ANALYSIS OF WOMEN'S PARTICIPATION AND INCORPORATION IN WASTE PICKING AND SOLID WASTE MANAGEMENT IN SOKOTO METROPOLIS

BY

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DECLARATION

I declare that the thesis entitled “Analysis of Women’s participation and incorporation in waste picking and solid waste management in Sokoto Metropolis” has been written by me in the Department of Urban and Regional Planning under the supervision of Tpl. Prof. A. Ahmed. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this project thesis was previously presented for another degree or diploma at any university.

_____	_____	_____
Name of student	Signature	Date

CERTIFICATION

This thesis entitled "Analysis of Women's Participation in waste picking and how to incorporate them in solid waste management of Sokoto metropolis" by MUSTAPHA, Abubakar meets the regulation governing the award of the Degree of Masters of Science Urban Management in Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

…….. ……

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DEDICATION

This thesis is dedicated to Allah (S. W. T.) who saw me through the entire programme. To Him I pledge allegiance with all my life and strength.

To my beloved parents, Late Alhaji Mustapha Sambo, Malama. Khadijah Mustapha and my Step Mother, Malama. Amina Mustapha, who gave me all the spiritual and moral support. I will always live to remember your love and care.

I also dedicate this project to my wife, Hajara Yusuf, my sons and daughter, Sadiq Abubakar Mustapha, Yusuf Abubakar Mustapha (Mustaen), Na'ana Khadijah Abubakar Mustapha, who saw when the journey started, and also lived to witness its successful completion.

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ABSTRACT

Analysis of women's participation in waste picking and solid waste management as a whole has immense socioeconomic and environmental benefits and also can serve as a basis for identifying problems and making relevant recommendations in Sokoto Metropolis, Nigeria. The objectives of this research are to: review gender participation in solid waste management; review the solid waste management policies and programmes in Sokoto metropolis; assess the nature of women's participation in municipal solid waste management in Sokoto metropolis and the outcomes; identify problems and make recommendations. A total of 328 women participants in waste picking among other solid waste management were studied in the six districts covered in Sokoto metropolis using cluster and purposive sampling techniques. Tables, percentages, and charts were used for the analysis. The results showed that majority of the women waste participants within the six districts of Sokoto Metropolis were less than 45 years old. As noted, majority of the people involved in solid waste activities, as indicated by the survey results were married with 53.7% and were mostly of Hausa/Fulani ethnic composition with 60.4%. Scrap metal, assorted bottles and farmyard manure, are the major materials that attract women solid waste entrepreneurs in Sokoto metropolis. About 57.6% of the respondents collect less than 200 kg of valuable waste materials every week. In contrast, 23.8% comprising some women scrap metal collectors, major dealers and those involved in compost business collect above 600 kg of waste valuables. about 65% of the respondents usually partake in waste activity on their own ranging from house to house collection of solid waste recyclables, to waste picking on the street, offices etc. field investigation also revealed that about 68% of women do collect more of solid waste materials e.g. glass bottles, assorted plastics, cans, among others even more than the opposite sex. The study notes that waste materials are mostly conveyed using locally made cart (*Kura*) and only a few are conveyed with car for disposal to end users. Women participants surveyed expressed that most of the solid waste materials are utilized locally throughout the study area. Interestingly, the benefits derived by some of the respondents include: family support; multiple source of income; earning a living/self sustenance; employer of labor among others. The average monthly income generated especially among some of the actors from scrap metal/bottles and farmyard manure (compost) collection was discovered to be above ₦6, 000 which is more than the salaries paid to some workers even civil servants (minimum wage of ₦ 18, 000 per month) as their take home in the study area. Also, about five (5) women earn up to about ₦90, 000 in a month. As high as 84.8% of sampled solid waste participants in the study area claimed that the government never came to their aid. However, the major challenges faced by solid waste entrepreneurs especially women in Sokoto Metropolis are categorized into: fluctuation in prices of waste valuables; high cost of transportation; inadequate labor force; poor or absent of union leaders etc.

It is concluded that participation of women in solid waste management without gender bias contribute more to waste management thus it is suggested that waste activity being an informal sector should be transformed into a more formal sector and formulating a more functional union leaders that will take their plea to appropriate government authorities which will in turn bring about better organization of the sector, hence making it more attractive and therefore, creating ample opportunities for the unemployed in Sokoto and beyond.

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND TO THE STUDY

The problems of solid waste management in Nigerian cities have resulted from rapid increase in urban populations, rapid industrialization and changing lifestyle. Many urban areas also generate solid wastes beyond what they can manage, and this is closely associated with economic profiles and background. In many places, municipalities spend 20-50% of their available re-current budget on solid waste management which normally generates marginal results. Yet, it is also common that 30-60% of all the urban solid wastes in developing countries are uncollected, and less than 50% of the population is served.

One of the critical areas that needs to be addressed when reviewing the impact of solid waste management is the gender issue. In all societies, women have a different role from that of men. As mothers and homemakers as well as educators, entrepreneurs and producers, women more than men, have to play multiple roles. The demands of these multiple roles in poorer countries place women, particularly the non-elite ones, at a special disadvantage (United Nations Development Fund for Women (UNDFW, 1998). This problem is huge considering the fact that women constitute 60% of the world's one billion poor and out of 1.3 billion people living in absolute poverty, over 70% are women.

Research according to Scheinberg *et. al*., (1998) has shown that across many cultures, women handle waste in their homes although the richer women delegate this task to servants. In general, women are not paid to handle waste, while men only do so when they are to be paid. Due to their lower mobility and access to public spaces, some women, who cannot leave their

homes for cultural or religious reasons, will find it difficult to deliver waste to a neighborhood collection point. Related to this, is the position of women groups which are often involved in the operation of informal waste collection and recycling where men rather have competitive advantage.

The current solid waste management crisis faced in the country is an indication of failure of existing management systems. For improvement therefore, pursuing the management option of gender involvement in solid waste management is not only desirable, but necessary. Governments must provide an enabling environment to promote these practices in the management system. In orientating and directing policies, it is important to take into account the specific needs of women to ensure that they can have equitable and affordable access to facilities and services (UNDFW, 1998). All these are issues that need to be addressed when planning waste management systems.

1.2 STATEMENT OF THE RESEARCH PROBLEM

In Sokoto metropolis, women are active players in solid waste management. This occurs at the home level and at public places, like schools, offices, market etc. Such activities are not only a means of livelihood, but they also ensure cleanness of public places in addition to helping reduce drastically the volume of wastes from the public system. Important as their activities have been, women's involvement in solid waste management has been poorly recognized by public policies and programmes of poverty reduction. That is, by failing to recognize them, the contribution women make to the economy and the way they enhance solid waste management practices appears to be considered in material. The lack of data to reinforce arguments for reversal of positions has often been sited as a major shortcoming.

This study makes contribution in this direction by examining the activities of women in solid waste management and the way this complements the formal solid waste management system in Sokoto. How women's solid waste management activities have improved the income base of participants is also covered by the study as a means of determining prospects for poverty alleviation.

Most of the previous studies conducted on solid waste management lack specific focus on women's activities in solid waste management. These include the study on social spaces and privatization of SWM (Adama, 2005); performance evaluation of community participation in solid waste management in Ibadan (Folurunsho, 2002), etc. It is in the light of this gap, that a gender based study of solid waste management practices is justified. The findings will yield practical, workable solution to address waste management problems within the Sokoto metropolis.

1.3 AIM OF THE STUDY

This study aims to examine the nature of women's participation in waste picking and how to incorporate them in solid waste management of sokoto metropolis as a basis for identifying problems and making relevant recommendations.

1.4 OBJECIVES OF THE STUDY

1. To review gender participation in solid waste management.
2. To review the solid waste management policies and programmes in Sokoto metropolis.
3. To assess the nature of women's participation in municipal solid waste management in Sokoto metropolis and the outcomes.
4. To identify problems and make recommendations.

1.5 SCOPE OF THE STUDY

The study covered Sokoto metropolis and emphasis was on the assessment of women participation in waste picking and how to incorporate them in solid waste management. The extent of the research also is on stakeholders, corporate organizations, government agencies that are involved in solid waste management within the study area.

CHAPTER TWO

2.0 CONCEPTUAL ISSUES AND LITERATURE REVIEW

2.1 CONCEPTUAL ISSUES

This chapter presents a review on waste collection, separation, transportation, sanitation, disposal, recycling and waste pickers among others in solid waste management together with integrated solid waste and sustainable waste management strategies. The aim is to highlight the major features and issues on waste collection, separation, transportation, sanitation, disposal, recycling and waste picking in solid waste management. Special attention is placed on women participation and sustainable solid waste management.

2.1.1 Gender

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’s and men’s socially defined roles and characteristics, which are shaped by historical, economical, religious, cultural and ethnic factors. What is women’s work in one society might be men’s 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 (International Consortium I.C (2012).

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 (International Consortium I.C (2012).

2.1.2 A Gendered 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.). Consequently, decisions taken by an individual are the result of balancing the combination of roles and expectations.

The word “waste” refers to something that is "no longer serving a purpose", something "without value" (The Concise Oxford Dictionary). Obviously, however, certain people in certain circumstances consider waste materials as a resource for their family, their livelihood, or their enterprise. So- called waste materials may serve as a crucial resource within households. 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. In short, there is a gendered definition of "waste" and of "resources", which must be reflected during any discussion of priorities regarding waste management in the community consultation process (Muller and Schienberg, 1998).

Similar issues are at stake in the field of gender and the rural environment Guijt (1994) adjusted to the urban setting, the key questions are: - What natural and social resources are important in local livelihoods? - Who uses which resources? - Who controls decisions about how resources are used? - Who is helping to sustain local resources and who benefits from this? - How is the situation changing? Answers to these questions must be sought through participatory research in the very beginning of waste management projects.

2.1.3 Urban Centre

Waste is mainly a by-product of consumer-based lifestyles that drive much of the world's economies. In most cities, the quickest way to reduce volume of waste is to reduce economic activity which is not generally an attractive option. Solid waste is the most visible and pernicious by-product of a resource-intensive, consumer-based economic lifestyle (Hoornweg and Bhada-Tata, 2012).

Solid waste is generally considered an 'urban' issue. Waste generation rates tend to be much lower in rural areas since, on average, residents are usually poorer, purchase fewer store-bought items (which results in less packaging), and have higher levels of reuse and recycling. Today, more than 50 percent of the world's population lives in cities, and the rate of urbanization are increasing quickly. This will add challenges to waste disposal; citizens and corporations will likely need to assume more responsibility for waste generation and disposal, specifically, product design and waste separation. Also likely to emerge will be a greater emphasis on 'urban mining' as the largest source of materials like metal and paper may be found in cities (Hoornweg and Bhada-Tata, 2012).

Solid waste is inextricably linked to urbanization and economic development. As countries urbanize, their economic wealth increases. An increase in the standards of living results in a corresponding increase in the amount of waste generated. It was estimated that at present almost 1.3 billion tonnes of municipal solid waste (MSW) are generated globally every year or 1.2 kg/capita/day. The actual per capita rates, however, are highly variable, as there are considerable differences in waste generation rates across countries, between cities, and even within cities (Hoornweg and Bhada-Tata, 2012).

2.1.4 Solid Waste Generation, Collection, Transportation and Disposal

Waste generation is primarily a function of people's consumption patterns and thus is based on their socioeconomic characteristics. Low income groups and the very poor typically generate low volumes of organic waste. In Tashkent, Uzbekistan, for example, there is little food to go around and the parts that are not consumed by the household members are used for the domestic animals or composted to amend the garden soil. Those who are somewhat better off may share leftovers as well as old clothing with those needier (Bernstein, 1999). In other word, Human activities create waste, and it is the way these waste are handle, stored collected and disposed of, which can pose risks to the environment and to public health. In urban areas, especially in the rapid urbanizing cities of the developing world, problems and issues of municipal solid waste management (MSWM) are of immediate importance. This has been acknowledged by most governments, however rapid population growth overwhelms the capacity of most municipal authorities to provide even the most basic services.

The economic activity within a settlement and the expectation of the community are also import factors. For instance, small communities that have little more than tourism to market have more to lose from the accumulation of waste in their street corners than the larger cities. Their

citizens, youth groups, and the tourism industry actively participate in beach clean-up programs and other campaigns to keep their towns clean. Local enterprises (for example, hotels, and restaurants) that generate much of the waste at the peak tourist season also agree to subsidize the household sector to secure the flow of tourists. At the same time, waste generation is influenced to an important degree by people's attitudes toward waste: their patterns of material use and waste handling, their interest in waste reduction, the degree to which they separate wastes, and the extent to which they refrain from indiscriminate dumping and services (Bernstein, 2004).

