some renovation by the state government. It was revealed that before the ongoing renovation which led to the partial closing of the dumpsites, the female gender that work there are more than the male population (See figure 5,6&7). They usually come the dump site to scavenge wastes which they take to companies that recycle for extra income while the men only come for pickup/transportation of scavenged materials which the female have gathered. On the dumpsites, looking at the percentage of gender roles, it's a 70/30 proportion where 70% belong to the females while 30% constituted the male workers.



Figure 5: view of men offloading cartoon waste at Elu Environs Tech Company Limited, Podo



Figure 6: view with the management of Elu Environs Tech Company Limited Depot, Podo, Ibadan



Figure 7: View of plastic wastes at OM Waste Recycling Limited, Alomaja, Ibadan

This research findings has been able to identify and provide information about environmental protection by reaching out to both men and women and recognising their roles and priorities in relation to the environment. The findings of the study is in line with the submission of [50] that the intergration of gender perspectives in the assessment, planning, implementation and monitoring of waste management projects; create equal opprtunities for men and women to benefit equally from the awareness programmes and training initiatives for waste management. [51]findings also corroborates the findings of this research that in developing counties a greater percentage of the between 15 and 20million waste pickers are women unlike in developed countries where there exists a highly formalised and automated waste management and recycling industries dominated by men. The benefit of incorporating both men and women in the job of effective waste management in an urban space like Ibadan; there will be improved efficiency and effectiveness and the environment will be safer and cleaner. Poverty level tends to decrease as this management means assist in empowering women and reducing poverty level and increases the socioeconomic wellbeing and the standard of living of the citizens which on the long run have positive effect on quality of lives and urban health.

V. CONCLUSION

Solid waste management and maintenance of a clean environment are very important for maintaining the aesthetic beauty of human environment as well as reducing health hazards, but it could not be effectively done without everyone in the process be it male or female. The study was set out to know gender involvement in solid waste management in Oluyole local government area of Oyo state. It revealed that around Oluyole local government, both male and female are greatly involved when it comes to waste management even thou there are different areas to which male and female are greatly involved about the environment in some ways. The study also investigated the processes involved in solid waste management in the local government area which included solid waste storage at household level, methods of waste disposal, collection process and final disposal by waste agencies. This study, concluded that even though both men and women are involved in solid waste management, the women participation when it comes to waste and waste management was found to be higher than that of men and there is positive relationship between socio economic status and waste management. Based on the findings of the study, the following recommendations are made: Government should provide communal bins in strategic places at Oluyole local government; to assist curb waste dumps at the roadsides since the

dumpsites are not fully functioning at the moment. Existing recycling drop-off centers need to have a mini-depot that is convenient for majority of the users such as near schools, shopping centers, in order to easily help both gender be actively involved in waste management. Also, provision of recycling hotline by recycling companies so as to have easy access to call which help facilitates quick transfer of wastes from the people to the companies. In addition, waste-to-wealth scheme should be embarked for both genders and not just the females so that some of the wastes can be officially re-processed and recycled for better use. Lastly, more awareness to the general public on various ways to properly manage and dispose off their wastes using the 3Rs (reuse, reduce and recycle) by both the waste companies and government to the people.

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