Despite the increase in awareness, waste management system in many third world cities is seriously challenged (Tevera *et. al.*, 2002). In the late 1990s, it was estimated that each person in the world generated 200 kg of solid waste per year (UNCHS, 2001) and this was expected to increase with the growth in population. It is estimated that in 2006 the total amount of municipal solid waste generated globally reached 2.02 billion tonnes, representing a 7% annual increase since 2003. It is further estimated that between 2007 and 2011, global generation of municipal waste would have risen by 37.3%, equivalent to roughly 8% increase per year. Based on reports from its participants, The Basel Convention estimated that about 318 and 338 million tonnes of hazardous and other wastes were generated for 2000 and 2001 respectively (Global Waste Management Market Report, 2007).

In municipal solid waste management (MSWM) of developing countries five typical problems area can be identified: Inadequate service coverage; Operational inefficiencies of services; Limited utilization of recycling; Inadequate management of non industrial hazardous waste, and; Inadequate land equate landfill disposal.

Open uncontrolled dumping is still the most common method of solid waste disposal in most developing countries. Although the environmental consequences are often quite evident,

the problem is seldom dealt with. Reasons for not dealing with the problem are low political priority, inadequate resources allocated, and/or missing know-how regarding alternative solutions for operating and managing a landfill/dump. Many examples are given of cities in Africa where uncollected and illegally dumped waste constitute problems of human health and environmental degradation. This scenario places the already-desperate urban councils in a difficult situation especially as they have to develop new strategies to deal with increasing volumes as well as strange varieties of wastes (Barise, 2001).

Literatures revealed that in many parts of the world, there is a clear ethnic, caste, or class dimension to people's participation in the collection, sorting and trading in waste. In Istanbul, for instance, gypsies (that is, *Roma*) have traditionally collected and traded in waste (Kudat 1988). In several countries of South Asia, sweepers and garbage sorters come exclusively from low caste groups. Aging is also emerging as a critical problem in MSWM (Bernstein 1999). In many nations of Eastern Europe and most countries of the former Soviet Union (FSU) population aging is rising. In some cases, over a quarter of the population are older than 60 years (Kudat and Youssef 1999). Even when they generate low volume of solid waste, elderly people face special problems**.** For example, they often do not have easy access to a waste collection bins or have difficulties paying for the waste collection services. In some countries, the poorest segments of the elderly population (mainly abandoned single elderly) collect food from waste bins, thus facing serious health risks. In other situations (e.g., in Mongolia) there are many elderly individuals who collect recyclable items (cans and bottles) for cash. For many of them, collecting waste is the main source of income (Bernstein, 2004).

Waste collection systems are totally lacking in the informal housing areas in Karachi (Pakistan) (as they are not connected to the public road system); there is almost no equipment

whatsoever, and public or private dump-sites are few and far between. This encourages people to dump their refuse along the roads, outside the homes, in the courtyards, in the rivers. As a result, uncontrolled dumps – affects environmental aesthetics and presents unhealthy condition thus if not controlled will continue to grow in number (Bulle, 1999).

In Dakar (Senegal), the municipal authorities entrust all refuse collection services to private operators, who in turn delegate preliminary collection jobs to micro and small enterprises (MSEs). There are 140 of such organizations in charge of sewer and street cleansing, and preliminary collection in informal housing areas; they have joined to form a federation (Bulle, 1999).

In Bamako, in areas without coverage by municipal services, refuse collection is directly entrusted by the municipality to the micro and small enterprises, under the terms of a municipal ordinance defining collection zones and fees. Bamako has 60 MSEs in the field of cleansing alone, only half of which are reported to be operational. They, too, have formed a federation to defend their common interests (Bulle, 1999).

Some forms of participation exist regardless of management tools (MSEs, district committees, etc.). For example, people (particularly women, as in Bamako or Cebu City) spontaneously take initiatives for clean-up activities, health care and sanitary awareness that are not carried out in any formal structural framework. On the other hand, some micro and small enterprises start their own preliminary refuse collection without allowing any means of control to residents, since no social mechanism has been created for consultation on the performance of the MSEs (as in MSE "Les Linguères" in Dakar) (Bulle, 1999). Several states in Nigeria are coming up with various means of waste collection 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 (Agunwamba *et al*., 1998). Willingness to pay for waste management services or facilities is very important to the success of the private sectors' participation (PSP) in (SWM) program. The willingness to or not to pay could have direct impact (positive or negative) on the reliability and success of any solid waste management strategy (Epp and Mauger, 1989; Rahman *et al*., 2005; Holland and Rosenberg, 1996; Merton, 1968; Fullerton and Kinnaman, 1995).

Industrial establishments present special problems regarding waste disposal patterns due to the volume and/or the occasionally hazardous nature of the generated wastes. While regulation and control measures should be employed as far as possible, low income countries commonly have limited enforcement capacity and tend toward many small industrial establishments (versus a few large ones) (Bernstein, 2004).

Only a small amount of the tropical region of Africa's waste is disposed of in sanitary landfills; most is deposited in open dumps or semi-controlled unlined landfills with no groundwater protection, leachate recovery, or treatment systems. The larger dumps are located on the edges of cities, towns, and villages, sometimes in ecologically sensitive areas, or areas where groundwater supplies are threatened. They serve as breeding grounds for rats, flies, birds and other organisms that serve as disease vectors. Smoke from burning refuse may be damaging to the health of nearby residents and the smell degrades their quality of life (USAID, 2009).

Currently in Nigeria, household waste of different sources are mixed and co-disposed without any form of segregation and sorting (Longe and Williams, 2006). In Nigeria, Open dump of solid waste is a common practice. While some employ the service of streams to transport their solid wastes out of their sight, some directly dump their solid wastes by the road sides. In some part of Nigeria, refuse is generally buried, though some heedless burning is sometimes observed.

Several Nigerians have considered it a cheap way of disposing off their solid wastes by setting the mixed wastes on fire in a little corner in their backyard or in a very open place (Igoni, *et al.,* 2007). Folorunso and Awosika (2001) related flooding in Lagos to clogging of drainage channels by dumped solid wastes. There is abundant release of gaseous toxic substances into Nigerian environment as well as jeopardizing of health of scavengers as a result of burning of obsolete e-wastes. Due to contact with smokes from burning of solid wastes and gaseous emission from dumpsites, cases of several diseases have been recorded (Oyelola *et al.,* 2009; Delgado *et al*., 2007; Huhtala, 1999; Macawile and Sia Su, 2009; NERHA, 2006). The proliferation of litter in the towns and cities of Jamaica often result in clogged drainage systems which further leads to flooding. Ground water and surface water sources can be compromised, and soil and air pollution results from poor solid waste management practices (Bertrand and Mullainathan, 2001).

Consequently, throughout Liberia waste disposal activities are focused on a small number of dump-sites, the majority of which are inappropriately located within wetlands and swamps, such as the Fiamah Site that services much of Monrovia, *The Boulevard* in Congo Town, and the dump-site located within the town of Kakata (UNEP, 2007).

Gage (1998) in a containerization study conducted in Jamaica revealed that in the low-income areas any convenient container was typically used, including small plastic bags, milk crates, five gallon pails, and cardboard boxes. On the other hand, in the middle and high-income communities, welded expanded metal receptacles located at the curbside were used to store bagged waste until collection occurred. Solid waste problems are exacerbated when the collection cycle does not match the disposal cycle dictated by the storage container, leading to the use of unsustainable disposal methods such as illegal dumping and burning. Plastic bags, if

used alone and not collected frequently, are vulnerable to scavenging animals, like dogs and rats that break open the bags in search of food and thus scatter the waste (Gage, 1998).

Jenkins (1993) developed a model where households maximize utility which depends positively on the quantity of goods consumed and negatively on the amount of recycling. Included in the household budget constraint is a disposal charge for SWS. Other variables that affect the demand for SWS are: the household income, the prices of goods consumed the payment for recycled items, the size and age distribution of the household, weather conditions and the degree of urbanization. She empirically tested the resulting demand equation for data from nine communities in the USA. Five of these had a volume-based fee and the other four had the usual flat fee system. The model relates the average quantity of household waste discarded per capita per month in an area to the averages of the variables above. Income, high temperature, percentage of population aged 18 to 49 and population density all had a positive effect on quantity of waste discarded. The price for SWS, average household size and the price of recycled paper had negative effects. The price elasticity of demand for SWS is calculated as –0.12 and the welfare loss of not using unit pricing for an average US community to be about $125 per tonnes.

Hong *et al.* (1993) derived a household recycling choice model and a demand function for SWS and estimated these for a sample of households from the Portland, Oregon metropolitan area. Disposal fees are based on a block payment schedule for pickup of a specific volume at a given time interval. The demand for waste collection services is assumed to be a function of the incremental fee associated with contracting an additional bin for waste disposal and the opportunity cost of sorting waste into recyclables and non-recyclables, here equal to the female wage rate. The number of persons per household, education level, race and rent or ownership of their house was also assumed to influence the demand for SWS. The results indicate a positive

but small relation between an increased payment difference and the demand for the quantity of waste collected. The effect of income is also positive and significant but the relationship is inelastic. Of the other variables only the value of time and the education level were found significant.

The effectiveness of waste disposal initiatives can be improved through the incorporation of an understanding of gender differences and inequalities. Waste disposal projects can also provide support to women (especially if they are responsible for waste disposal) and ease their overall work burden through improved family health. Waste disposal initiatives can also contribute to gender equality through offering opportunities for women's increased employment (Woroniuk, and Schalkwyk, 1998).

2.1.5 Scavengers (Waste Pickers)

Waste picking is a widespread activity in nearly all cities of developing countries. Men, women and children survive selling or using valuables from materials that households and enterprises throw away, such as food, paper, scrap metals, cloth, household goods and building materials etc. Some waste pickers work at a single site that holds an abundance of waste, like dumpsites or transfer stations. Others move from place to place, collecting materials from factories, offices, stores, schools, hospitals and residential areas, and dumpsters, vacant lots, canals, and rivers where people dump their refuse (Bernstein, 2004).

Waste pickers are often regarded among the poorest of the poor. They are vulnerable because they have few assets and few alternative livelihood options if their earnings from waste picking are threatened. The vast majority are also independent, self-employed workers, so they have no social security or organizational support to help them through difficult times. In many countries municipalities take measures to formalize waste collection and recycling activities by

organizing the labour often in teams or enforcing registration procedures. However, waste pickers are not provided with any benefits, i.e. health insurance or personal security, thus remaining extremely vulnerable to variety of social and health risks (Bernstein, 2004).

Scavengers may be of any age. Many children salvage or collect recyclables to supplement the family income. Others are abandoned and are simply trying to survive. Many older people also scavenge. In the countries of the FSU, majority of waste pickers are represented by single elderly who became extremely impoverished as a result of transition. At large, more women scavenge than men. Often they are single mothers, who bring their children to work with them (Bernstein, 2004).

Changes in collection and disposal practices of solid waste management systems can profoundly affect waste pickers and their livelihoods. Closing existing dumps and opening new ones further away, and mechanizing collection can restrict if not eliminate many opportunities for waste picking, causing extreme hardship for people who are poor and vulnerable. Closing dumps can also displace families who cannot afford other places to live. Waste pickers are among the key stakeholders of MSWM systems (Bernstein, 2004).

2.1.5.1 Social Conditions of Scavengers

Social conditions for waste pickers are nearly always poor, even for those with earnings above the poverty level. Many live at the dump site or in squatter settlements just outside dumps. Their homes tend to be poorly constructed, often of scavenged materials. Their education levels and work skills are lower than those of the general population. In Mexico, for example, 40 percent have no formal education, another 10 percent have completed less than two years of school, and only 4 percent have completed elementary school (World Bank, 1994). However, in transition economies, many waste pickers come from different social and economic backgrounds

and are forced into scavenging as a result of dramatic loss on incomes and employment opportunities (Latvia Solid Waste Management Project, 2001).

Scavengers suffer many more illnesses and injuries than the general population. Particularly prevalent are gastrointestinal, respiratory and skin diseases, lead poisoning, and cuts from needles and broken glass. Child waste pickers are particularly at risk (Cointreau, 2000). Waste picking may permanently damage a child's intellectual, emotional, and physical development, condemning them permanently to poverty and shortening their lives. Studies of the health of children working at the now closed Smokey Mountain dumpsite in Manila, Philippines revealed that the child waste pickers were at extreme risk of long-term disease or disability. Many children had elevated blood lead levels, tetanus, gunshot wounds, impaired pulmonary function from exposure to extreme carbon monoxide pollution (25 times the national limit), and debilitating conditions such as stunting and wasting due to low calorie intake (Bernstein, 2004).

Moreover, children's intelligence declined gradually from ages 7 to 13 relative to the Filipino norm. The children were particularly disadvantaged in verbal ability, problem-solving, ability to absorb new material, and ability to plan ahead. Analyses suggested it was the work itself, which is dull and repetitive, and possibly physical factors such as malnutrition and lead poisoning that led to this outcome (Gunn and Ostos, 1992).Working in hazardous conditions has serious consequences for waste pickers. Life expectancy of Mexican waste pickers is 11 years lower than that of the overall Mexican population (53 versus 64) (World Bank, 1994). Infant mortality among the *zabbelin* waste collectors in Cairo is much higher than that of other residents of the city with about one in four infants dying before reaching their first birthday. Waste pickers also are faced with the public's perception that they are social outcasts, part of the marginalized segment of the general population (Medina, 1997).

2.1.5.2 Organization of Scavenging

Organization of waste picking varies greatly across cities. Waste picking may be an unorganized activity, with people moving freely in and out of the occupation as their individual circumstances change. For example, in Mexican cities many waste pickers are migrant farm workers working during the off-season and construction workers between jobs. The number of waste pickers in unorganized systems fluctuates depending on the season, changes in overall economic conditions, and changes in the prices of recyclables. For these casual workers, waste picking offers an essential safety net against absolute poverty (Bernstein, 2004).

Waste picking may also be a full-time, highly organized activity, with high barriers to entry. In Cairo rights to garbage historically belong to members of two communities, *wahis* and *zabbelin,* who established these rights through legal agreements forged more than a half century ago. They vigilantly defend their rights to garbage and its valuables through their community organizations, which operate much like trade unions (Bernstein, 2004). It may be controlled by organized groups of intermediaries who control access both to waste picking opportunities and to dealers of recyclables. In Beijing waste picking is under the control of a few men who migrated to the city a dozen years ago and established elaborate garbage networks based on personal connections to migrant waste pickers from the same province. Garbage picking is now the specialty of Bazhong County. One-third of its official residents pursue similar work in cities all over China (New York Times, 2000).

Finally, waste picking may be carried out by cooperatives of waste pickers, formed to improve incomes and quality of life of workers by strengthening their bargaining position relative to purchasers and by providing social services. The oldest and most dynamic waste picker cooperatives in the world today are in Colombia. The cooperative movement is also

strong and growing in Brazil, Mexico, India, Indonesia and the Philippines. In some countries, municipalities take actions to formalize waste collection and recycling activities by formalizing the work or enforcing registration requirements (Medina, 1998).

The form of organization that waste pickers belong to greatly affects their incomes and quality of life. Those in unorganized systems earn low and highly variable incomes depending on their individual effort, competition from others and luck. In Mexico City, waste pickers earn ¼ to ½ the minimum wage of its economy (World Bank, 1994b). Waste pickers in more organized systems earn higher incomes. For example, *zabbelin* in Cairo earn 1 to 5 times civil servants' salaries. Members of cooperatives generally earn more than waste pickers that are not part of such an organization (Medina, 1997).

Members of a cooperative in Colombia (60 percent of them women) earn 1.5 times the minimum wage, members of a coop in Brazil earn twice the minimum wage, and members of a coop in Juaréz, Mexico earn 2 ½ times the minimum wage (Medina, 1998). Waste pickers that belong to an organization also often benefit from services not available to independent workers. Members of the *Cooperativa Recuperer* in Medellin, Colombia have life and accident insurance, and are eligible for loans and scholarships from the coop (Medina, 1998). Members of the *Sociedad de Selecciones de Materiales* (Socosema) in Juarez, Mexico can participate in training and formal education programs sponsored by the coop, and have access to health care and legal protection (Medina, 1998).

It should be noted however that integrating informal recycling into the formal system may increase the vulnerability of waste pickers. For example, formal systems rarely employ as many people as work on a freelance basis. Women in particular are likely to drop out when informal activities become legitimized, formalized and the subject of employment or commercial

contracts (Scheinberg, *et. al.,* 1999). The Self Employed Women's Association (SEWA), an NGO in Ahmedabad, India, has helped in organizing women engaged in paper and rag picking and safeguarding their interests from the clutches of the paper contractors and middlemen. SEWA has helped these women in setting up their own *godown* from where they sell collected waste paper directly to the mills. SEWA's efforts have not only safeguarded these women from the drudgery and dangers of work but also have increased their income by eliminating the middleman. This has also improved the status of women by making them organized workers who sell paper/rag directly to the mills through its own cooperative. (Scheinberg, *et. al.,* 1999).

In Metro Manila an estimated number of 17,000 people make their living as dump site scavengers (CAPS, 1992). The number of waste pickers in Bangalore is estimated to range from 20,000 to 30,000 (Baud *et al.,* 1994). In Cairo more than 400 small plastics reprocessing enterprises exist, which recycle approximately 70% of the waste plastics generated (EQI, 1991). Over 20,000 women work as paper pickers in Ahmedabad (Bentley, 1988).

2.1.6 Reuse and recycling

Recycling and composting are technological strategies to waste management, whereas source reduction relies heavily on behavioral change. Recycling and source reduction are two different forms of conservation behavior (Ebreo *et al.,* 1999), but research has shown that individuals view recycling as a source reduction strategy, not a separate waste reduction strategy (Ebreo and Vining, 2001). In comparisons of waste reduction methods, one behavior has been found to not be a sound predictor of another behavior, and that each behavior is influenced by different variables (Ebreo and Vining, 2001; Oskamp *et al.,* 1991).

Poverty, ethnic background, culture and traditions, gender, and age are all important social considerations in the extent of waste recycling. They are also important in the design and

implementation of newly established recycling programs. The poor not only generate a very low volume of waste but also recycle it. The poor also generate income from recycling efforts by sorting the waste, by collecting already sorted waste, by marketing the separated waste, and often by clothing or even feeding themselves with waste. Women's groups have been particularly active in promoting recycling and encouraging women to start small-scale businesses using recycled materials (Bernstein, 2004). Because there is income to be generated from solid waste, dump sites in many countries are controlled by the "garbage mafia" with pre-established power relationships with the scavenger groups. In Tashkent, for instance, control over the waste had for a short period of time become the object of competition between various groups after the transition (Expert Center for Social Research, 1999). While the city's efforts to upgrade the solid waste management system subsequently interfered with the waste picking operations at the landfill, opportunities were created for the pickers to find alternative sources of income (for example, some were hired by the recycling centre located near the landfill, others hired to carry out manual labor at other waste facilities). Because curtailing informal waste recycling can threaten the incomes of the very poor and disrupt their fragile social networks, measures to assure alternative livelihoods, and in some cases, hold communities together, could be essential (Bernstein, 2004).

The emergence of biodegradable solid waste in the production of organic fertilizer and possible use in the production of biogas. (Yusuf and Oyewumi, 2008) revealed that there's actually a great potential in Nigeria's municipal solid wastes to produce enormous amount of methane gas. Mixtures of manure and ashes from burning of urban solid wastes have been used for soil amelioration to boost agricultural productions in Jos (Pasquini and Alexander, 2003). Abeokuta alone generates 2 288m^3 of wood wastes per day from saw mills activities (Aina,

2006).If each state in Nigeria generates equal amount of wood wastes, then 82 368 m^3 of wood wastes will be generated in the country per day, and 30 064 320 m^3 annually. Resource from wood wastes alone could meet more than Nigeria's needs in the wood-based raw materials for such industries as potash industry, since African wood species have been studied to have potentials for generating good amount of potash (Adewuyi *et al.,* 2008).

Troschinetz (2005) investigated recycling of municipal solid waste in developing countries; the author identified twelve factors influencing sustainable recycling in developing countries, while considering the three dimensions of sustainability – environment, society, and economy. The factors were derived from quantitative and qualitative examination of twenty-three case studies of developing countries. The factors were then subjectively designated as either a barrier against or an incentive toward recycling, based on interpretation of statements made in the individual country-specific case studies. The twelve factors identified are: Government Policy, Government Finances, Waste Characterization, Waste Collection and Segregation, Household Education, Household Economics, Municipal Solid Waste Management (MSWM) Administration, MSWM Personnel Education, MSWM Plan, Local Recycled-Material Market, Technological and Human Resources, Land Availability. Based on the interpretations made by Troschinetz (2005) of the study conducted by Pendley (2005), only two of the twelve factors were considered to be incentives to recycling in Jamaica, namely *Government Policy* and *Government Finances*. Whereas five factors were seen to be barriers to recycling, including *Waste Collection/Segregation, Household Education, MSWM Administration, Local Recycled-Material Market*, and *Technological & Human Resources*, the remaining five factors were not apparent in the literature source and thus were not included in the results for Jamaica (Troschinetz, 2005 :37). Troschinetz (2005) suggests that recycling may not be the best option

for Jamaica at the present time based on the presence of few existing incentives. Except composting, since about 50% of household waste is organic material (Pendley, 2005).

In Pune city (India), rag pickers collect solid waste from homes and streets. Street sweepers also collect waste while sweeping various streets. Rag pickers visit every day to different households and collect waste and segregate it. These waste pickers consist of male, female and children of different age groups (Rode, 2011). Sterner, and Bartelings, (1999) researched on Household Waste Management: Determinants of Waste Disposal, Recycling and Composting in a Swedish Municipality. The authors revealed that on average people claimed that they were composting 75% of their garden waste and 60% of their kitchen waste. 11% did not do any composting at all. The majority of the respondents gave as reason for this: lack of space or that they had not yet bought the necessary equipment, but were planning to do so.

Figueroa (1998) illustrates that in Canada, savings have been realized in both the economic and environmental realms within the solid waste management sector by the utilization of backyard composting.

Based on the aforementioned solid waste activities women engaged in from literatures, Sokoto metropolis is not an exception their participation in solid waste management ranges from; sweeping of public/private streets, cleaning of public and private institutions, house to house cleaning of the environment, picking of recyclable i.e. plastic bottles, cans, scrap metals, aluminium, bottles, rubbers etc. in order to earn a living. Pockets of women cooperative were also identified within the study area.

2.2 STUDY AREA

Sokoto metropolis is currently the capital city of Sokoto state, which is located in the North-West geo-political zone of Nigeria within latitude 13° 3’ 49’’N, longitude 5° 14’ 89’’E

and at an average elevation of 272 m above sea level. Sokoto metropolis comprised of a number of local administrative units (local governments): Sokoto North and South as well as some parts of Kware, Dange-Shuni and Wamakko local government areas (Bello and Kamariah, 2012). It is linked to other parts of the country via three major routes converging in the centre of the city. Two south bounds and one north bound, one of the South bound routes connect Sokoto with Ilorin, Ibadan and Lagos via Jega and Yauri while the other route link it with Kaduna, Kano and other Northern Cities via Gusau, Funtua and Zaria. The north bound route extends up to the neighbouring Niger Republic through Illela (Bala, 1987) (see figure 1.0).

2.3 THE PHYSICAL FEATURES OF SOKOTO

2.3.1 Climatic Condition

In terms of climate, Sokoto is largely influenced by the interactions between two air masses: the tropical maritime air mass from the Atlantic Ocean and the tropical continental air mass from Sahara Desert. The climate is characterized by rapid changes in temperature and humidity. Temperatures are generally high in the months of March-May, with highest recorded mean monthly temperature of about 40°C in April (Ayoade, 2004). The lowest temperatures occur in the months of December and January due to the influence of harmattan. Seasonal rainfall prediction by NIMET (2013) shows that the northern Nigeria region will have a range of mean annual rainfall that is between 300mm- 1200m. The relative humidity is very high during rainy season reaching about 65 to 70%.

Sokoto is in the dry Sahel savannah vegetation pierced by loam to sandy terrain, dispersed shrubs and isolated hills. The rainy period is usually from June to September or sometimes October. The average annual rainfall is 550 mm with peak in the month of August

(SRRBDA, 2007). The highest temperatures of 45 to 47°C during the hot season are experienced in the months of March and April. The prevalence of the tropical continental air mass (North east trade winds) is experienced between the months of November and February which brings about cold, dry, windy and dusty conditions in the city (Bello and Kamariah, 2012).

The wind direction changes with the changing seasons. In the rainy season between April and September, the prevailing winds blow mainly from the south west direction, with secondary winds coming from the west. The normal wind velocities range from one to ten knots with occasional gust up to forty knots.

During the dry season which last between October to March, the dust laden easterly harmattan winds become most prevalent. The secondary winds blow from the North east direction (Bala, 1987).

2.3.2 Topography

The topography of the urban area can be divided into four main physiographic zones:

(i) The Sokoto and Rima River Valleys and Flood Plains.

(ii) Major tributary valleys.

(iii) Sandy plains.

(iv) Undulating upland plains and ridges.

The Sokoto and Rima river valleys and associated flood plains form the most visible topographic features of the area. The two rivers join about 8 Kilometres North West of the city. The width of the flood plain varies between 1 and 3 Kilometres, the greatest width being at the

confluence. These flood plains consist of alluvial deposits transported and deposited during the rainy season, 40 percent to 50 percent of which occurs during August of each year.

There are many seasonal tributaries that flow down from the surrounding upland areas to join Sokoto Rima valleys. Some of the larger ones are up to 5km wide and retain flow all year round. During the rainy season, these valleys act as drainage channels transporting large body of water and sediments into the main river system.

The sandy plains constitute the largest part of the urban area and generally lie between 250 and 300 metres above sea level. They consist of a layer of sand under which lies an impermeable layer of laterite.

The undulating upland plains and ridges exist to the North west and South east of the urban area. The general elevation of the plains is about 270-275 metres with hills rising to about 300 metres. The plains are dissected by seasonal water courses. The top of the hills are in most cases capped with laterite soil.

2.4 POPULATION

The population of Sokoto according to the 2006 census figure is put at 427, 760 (NPC, 2009). This figure makes Sokoto as one of the most populated urban centre among the north-western states in Nigeria. This population is shared by the twenty three local government areas of Sokoto state, the total population of male to female and both are as shown in Table 3.1. Due to the fact that official population assessment in Nigeria reflects administrative boundaries rather than settlements, this population figure also captures rural areas that are at the periphery but whose jurisdiction falls within Sokoto state.

Table 2.1: Population of Sokoto

Sex					Total population	Total
	Male	(%)	Female	(%)	Both sexes	(%)
Total	1,863,713	50.3	1,838,963	49.7	3,702,676	100.0

Source: NPC (2009).

2.5 URBAN STRUCTURE OF SOKOTO

Local inhabitants comprises mostly of Hausa/Fulani and other groups such as Gobirawa, Zabarmawa, Kabawa, Adarawa, Arawa, Nupes, Yorubas, Ibos and other migrants. The predominant language is Hausa. A common feature of cities in northern Nigeria is a defensive wall and a number of city gates denoting entry points from other neignbouring areas. In sokoto, the wall is presently non-existent. However, almost all the known gates have been preserved at their original locations which show a good indication of how rapid the city sprawls: the old city centre surrounded by the gates only represents a small proportion of the city at present.

The predominant architecture in the city is currently a mixture of modern buildings in a traditional context, reflecting the prevailing physical and economic conditions of the residents. Privacy in housing is important to the city dwellers. As such therefore, even the modern or semi-modern houses reflect the traditional concept of privacy.

2.6 SOCIO-CULTURAL CHARACTERISTICS

Occupation of city dwellers includes trading, commerce, domestication of animals with a reasonable proportion of the population working in private and public sectors. Population of farmers is on a decline (Bello, 2006).

Majority of the city's population are muslims. It is therefore not uncommon to observe several mosques located around the entire city. Historically, Sokoto used to be the centre of the established political empire after the 1804 "Jihad" of Shehu Usmanu bin Fodiyo.

Common local entertainment sports (although not very active nowadays) include *dambe*, *Kokawa* and *sharo*. The nearby Argungu town is also famous in the annual fishing festival on the Rima River which passes through Sokoto metropolis. Because of the semi-arid nature of the city, a number of dry climate animals can be raised. Camels are still a common mode of transport particularly at the time of crops harvests.

Many cities world over have recognized the potential of preserving their historic traditions. This not only provides such cities with economic opportunities to be visited by tourists, but also created an interest for digging and therefore preserving their histories. Examples of such cities include Timbuktu (in Mali), Roma (in Rome) and Melaka (in Malaysia). Sokoto is also one of such cities as it is still an attraction city to several visitors from within and outside Nigeria particularly to the famous *Hubbare* of Shehu Usmanu bin Fodio. The political history of the city as the centre of the then caliphate also attracted the attention of a number of historical writers (example, Jean Boyd) (Bello and Kamariah, 2012).

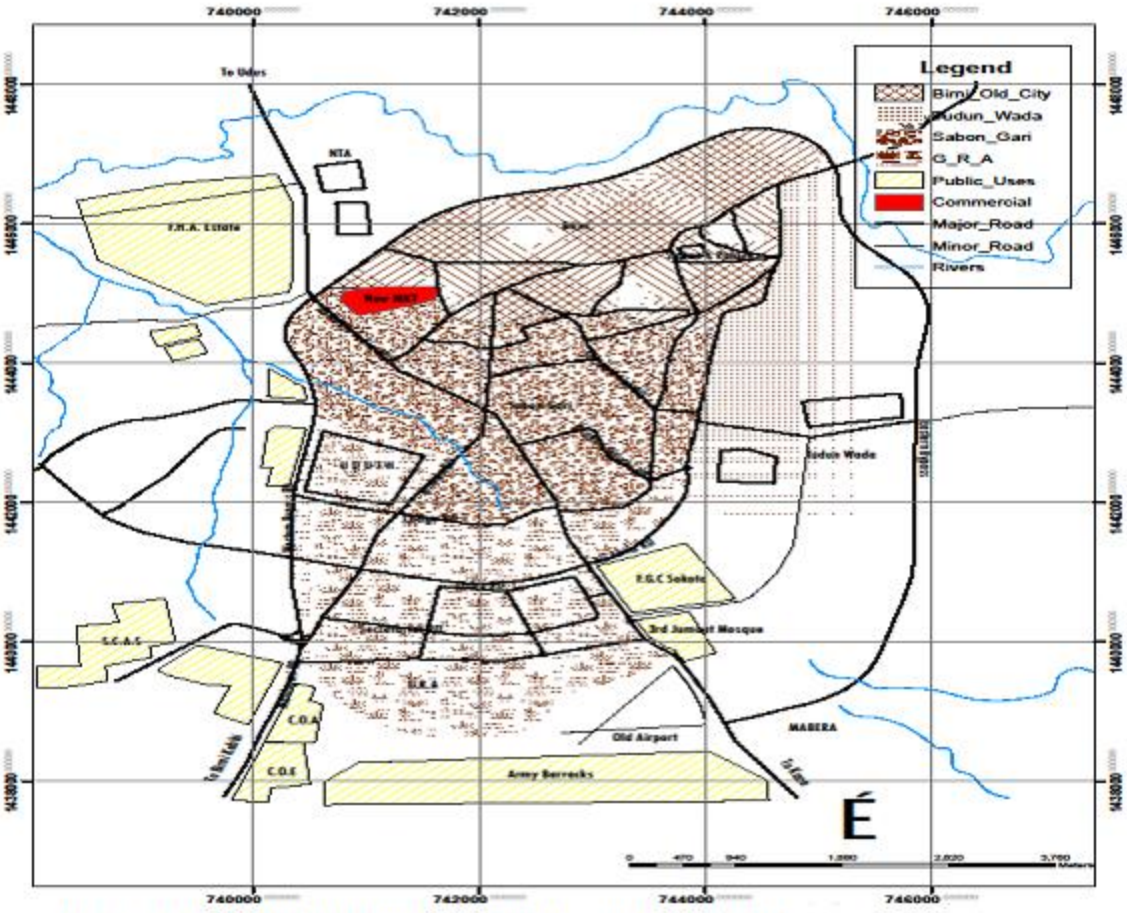


FIG.3.1 : SOKOTO METROPOLIS SHOWING THE STUDY AREA
Source: Satellite imagery from Google Earth

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 METHODOLOGY

This section discusses the various methods that were employed in generating data for the study. It focuses on the types of data needed, the sources of data, the sampling design, and the methods of data analysis. Reconnaissance survey was conducted to generate information on the following: the main data collected included solid waste management activities, means of conveying solid waste materials, SWM union or organization among others in the study area.

3.1.1 Data Required and Sources

To achieve the objectives of the study, the types of data required and used are listed in table 3.2 and were sourced through two main sources: Primary and secondary sources.

3.1.1.1 Primary Data

The primary data will be sourced from field surveys using questionnaires and field observation. Questionnaires were administered to women participating in solid waste management. Interviews were also carried out with staff of the various establishments or agencies responsible for solid waste management within the study area.

3.1.1.2 Secondary Data

The secondary sources of data were sourced from existing empirical studies on solid waste management, data, maps, records, published and unpublished literally material such as articles, journals, seminar papers, thesis, and government report on solid waste, gazettes, and

internet sources and other necessary information from the ministry of environment and Sokoto state urban and regional planning development authority.

Table 3.1: Data required and sources

	Data	**Sources**
1	Base Map of Sokoto	Min of Land and Housing
2	Environmental Policies	Min of Environment, SEPA.
3	Solid Waste Management Practice	SEPA.
4	Location of Dumpsite	SEPA.
5	Socio-economic characteristic of the population	Households
6	Informal Women group Participation in SWM	Household Heads.
7	Formal Agency responsible of SWM	Min of ENV,SEPA,SURDA

Sources: Field Survey, Researcher, 2011

3.1.2 Survey Instrument

Since the aim of the survey is to analyze women's participation in waste picking and how to incorporate them in solid waste management of Sokoto metropolis; the respondents for which questionnaires were administered include:

3.1.2.1 Institutional Survey

This survey type targets institutions responsible for the solid waste management within the study area. The survey was conducted to determine the pattern and the process of women participation in waste picking and how to incorporate them in solid waste management within Sokoto metropolis and also solicited information on the various women organization and management activities of solid waste.

3.1.3 Data Collection Procedure

3.1.3.1Sampling Frame

Sokoto metropolis is made up of five districts, which are Birni (old city), Tudun wada, Sabon gari, G.R.A, Mabera and other peri-urban settlements. It is from these districts that samples were drawn for this study. Each district is made up of a number of settlements or neighborhoods and collectively has a total population of 1,838,963 females (NPC, 2009). It is important to note that the author was faced with difficulty in obtaining relevant data that captures strictly women participation in solid waste management in Sokoto metropolis.

3.1.3.2 Sampling Technique and Sample Size

Based on the reconnaissance survey and the conviction that there were fewer women solid waste participants at the GRA but more number at Birni (old city), Mabera and other per-urb settlement, Tudun Wada and Sabon Gari, a proportionate sample size was decided. Consequently, a total of 328 respondents were interviewed using structured questions. The respondents comprised sixty one (61) of women solid waste participant at Birni (old city), 137 at Mabera and other per- urb settlement, 58 at Tudun Wada, 51 at Sabon Gari, and 21 women solid waste participants at GRA. Using these procedures a total of 328 persons (women) were considered as an appropriate sample size. In addition, field investigation revealed that majority of Women hand pickers were non-organized thus there was difficulty in accessing data on Women participants on hand picking in Sokoto metropolis.

A non-probability sampling technique such as purposive sampling was used in identifying individuals to administer questionnaire to and to be interviewed. These sampling techniques were appropriate given their strength in identifying unique and informative cases (Neuman, 1997; Bernard, 2002).

Furthermore, with the purposive sampling, personal judgment was used to select cases that will best meet the research questions and objectives (Saunders *et. al.,* 2003). The researcher selected informants who are knowledgeable about the issues being investigated, willing to talk and representative of the range of points of view (Rubin and Rubin, 1995). In line with Schutt's (2006) approach, areas with more respondents attracted more questionnaires. The reason for this decision is to avoid shortage in one area and surplus in another. The researcher was assisted by five field assistants. This was done by identifying convenient time when the women solid waste participants, could be met at their work place for the administration of the questionnaire.

Table 3.2: Clusters and Selected Neighborhood in the Study Area.

Cluster	**Neighbourhoods**	**Sampled Neighbourhood**
Birni (Old City)	Gwamatsi,Kamata,Dundaye, Gumbi,kufar atiku, Kufar Rini, Gawun Nama, Gidan Kaya,Gidan Yaro.Dandima,Tsuhun kasuwa	Dandima, Dundaye, and Kufar Rini
Tudun Wada	Minanata, Fakwan Idi, Barayar Zaki, Rigiyan Shehu, Rijiya Mai Ruwa, Kaura,Gyidawa.	Barayar Zaki, Rigiyan Shehu, Kaura and Gyidawa.
Sabon Gari	Sahara,Ung/Malamai, Emire yahya, sabon gari.	Sahara,Ung/Malamai, Emire yahya,
G.R.A	Bado, Samma, Yawuri Flat,Kasarawa, Gwiwa Area, Bafarawa Estate, Commissioners Quarters.	Bado, Yawuri Flat, Commissioners Quarters Bafarawa Estate and Bafarawa Estate.
Mabera & Other per-Urban Settlement	Mabera Jailani, Mabera Idi, Shuni, Mana Karama, Mana Bubba, Gagi, Kantin Sani, Wajaki, Nakasari, Tamaji, Salami	Mabera Jailani, Mana Karama, Gagi, Wajaki, Nakasari and Tamaji.

Sources: Field Survey 2012

3.1.4 Techniques of Data Analysis

The data was analyzed using simple descriptive statistical techniques (such as frequency analysis, percentage distribution, and means scores of participate of women by age, education and income etc). Also Microsoft excels and SPSS will be employed for the detail analysis and the interpretation of the data where applicable. The study also established participation in terms of who, where and type, Benefit-income, education and the type of employment etc. and nature of participation and size of income or group. These actually brought out the desired result. The analyzed data were presented in graphs, tables, maps, and charts of various types. These statistical techniques were adopted to analyze the responses generated during the study.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.0 INTRODUCTION

Women involvement in waste picking among other solid waste management activities is diverse and will be interesting to know them. In addition, means of conveying solid waste materials collected; level of women participation in solid waste management; extent of waste sorting among households; average income generated from waste by solid waste participants; various benefits derived from solid waste activities; waste management enterprises and job creation; health implications as a result of solid waste among others. Detailed discussion on women participation in solid waste management was made. Based on the analysis, wealth creation in both cash/kind and a reduction in the quantity of solid waste on the environment were identified.

4.1 SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS

A total number of 328 households especially women were involved in the study. Their socio-economic characteristics have inference on solid waste management and were discussed under age, marital categories, educational and family size. Other issues are average income and ethnic composition.

4.1.1. Age of respondents

The study established that majority of the women involved in solid waste activities about 40.2% within the six districts namely; Birni (old city), Tudun wada, Sabon gari, Government Residential Area (GRA), Mabera and Dundaye of Sokoto metropolis were between 26-35 years

old. Those between 36-45 years and 10-25 years account for 25.6% and 22.3% respectively, while the least is 11.9% which covers 46 years and above. While all age groups are represented, the majority are adults, accounting for nearly half of the sampled population (Table 4.1).

Table 4.1: Age of respondents

Age	No. of respondents	Percentage (%)
26-35	132	40.2
36-45	84	25.6
10-25	73	22.3
> 46	39	11.9
Total	**328**	**100**

Source: Field survey, 2012

4.1.2 Marital status of respondents

Figure 4.1 shows the marital status of the respondents. It shows that about 176 (53.7%) were married which dominate the waste management entrepreneurs (WMEs) activities in the study area. A total of 79 (24.1%) were divorced where by 16.2% were widowed and 6.1% said they were single. The marital categories when examined in line with age reveal the adult and in turn youthful nature of those participating in solid waste management.

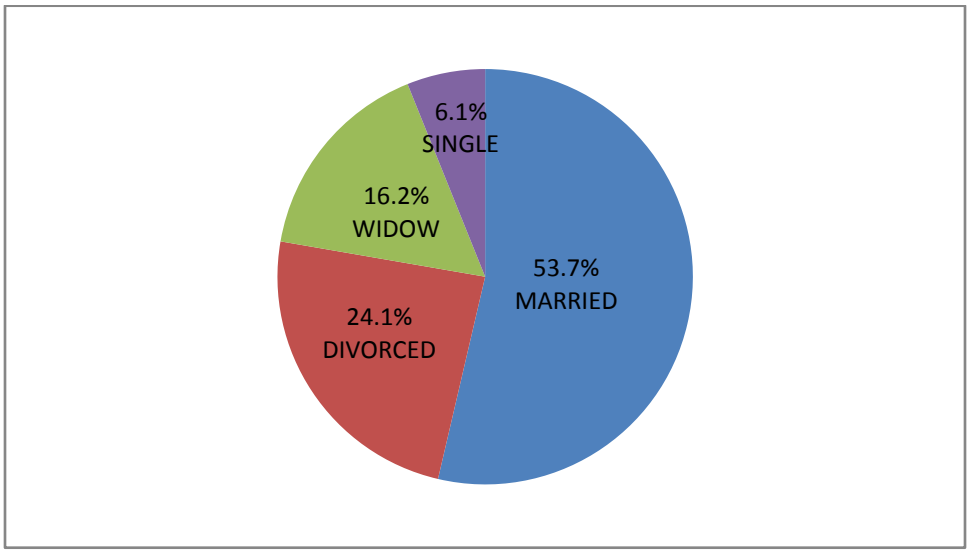


Figure 4.1: Marital status of respondents

4.1.3. Occupation of respondents

Occupation categorization in Table 4.2 revealed that petty trade is the major occupation in the study area, with 38.4%. The high proportion of this occupation perhaps signifies the increasing number of unemployment in Sokoto metropolis. Others (full time house wife and cleaner both in private and government institutions) is next in terms of proportion in the study area which accounts for 22.6% while another form of occupation is civil servant having about 20.1% of respondents and lastly business accounted for 18.9%. Civil servants being third in terms of proportion shows gender disparity on the part of private and government institution as regards employment, couple with the fact that the institutions are inadequate.

Table 4.2: Occupation of respondents

Occupation	**No. of respondents**	**Percentage (%)**
Petty trade	126	38.4
Others	74	22.6
Civil servant	66	20.1
Business	62	18.9
Total	**328**	**100**

Source: Field survey, 2012

4.1.4. Ethnic group of respondents

Ethnic group categorization in Table 4.3 revealed that Hausa/Fulani is the major ethnic group as regards women in solid waste management activities, with 60.4 %. The high proportion of these ethnic groups perhaps signifies their exposure to enormous wealth benefits attached to waste. Others (Igala, Ebirah, Nupe,Tangale, Bass-rige) is next in terms of proportion in waste business which accounts for 19.8%. Yoruba and Igbo accounts for 12.2% and 7.6% respectively, these groups are least and are not very familiar of the business with lack of interest in Sokoto

metropolis; even when involved they are usually engaged in scrap metal collection they are rarely found in sections like composting (i.e. bagging of solid waste from landfills).

Table 4.3: Ethnic group of respondents

Ethnic groups	No. of respondents	Percentage (%)
Hausa/Fulani	198	60.4
Others	65	19.8
Yoruba	40	12.2
Igbo	25	7.6
Total	**328**	**100**

Source: Field survey, 2012

4.1.5. Educational qualification of respondents

Figure 4.2 shows the educational qualification of women participants in informal waste management. It revealed that individuals involved in waste activity generally have low levels of formal education. In fact, 50.0% of the respondents claimed that their highest level of education is secondary education compared to 8.8% that has acquired tertiary education. Those with Quranic education accounts for 22.3%, while respondents with primary education were 18.9%.

This lack of formal education also predisposes them to making a living from these activities for survival. Generally, the low educational level of the respondents indicates that formal educational qualification is not a major determinant of being a participant in this type of business.

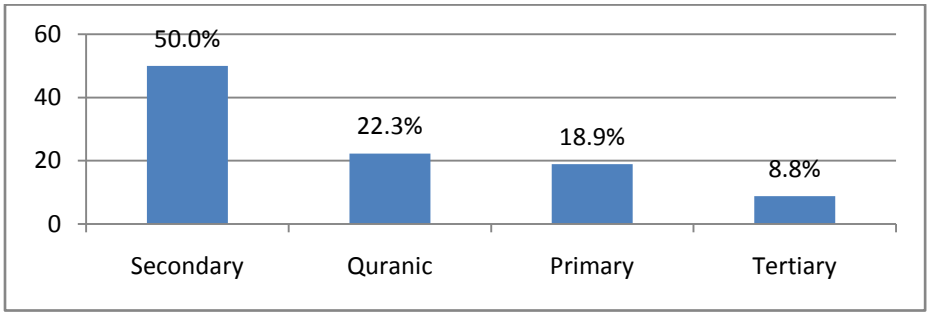


Figure 4.2: Educational qualification of respondents

4.1.6. Family size of respondents

The data presented in table 4.4 revealed that 28.7% of the respondents which are the majority have a family size of 5-6 children. 3-4, 7-8, and 1-2 family size accounts for 23.5%, 15.9%, and 7.3% respectively. Furthermore, about 16.2% of the respondents do not have children possibly they were not married, and the least family size 9 and above accounts for 8.5%. It is suggested that the large family size of most respondents forced a reasonable number of women into solid waste activities in order to support their family.

Table 4.4: Family size of respondents

Family size	No. of respondents	Percentage (%)
5-6	94	28.7
3-4	77	23.5
NIL	53	16.2
7-8	52	15.9
1-2	24	7.3
>9	28	8.5
Total	**328**	**100**

Source: Field survey, 2012

4.1.7. Income of respondents

The distribution of the average monthly income among women respondents that earn income from solid waste activities is shown in Table 4.5. The income category as presented in Table 4.5 established that about 26.5% of the respondents in all categories earn between ₦600 to ₦5, 000 monthly while above ₦6, 000 accounts for 11.3% which is more than the salaries paid to some workers even civil servants (minimum wage of ₦ 18, 000 per month) as their take home in the study area. The field survey further notes that about five (5) women earn up to about ₦90, 000 in a month. The table further reveals differences in the income among respondents such that the lower income groups; 26.6% of the respondents which is least earn between ₦100- ₦500

while a greater percentage of the respondents of about 57.6% claimed that they don't engage in solid waste management activities to earn an income, this category are mostly women involved in household sweep. The finding puts to the fore that women participants in solid waste activities are, relatively speaking, wealthy people and, thus, waste collection can be taken as a lucrative business. This is in line with Bernstein (2004) who revealed that the poor also generate income from solid waste activities especially by sorting the waste, by collecting already sorted waste, by marketing the separated waste, and often by clothing or even feeding themselves with waste. Furthermore, when other occupations were inquired, only about 38.4% which are the majority were engaged in other occupation like petty trading among others as earlier stated in table 4.2. This is a clear indication that income generated by women as a result of waste activity is basically to complement the one from other source(s).

Table 4.5: Income of respondents

Income	**No. of respondents**	**Percentage (%)**
₦100- ₦500	15	4.6
₦600- ₦5, 000	87	26.5
> ₦6, 000	37	11.3
None of the above	189	57.6
Total	**328**	**100**

Source: Field survey, 2012

Field survey revealed that women participation in waste picking cannot exist in isolation without the involvement of the opposite sex, also because of the culture of the major actors in the study area; their male counterpart do form part of the waste business.

4.2 SOLID WASTE MANAGEMENT ACTIVITIES

4.2.1. Solid waste activities

Solid waste activities as presented in figure 4.3 shows that in terms of transportation 29.6% of women waste actors pay individuals (male) to convey waste valuables (metal scraps,

farmyard manure etc.) compared to collection of usable materials mostly from single sourcing which accounts for 21.3% as discussed in table 4.7. In contrast, Bentley (1988) revealed that over 20,000 women were working as paper pickers in Ahmedabad (India).

Household sweep which is a common domestic chore accounts for 19.5% of respondents. However, separation of waste accounts for 16.6%; this is a clear indication that most of the inhabitants in the study area don't separate their waste before disposal which accounts for about 13.1% and is mostly on unauthorized dump site/landfill. Field investigation revealed that the respondents hardly participate in multiple solid waste management activities, also none of them were involved in recycling thus will affect greater income. This is in line with UNEP (2005) which notes that the greatest obstacles to women's participation in solid waste activities include; social restrictions, time availability, illiteracy and lack of awareness, as well as limited (access to) resources (see plate I, II, III VIII and IX).

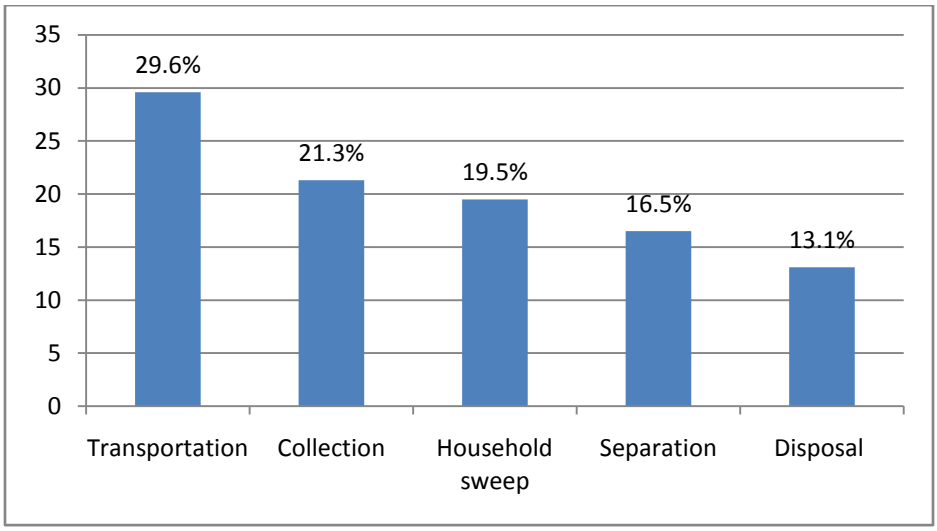


Figure 4.3: Solid waste activities of respondents



Plate I: A woman sweeping the street of Barayar Zaki in Sokoto metropolis

4.2.2. Means of transportation in solid waste management

According to Table 4.6, about 40.5% of the respondents convey their waste materials using locally made cart (*Kura*). Women participants surveyed expressed that most of the solid waste materials are utilized locally throughout the study area. About 31.7% of the respondents were of the view that they dispose of their waste through motor cycle while others 16.2% and 5.8% disclosed that they use wheel barrow and bicycle respectively to dispose their waste. Also, only 5.8% of the respondents claimed that they convey theirs with car (see plate II and III).

Table 4.6: Means of transportation by respondents

Means of transportation	No. of respondents	Percentage (%)
Barrow	53	16.2
Bicycle	19	5.8
Motor cycle	104	31.7
Car	19	5.8
Others [locally made cart (*Kura*)]	133	40.5
Total	**328**	**100**

Source: Field survey, 2012



Plate II: Children sent to sell scrap metals and bottles by their mother to Scavengers in Birni (old city)

Source: Field work, 2012



Plate III: A young scavenger in Sabon Gari on waste activity
Source: Field work, 2012

Referring to Table 4.7 it was observed that a relatively high proportion (35.4%) of respondents were involved in house to house waste collection, while about 25.3% of the respondents centred on market level. The field observations further revealed that some of the respondents were only engaged in office and home level of participation these accounts for about 9.5%, 22.9% respectively. Lastly, about 7.0% of the respondents never responded.

Table 4.7: Level of participation by respondents

Level of participation	**No. of respondents**	**Percentage (%)**
House to house	116	35.4
Office	31	9.5
Market	83	25.3
Home	75	22.9
No response	23	7.0
Total	**328**	**100**

Source: Field survey, 2012

4.2.3. Self Employed, Waste Workers with Public and Private Waste Organizations among Respondents

The findings shows that about 65% of the respondents usually partake in waste activity on their own ranging from house to house collection of solid waste recyclables, to waste picking on the street, offices etc. (see plate IV and V), while about 10% and 25% were women who are involved in single sourcing of waste valuables since they work in private and public waste organizations respectively, simply because they want to complement their income. The women in this category, do find it difficult to be engaged in multiple sourcing of waste valuables due to the nature of their job. In addition, field investigation also revealed that about 68% of women do collect more of solid waste materials e.g. glass bottles, assorted plastics, cans, among others for individual consumption or sold to those involved in reuse like, bottling of locally made drinks (*Zobo and Kunu*), traditional herbs and honey both within and outside Sokoto. While only about 32% of men solid waste workers collect waste materials of this kind for same reason in the study area. This is a clear indication that in some aspect of waste activity women also dominate men.



Plate IV: A self employed woman picking waste valuables from dumpsite at Tudun Wada
Source: Field work, 2012



Plate V: Women waste wokers and cleaners at one of the public institution in Wamakko L.G.A
Source: Field work, 2012

4.2.4. Day(s) of participation by respondents

A close examination of Table 4.8 reveals that about 50.9% of the respondents were involved in solid waste management activities everyday these covers all categories (separation, collection, transportation, disposal and household sweep). In general, everyday participation brought about greater quantity of waste materials and circulation within Sokoto metropolis since most of the materials were consumed locally as earlier stated in table 4.6. In contrast, 29.6%, 15.5% of the respondents carry out waste activities weekly and monthly respectively these covers mostly women involved in composting to feed both dry and rainy season farmers. In addition, others of about 4.0% of the women did not respond (see plate V and VII).

There are variations in both quantity of waste materials and participation between Tudun wada, Sabon gari, Mabera, Dundaye district and Birni, G. R. A district. The latter districts were characterized with low quantity of solid waste and involvement than the former. This may be due to differences in population, interest or proximity to the central business district of Sokoto. Generally, large quantity of solid waste and greater participation are usually during functions like meetings, weddings, picnics among others at every level of participation also when salaries are paid.

Table 4.8: Day(s) of participation by respondents

Day(s) of participation	No. of respondents	Percentage (%)
Every day	167	50.9
Weekly	97	29.6
Monthly	51	15.5
Others	13	4.0
Total	**328**	**100**

Source: Field survey, 2012

4.2.5. Waste sorting activity

Field investigation revealed that about 41.5% of the respondents do sort their waste especially women who earn income from solid waste activities while majority accounts for about 58.5% of the respondents don't sort their waste in any way reasons according to some of the women was that there are no waste facilities which in turn discourage waste sorting generally. However, all the respondents claimed that none of them were employed by the government basically to sort waste.

4.2.6. Level of waste sorting activity among respondents

Levels of waste sorting as presented in Table 4.9 shows that about 11.9% of the respondents sort their waste on strictly house level, market which was next accounts for about

11.3% of the respondents. However, street and public places cover individuals involved in farmyard manure collection and a few who collect scrap metals among other waste this accounts for 6.1% and 7.9% respectively. Also, a negligible percentage of about 4.3% of the respondents claimed that they are involved at all levels (see figure 4.3). Lastly, 58.5% which covers majority of the respondents as earlier stated in table 4.7 never responded possibly they don't sort their waste completely (see plate VIII and IX).

Table 4.9: Level of waste sorting among respondents

Level of waste sorting	**No. of respondents**	**Percentage (%)**
Home	39	11.9
Market	37	11.3
Street	20	6.1
Public place	26	7.9
All of the above	14	4.3
No response	192	58.5
Total	**328**	**100**

Source: Field survey, 2012

Still relating to waste sorting, the findings in Table 4.10 revealed that time constraint as a reason for not sorting waste constitute about 13.7% of the respondents. Another interesting reason from the women's claim was that there's actually no need sorting waste this accounts for 9.5%. Financial problem and lack of waste receptacles among other equipments were reasons claimed by participants in solid waste management this constitute about 2.1%, 14.6% respectively. Others were of the view that all the reasons highlighted was key to they not engaged in waste sorting it accounted for about 18.6% which are of the majority. However, about 41.5% of the respondent never responded the implication is that they do engage in the activity thus disclosed that no reason of any kind will hinder them from sorting their waste.

Table 4.10: Reason(s) for not sorting waste among respondents

Reason(s)	No. of respondents	Percentage (%)
Time constraint	45	13.7
No need sorting waste	31	9.5
Lack of receptacles and other equipment	48	14.6
Financial problem	7	2.1
All of the above	61	18.6
No response	136	41.5
Total	**328**	**100**

Source: Field survey, 2012

4.2.7. Quantity of waste materials collected every week by respondents

A close examination of table 4.11 reveals that about 57.6% of the respondents collect less than 200 kg of valuable waste materials every week. This is actually in line with the quantity collected by majority of the waste collectors who collects basically scrap metals, plastic/glass bottle among other solid waste especially at homes, on the street, women at their work places both in public and private institutions. In general, greater quantity of the materials still circulate within Sokoto metropolis since most of the women waste pickers alongside male scavengers who are the majority in solid waste business do find it difficult transporting. Since there are no recycling plants except artisanal recyclers which are mostly male, these male scavengers and women waste pickers do sell the recyclables of any quantity to them or major dealers greatly dominated by the opposite sex. In contrast, 23.8% comprising some women scrap metal collectors and major dealers collect above 600 kg of waste valuables. Field survey further revealed that some of the major dealers (women) in scrap metal and compost business claimed that they collect about 1000kg to 200,000kg of scrap metal and farm yard manure weekly. These are in Tudun-wada, Birni, and Sabon Gari.

About, 6.4%, 5.1%, 7.0% of the respondents collect about 300kg, 400kg, and 500kg of waste respectively. There are variations in the quantity of waste materials gathered between Tudun-wada, Birni, and Sabon Gari axis and GRA, Mabera and other peri-urban axis. The former axis collects high quantity of waste than the latter. This may be due to differences in population or proximity to areas where businesses thrives.

Table 4.11: Quantity of waste materials collected every week

Quantity (Kg)	No. of respondents	Percentage (%)
< 200	189	57.6
300	21	6.4
400	17	5.1
500	23	7.0
> 600	78	23.8
Total	**328**	**100**

Source: Field survey, 2012

Interestingly, field investigation revealed that a greater percentage say 70% of waste actors in the study area are men i.e. waste activities (scavenging, waste union, middle person, waste private companies etc) are men driven only fewer women partake in waste related activities in the metropolis. This may be tied to so many reasons, ranging from religious, cultural, personal among others. But it is important to note that waste activity is not gender bias and as it was revealed in the course of the survey; men and women working together in order to achieving their said purpose as far as waste activity is concern.

4.2.8. Benefits derived from solid waste management business

Every business personnel venture into any business of his/her choice to derive one benefit to the other. Findings from table 4.12 Shows that about 17.4% of the respondents claimed that the benefit they enjoy was family support in terms of their contribution to feeding the family and some produce manure to their farms for greater crop yield both during dry and rainy season

farming. About 13.7% of the respondents were of the view that they derived multiple source of income from solid waste activity especially those involved in other occupation as earlier stated in table 4.2. Earning a living/self sustenance affected mostly singles and divorced women this constitute about 6.7% while others especially employer of labor accounts for about 1.8% of the respondents mostly those that earn high income from solid waste activities as earlier mentioned in table 4.5. About 1.8% of the respondents were of the view that they enjoy all benefits solid waste has to offer. Field investigation further revealed that most of the women involved in solid waste activities were in one way or the other satisfied with the business. Majority accounts for 58.5% of the women that did not respond it may be due to complete absence of benefit since they don't engage in solid waste management as a form of business in any way (see plate VII and VIII).

Table 4.12: Solid waste benefits derived from respondents

Solid waste benefit(s)	**No. of respondents**	**Percentage (%)**
Support the family	57	17.4
Multiple source of income	45	13.7
Earn a living/self sustenance	22	6.7
Others (employer of labor)	6	1.8
All of the above	6	1.8
No response	192	58.5
Total	**328**	**100**

Source: Field survey, 2012



Plate VI: Bagged waste valuables (farmyard manure) owned by a woman at Sabon Gari
Source: Field survey, 2012



Plate VII: Heaps of farmyard manure at Dundaye
Source: Field survey, 2012



Plate VIII: Road side dumpsite a source for waste valuables at Tudun wada
Source: Field survey, 2012



Plate IX: A cleared dumpsite as a result of waste valuables utilization at Mabera
Source: Field survey, 2012

4.2.9 Private and Government Institution with Women Waste workers

The finding shows that about 69.6% of the respondents usually partake as cleaners in both government and private institutions thus are paid for the service provided. About 21% of the

respondents disclosed that they work with ministry of environment, Sokoto state Urban and regional development Authority (SUDA) as waste workers. In contrast, only about 9.8% of the respondents indicated that they relate to a private company by name Alfijir waste collectors Nigerian limited involved in solid waste management business in Sokoto metropolis out of other existing ones namely; Sharah group association (SGA), Mebera women association of solid waste management, Arewa cleaners association (ACA) and Tsafta groups emire yahaya association, having about 10.2%, 18.4%, 11.9% and 8.1% of women waste workers respectively. Furthermore, the contribution of both private and government institutions as regards the involvement of women in waste activities is actually not encouraging as revealed from the field survey.

4.2.10 An illustration/findings on Women's Participation in Solid Waste Management

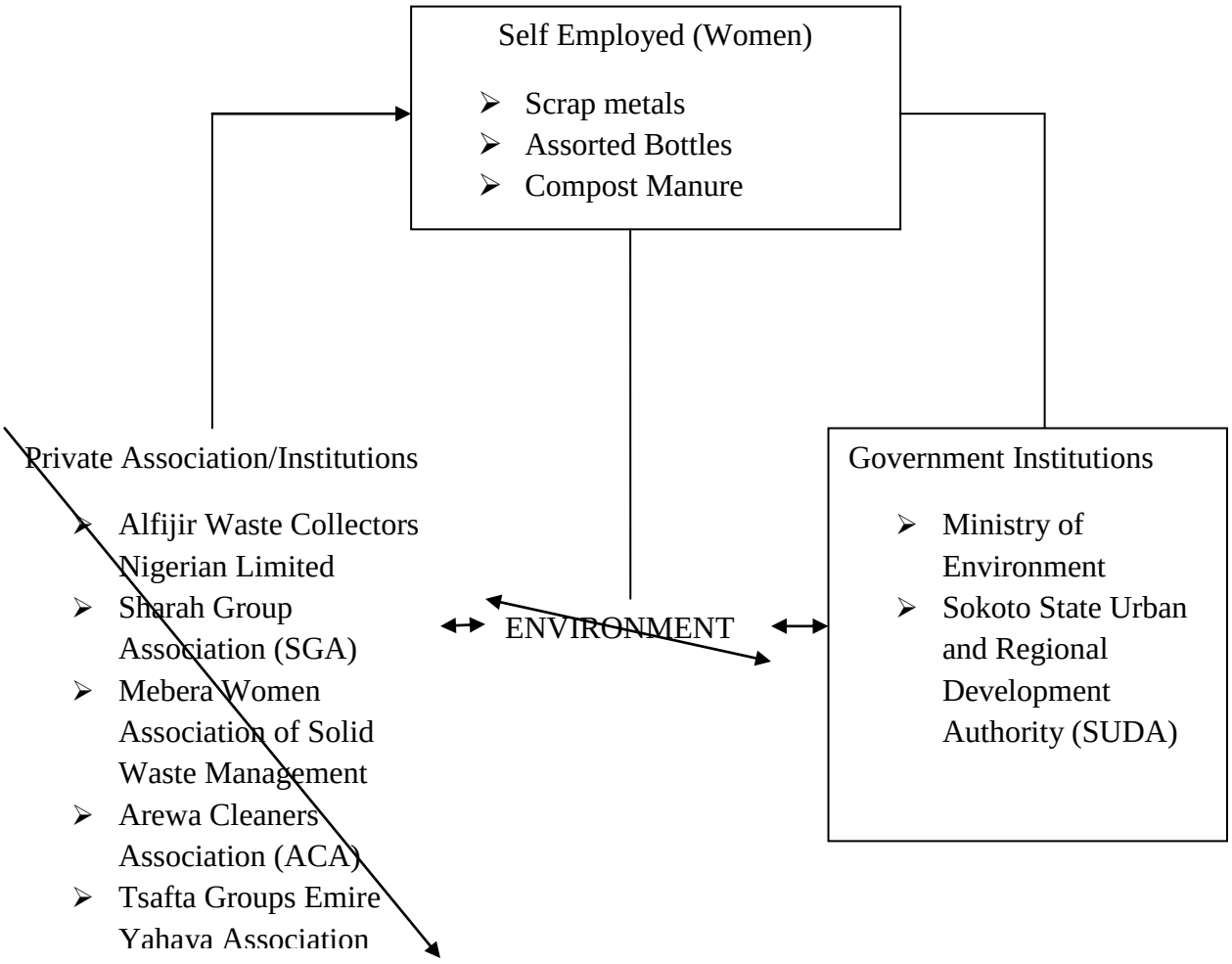


Figure 4.4: An illustration/findings on Women's Participation in Solid Waste Management within Sokoto metropolis

The above illustration/findings depicts that self employed women utilizes the various solid waste valuables from private/government institutions and the environment. All the units including the environment benefit from each other. As mentioned earlier in the text, the three units namely; self employed, private and government institutions are occupied by varying percentages of women solid waste workers carrying out different waste activities.

4.3. CHALLENGES IN WASTE MANAGEMENT ACTIVITIES

It was clearly seen from the responses that the government has not in any way recognized women participation in solid waste management through the provision of waste receptacles, trucks, protectors, functioning recycling plants etc. From this analysis, as high as 84.8% of sampled solid waste participants in the study area claimed that the government never came to their aid.

Four (4) person's from the existing private waste companies in the metropolis disclosed that finance was their greatest challenge as regards employment of staffs that will comprise both male and female and what the association do majorly is waste collection from dumpsites and that its usually stressful and demanding. They are of the view that women shouldn't be exposed to such a hard task but rather a less stressful waste activities e.g. waste sorting, sweeping the street, re-use among others.

4.3.1. Kind of support needed from the government

As shown in Table 4.13 about 59.1% of the respondents said they need support in monetary form in order to boost solid waste management activities especially those involved in scrap metal and farmyard manure collection business, some were of the view that they need the money to obtain domestic waste facilities themselves. While about 28.0% of the respondents in all categories revealed that government providing equipments as earlier mentioned above thus will ease most of the stress they face as regards solid waste management. Others about 12.8% of the respondents pointed out that the government in terms of assistance should not only provide recycling plants but rather a plant that is functional.

Table 4.13: Kind(s) of support by respondents

Kind(s) of support	No. of respondents	Percentage (%)
Finance	194	59.1
Equipment	92	28.0
Others	42	12.8
Total	**328**	**100**

Source: Field survey, 2012

4.3.2 Major challenges among respondents involved in solid waste business

With respect to major challenges faced by solid waste entrepreneurs, about 17.4% of the respondents indicated that their major challenge is the fluctuation in prices of waste valuables that stability in price will help a great deal. High cost of transportation accounts for 13.7% of the respondents, this is another serious challenge affecting especially women that have to pay for waste valuables conveyed for people that buy from them. About 1.8% of the respondents claimed that there's inadequate labor force and were of the view that it may be due to the way people perceive the job as discussed in table 4.15. While about 1.8% of the respondents claimed that all the challenges itemized poses serious threat to solid waste business. Others encompass poor or absent of union leaders which constitute about 6.7% of the respondents revealed that there's actually a non-functional or union on solid waste entrepreneurs does not exist in the study area.

This is not in line with Scheinberg, *et. al*, (1999) on Self Employed Women's Association (SEWA), an NGO in Ahmedabad (India) has helped in organizing women engaged in paper and rag picking and safeguarding their interests from the clutches of the paper contractors and middlemen. SEWA has helped these women in setting up their own collection point (store) from where they sell collected waste paper directly to the mills. SEWA's efforts have not only safeguarded these women from the drudgery and dangers of work but also have increased their

income by eliminating the middleman. This has also improved the status of women by making them organized workers who sell paper/rag directly to the mills through its own cooperative.

Consequently, a greater percentage (58.5%) of the respondents did not respond possibly they are not in the category of solid waste entrepreneurs.

Table 4.14: Major solid waste business challenges among respondents

Major Solid waste business challenges	**No. of respondents**	**Percentage (%)**
Fluctuation in the prices of valuables	57	17.4
High cost of transportation	45	13.7
Inadequate labor force	6	1.8
Others	22	6.7
All of the above	6	1.8
No response	192	58.5
Total	**328**	**100**

Source: Field survey, 2012

4.3.3 Public view as a challenge on solid waste collectors

The finding in Table 4.15 disclosed that people's perception about waste collectors (pickers) is actually not encouraging in Sokoto metropolis. Greater percentage of about 46.6% of the respondents said they view solid waste collectors as derogatory in contrast to about 5.5% of the respondents who see's waste pickers as dignified individuals. In addition, 139 (42.4%) claimed that they perceive them as both dignified and derogatory, only 5.5% of respondents didn't respond. This may be due to lack of proper awareness and motivation on a lucrative activity of this kind. In the words of some of the, respondents "*the people that are derogatory/illiterate were those not involved in solid waste picking business*".

Table 4.15: Public view on solid waste collectors

Public view	No. of respondents	Percentage (%)
Derogatory	153	46.6
Dignified	18	5.5
All of the above	139	42.4
No response	18	5.5
Total	**328**	**100**

Source: Field survey, 2012

4.4. SOLID WASTE MANAGEMENT AND THE STATE OF HEALTH

Solid waste collectors especially at dumpsites, on the streets among others are socially marginalized. Some live and work without basic economic or social security, under conditions which are extremely hazardous to health and detrimental to family, social, and educational development. Often children and the elderly are involved in this type of work. Waste pickers live and work under socially precarious conditions and are subject to serious health risks in most urban areas of both developed and developing countries of the world (Bernstein, 1999). Waste managers suffer many more illnesses and injuries than the general population. Particularly prevalent are gastrointestinal, respiratory and skin diseases, lead poisoning, and cuts from needles and broken glass (Cointreau, 2000). This is not different from what is obtained from solid waste participants in Sokoto metropolis.

4.4.1. Awareness of health implication of waste management among respondents

The survey revealed that only about 49.7% of the respondents said they were aware of the health implications as regards waste management compared to as high as 50.3% of the respondents who don't have the knowledge completely.

Table 4.16 further revealed that majority of about 12.5% of the respondents were knowledgeable of the fact that solid waste which they attach value to or come in contact with if

left on the environment without proper management will present a serious threat like breeding ground for mosquitoes and other disease vectors e.g. rats, rodents among others to human beings. Whereas, 165 (50.8%) of the respondents which are the majority did not respond and were of the view that they are not aware of municipal solid waste being a threat to people, environment etc.

Field investigation further revealed that about 6.1% of the respondents were knowledgeable of the threat which can be in form of cholera, 12.2% constitute respondents that were aware of all the possible threats (cholera, diarrhea, breeding ground for mosquitoes and other disease vectors, bad odor). About 9.1%, 7.6% of the respondents were only aware of diarrhea and bad odor respectively. Lastly 2.1% of the respondents were others that were only aware of the possible consequences to human beings to be cholera and bad odor.

Table 4.16: Health implication of waste management among respondents

Health implication (s)	**No. of respondents**	**Percentage (%)**
Cholera	20	6.1
Diarrhea	30	9.1
Breeding ground for mosquitoes and other disease vectors	41	12.5
Bad odor	25	7.6
Others	7	2.1
All of the above	40	12.2
No response	165	50.8
Total	**328**	**100**

Source: Field survey, 2012

CHAPTER FIVE

SUMMARY, RECOMMENDATIONS AND CONCLUSION

5.0 INTRODUCTION

This chapter provides a summary of findings of the research and makes recommendations that, if implemented, would promote women participation in every facet of solid waste management for growth and development in order to eradicate poverty among other challenges in Sokoto metropolis.

5.1 SUMMARY

A total of 328 women participants in waste picking and how to incorporate them in solid waste management were identified in the six districts covered in Sokoto metropolis. Cluster and purposive sampling techniques which were appropriate in their strength in identifying unique and informative cases in a network of difficulty to find populations were employed in selecting respondents for questionnaire survey and interview.

The study established that majority of the women engaged in solid waste management activities within the six districts of Sokoto metropolis were less than 45 years old. The implication is that the trade is more attractive to mostly the very active age groups. As noted, majority of the people involved in solid waste picking among other waste activities, as indicated by the survey results were married with 53.7% and were mostly of Hausa/Fulani ethnic composition with 60.4%. Scrap metal and farmyard manure, are the major materials that attract solid waste entrepreneurs in Sokoto metropolis.

Solid waste activities terms of transportation include women waste actors that pay individuals especially the male to convey waste valuables (metal scraps, farmyard manure etc.)

compared to collection of usable materials mostly from single sourcing, however, household sweep which is a common domestic chore and disposal mostly on unauthorized dump site/landfill attracted some of the participants while separation wasn't encouraging; this situation indicates that most of the inhabitants in the study area don't separate their waste before disposal. These activities are carried out mostly every day and it covers all categories (separation, collection, transportation, disposal and household sweep) except for women engaged in composting for supply to both dry and rainy season farmers carry's out such on weekly and monthly basis. Field investigation revealed that the respondents hardly participate in multiple solid waste management activities, notable utilization include a relatively high proportion (35.4%) of women involved in house to house waste collection, while about 25.3% of the respondents centred on market level. Other levels are office and home. Also none of them were involved in recycling thus will affect greater income.

The study notes that waste materials are mostly conveyed using locally made cart (*Kura*) and only a few are conveyed with car for disposal to end users. Women participants surveyed expressed that most of the solid waste materials are utilized locally throughout the study area. There are variations in both quantity of waste materials and participation between Tudun wada, Sabon gari, Mabera, Dundaye district and Birni, G. R. A district. The latter districts were characterized with low quantity of solid waste and involvement than the former. Generally, large quantity of solid waste and greater participation are usually during functions like meetings, weddings, picnics among others at every level of participation also when salaries are paid.

Field survey disclosed reasons for not participating in waste sorting to include no need sorting waste; financial problem and lack of waste receptacles among other equipments. Interestingly, some of the respondents were in one way or the other satisfied with solid waste

business they claimed that they derived benefits like family support; multiple source of income; earning a living/self sustenance; employer of labor among others. Although the average monthly income generated especially among some of the actors from scrap metal/bottles and farmyard manure (compost) collection was discovered to be above ₦6, 000 which is more than the salaries paid to some workers even civil servants (minimum wage of ₦ 18, 000 per month) as their take home in the study area. The field survey further notes that about five (5) women earn up to about ₦90, 000 in a month. This is a clear indication that income generated as a result of waste activity can basically be adequate to complement other source(s), eradicate poverty and generate employment for some if not all age categories in the study area.

In Sokoto metropolis it was clearly seen from the responses that the government has not in any way recognized women participation in solid waste management through the provision of waste receptacles, trucks, protectors, functioning recycling plants etc. From this analysis, as high as 84.8% of sampled solid waste participants in the study area claimed that the government never came to their aid. In addition, some of the major challenges faced by solid waste entrepreneurs are categorized into: fluctuation in prices of waste valuables; high cost of transportation; inadequate labor force; poor or absence of union leaders. With respect to public view on solid waste collectors; greater percentage of about 46.6% of the respondents said they view solid waste collectors as derogatory in contrast to about 5.5% of the respondents who see's waste pickers as dignified/sensible individuals. In the words of some of the, respondents "*the people that are derogatory/illiterate were those not involved in solid waste picking business*".

The study portrays that health implications as regards waste management disclosed by the respondents comprise threat like breeding ground for mosquitoes and other disease vectors; cholera; diarrhea; bad odor.

5.2 RECOMMENDATIONS

The study revealed the characteristics of waste activities (scrap metal and bottles/composting) as waste management strategy as well as the benefits of sustainable waste management in Sokoto metropolis. Based on such findings, recommendations were developed to promote scrap metal and bottles composting among other waste activity situation in Sokoto metropolis.

5.2.1 Specific Recommendations

General public oriented and more encompassing approach in empowering the capacity of the unemployed to make choices for their wellbeing should be the bone of contention. Within the solid waste management framework, there should be a joint effort amongst all actors such as municipal solid waste management agencies, waste management entrepreneurs, government agencies such as the ministries of labour, trade and state security to dialogue and design policies and regulations that will address issues of farmyard manure scrap metal and bottle price, price instability, regulation in the cost of conveying waste valuables from one point to the other, providing adequate receptacles among other equipments and also make provision for a functional recycling plant in Sokoto and its environs. This will greatly ease their (actors) activities and thus improve their income. Here, both Government and non-governmental organizations should take the leading role in the formulation and implementation of multi-dimensional policies and the empowerment of the jobless so that their development in terms of capacity building will sustainably be achieved.

Some forms of participation need to be employed regardless of management tools (MSEs, district committees, etc.). Women in particular, within Sokoto metropolis should spontaneously take initiatives for clean-up activities, picking of recyclable wastes, health care

and sanitary awareness that are not carried out in any formal structural framework. On the other hand, there is need to enlighten and encourage some micro and small scale enterprises to actually start their own preliminary refuse collection.

Since several states in Nigeria are coming up with various means of waste collection initiated by both public and private sectors, Sokoto and its environs should not be left out; 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. Willingness to pay for waste management services or facilities is very important to the success of the private sectors' participation (PSP) in (SWM) program. The willingness to or not to pay could have direct impact (positive or negative) on the reliability and success of any solid waste management strategy.

It is a known fact that people's attitude thus influences the effective demand for waste collection services. Attitudes may be positively influenced through awareness building campaigns and education about the negative aspects of inadequate waste collection with regard to public health and environmental conditions, and the value of effective disposal. Such campaigns also should inform people of their responsibility as waste generators and of their rights as citizens to adequate solid waste management services.

It was clearly seen from the finding 84.8% of non organised hand pickers and 15.2% of organised hand picking activities formal sector. This formulating a more functional union leaders that will take their plea to appropriate government authorities which will in turn bring about better organization of the sector. Hence making if more attractive and creating ample opportunity for the unemployed in Sokoto.

The non-governmental organization (NGO's) can also be involved by giving them a further boost and in turn achievable through the provision of a sound and appropriate public enlightenment. The equipments and educational programmes that are captivating the benefits derived as a result of solid waste management activities in order to counter the negative perception majority of the respondents perceived about the business.

Also, there is need to actually strengthen the existing few organized private sectors e.g. Mebera Women Association of Solid Waste Management, Arewa Cleaners etc and still encourage and support other women waste participants to establish more waste association/institutions. On the other hand, Government institutions should also employ a greater number of women both within and outside her institutions so that they can be engaged in solid waste management in order to earn a living.

Lack of greater diversification and multiple source utilization of waste valuables was observed from the results of the field work, that some of the respondents were restricted to single sourcing of waste valuables, waste activity and also not diversifying into other activities outside waste. Diversification and multiple source utilization of waste materials if encouraged will be a sure means of high income generation and promote more employment opportunities.

It is recommended that the operational policies adopted by United Nations Industrial Development Organization (UNIDO) (2012) be implemented and it is highlighted below:

Environmental management in Nigeria is hinged on the 1989 National Policy on the Environment as revised in 1998, as well as a set of laws, regulations and guidelines to ensure the conservation of natural resources and the protection of the environment and human health. The goal of the National Policy on the Environment of the Nigerian Government is to achieve sustainable development in Nigeria. The purposes are to secure for all Nigerians a quality of

environment adequate for their health and well being; restore, maintain and enhance the ecosystems and ecological processes essential for the functioning of the biosphere to preserve biological diversity and the principle of optimum sustainable yield in the use of these natural resources and ecosystems; raise public awareness and promote understanding of essential linkages between environmental and development and to encourage individual and community participation in environmental improvement efforts; and cooperate in good faith with other countries, international organizations/agencies to achieve optimal use of trans-boundary natural resources and effective prevention of trans-boundary environmental pollution (UNIDO, 2012**)**.

The Federal Environmental Protection Agency (FEPA) Act is the major legal framework on environment in Nigeria. At the return to democratic governance in 1999, FEPA metamorphosed into the Federal Ministry of Environment in June 1999. Since a ministry is more of a policy-making organ, the Federal Government established in November 2006 the National Environmental Standards and Regulations Enforcement Agency (NESREA) with powers similar to the defunct FEPA for effective enforcement of environmental regulations in the country. All FEPA's laws have been repealed with the NESREA act signed into laws by the President of Nigeria in July 2007. The federal laws are the minimum standards in the states. The Constitution allows states to establish stricter standards than the Federal and also impose stiffer penalties on violators (UNIDO, 2012**).**

Nigeria has various Ministries, Agencies and Departments (MDAs) involved directly or indirectly with environmental issues. These include Federal Ministry of Environment, State Environmental Protection Agency, State Ministry of Environment, various Local Government and Area Councils and NESREA. The local government authorities are given the responsibility

of municipal solid waste management by law, however due to inefficiency hence the intervention in waste management activities by various States environmental protection board/agency.

The National Environmental Protection (Pollution Abatement in Industries and Facilities Generating Wastes) Regulations S.I.9 of 1991 imposes restrictions on the release of toxic substances and stipulates requirements for monitoring of pollution; it also makes it mandatory for existing industries and facilities to conduct an environmental audit. The National Environmental Protection (Waste Management) Regulations S.I.15 of 1991 regulates the collection, treatment and disposal of solid and hazardous wastes from municipal and industrial source. The National Guidelines and Standards for Environmental Pollution Control in Nigeria 1991 provide the basic instrument for monitoring and controlling industrial and urban pollution in Nigeria (UNIDO, 2012).

Recommendations for further research are as follows:

i. Gender disparity and its implications among waste management actors in Sokoto, Nigeria.
ii. The effectiveness of government agencies and private companies in waste management in Sokoto, Nigeria.

5.3 CONCLUSION

By employing waste activities like scrap metal/bottle collection and composting as a potential means of eradicating poverty, creating job opportunities, greater environmental sustainability among other benefits. Both the Government and NGOs should take positive steps in the right direction from policies and programmes formulation and implementations on solid waste management, price instability both in waste valuables and transportation, functional recycling plants, an appropriate public awareness campaign and educational programmes that are

captivating etc. as regards the various benefits derived as a result of solid waste management activities will go a long way in motivating and curbing the negative perception on the activity which will in turn attract more individuals into the business and realizing adequate income enough to meet the living conditions of citizenry especially waste workers in the study area.

Lastly, from the research findings gathered; transforming the few existing informal women waste activities and establishing new ones by individual waste actors that are also more organized will be attracted by the Government of Sokoto to actually see the need for such sector to be integrated into the formal solid waste system of the state.

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APPENDIX

DEPARTMENT OF URBAN AND REGIONAL PLANNING

AHMADU BELLO UNIVERSITY, ZARIA.

ACADEMIC RESEARCH FOR M.Sc. URBAN MANAGEMENT

Dear respondent,

The purpose of this questionnaire is to obtain information on "**WOMEN PARTICIPATION IN SOLID WASTE MANAGEMENT IN SOKOTO METROPOLIS**". Your answers will be confidential and strictly for academic use. I sincerely request your cooperation in completing this questionnaire. Please tick the appropriate option.

ABUBAKAR MUSTAPHA

1) District? ……
2) Age? (a) Between 10-25 ( ). (b) 26-35 ( ). (d) 36-45 ( ) .(c) 46 and above ( )
3) Marital status? (a) Single ( ). (b) Married ( ). (c) Widow ( ). (d) Divorced ( )
4) Occupation? (a) Civil servant ( ). (b) Business ( ). (c) Trader ( ). (d) Others (please specify)……..
5) What is your ethnic group? (a) Hausa/Fulani ( ) (b) Igbo ( ) (c) Yoruba ( ) (d) others (specify)……..
6) Educational qualification? (a) Primary ( ). (b) Secondary ( ). (c) Tertiary ( ). (d) Qur'anic ( ). (e) Others (please specify……
7) What is your size of your family? (a) 1-2 ( ). (b) 3-4 ( ). (c) 5-7 ( ). (d) 8-10 ( ). (e) 10 and above ( ).

8) What kind of solid waste management activities do you participate in? (a) Separation ( ). (b) Recycling ( ). (c) Collection ( ). (d) Transportation ( ). (e) Disposal ( ). (f) Household Sweeping ( ).

9) If involved in transportation, what is the means of transportation used in carrying solid waste management? (a) Barrow ( ). (b) Bicycle ( ). (c) Motorcycle ( ). (d) Car ( ). (e) Others (please specify)……

10) Do you belong to any SWM Union or organization (a) Individual ( ). (b) In group ( ). (c) All of the above ( ). (d) Others (please specify)…….....

11) If (b) State the name of the group …….

12) At what level do you participate in solid waste management? (a) Home Cleaning ( ). (b) Offices Cleaning ( ). (c) Market Cleaning ( ). (d) House to House collection of wastes ( ). (e) Sorting ( ). (f) Recycling ( ). (g) Others (please specify)……..

13) How often do you participate in solid waste management activities? (a) Every day ( ). (b) Weekly ( ) (c) Monthly ( ). (d) Others (please specify)……..

14) Does Government recognize your activities in solid waste management? (a) Yes ( ). (b) No ( ).

15) If yes, How? (a) Provide trucks ( ) (b) Provide protective ( ) (c) Recycling plant ( ) (d) Pay you for keeping the environment clean ( ) (d) Others (please specify)……..

16) What kind of support do you need from the government if they are to assist? (a) Finance ( ) (b) Equipment ( ) (c) Others (please specify)…….....

17) What is your Average income per month in solid waste management activities? (a) 100-500 ( ). (b) 600-5000 ( ). (c) 6000 and above ( ).

18) How does the public view solid waste pickers or collectors? (a) Derogatory ( ). (b) Dignified ( ). (c) All of the above ( ). (d) Others (please specify)…….....

19) Do you relate with other Private company responsible for solid waste management in Sokoto metropolis. (a) Yes ( ). (b) No ( ).

20) If yes mention them…….....

.....

21) Are you satisfied with solid waste management as a business? (a) Yes ( ). (b) No ( ).

22) If yes, what kind of benefit are you deriving? (a) Source of income ( ) (b) Farmyard manure ( ) (c) Employer of labor ( ) (d) All of the above ( ) (e) Others (please specify)……

23) What kind of challenges are you facing with solid waste management activities? (a) High cost of transportation ( ) (b) Fluctuation in the prices of waste valuables ( ) (c) Inadequate labor force ( ) (d) All of the above ( ) (e) Others (please specify)…….....

24) Are you employed by the government to sort waste? (a) Yes ( ). (b) No ( )

25) If yes, in which of the following activity; (a) street cleaning ( ). (b) Office cleaning ( ). (c) Market cleaning ( ). (d) Collection ( ).

26) Do you engage in waste sorting? (a) Yes ( ) (b) No ( )

27) If yes, at what level? (a) Home ( ) (b) Market ( ) (c) Street ( ) (d) Public places ( ) (e) All of the above ( ) (f) Others (please specify).....…….....

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28) If no, why? (a) Time constraint ( ) (b) There's no need sorting waste ( ) (c) Lack of receptacles ( ) (d) All of the above ( ) (e) Others (please specify)…….....
29) Do you engage in solid waste management for income earning? (a) Yes ( ) (b) No ( )
30) If yes, why? (a) Support the family ( ) (b) Multiple source of income ( ) (c) Earn a living/self sustenance ( ) (d) Others (please specify)…….....
31) Do you know the health implication of solid waste management activities? (a) Yes ( ). (b) No ( )
32) If yes, what are the health implications? (a) Cholera ( ) (b) Diarrhea ( ) (c) Breeding ground for mosquitoes and other disease vectors ( ) (d) Bad odor ( ) (e) All of the above ( ) (d) Others (please specify)…….....