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Waste Recycling/Reuse and Sustainable Livelihoods In Uyo Akwa Ibom State, Nigeria

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Abstracts
The aimed of the study was to evaluate the influence of waste recycling/reuse and sustainable livelihoods in Uyo Akwa Ibom State, Nigeria. The specific objectives include; to assess the influence of recycling on sustainable livelihood and to determine the relationship of waste reuse on sustainable livelihood. Base on the objectives of the study the following research questions were pose; in what way does waste recycling influence sustainable livelihood and how does waste reuse influence sustainable livelihood? To attain to the research questions, two hypotheses were formulated, thus; there is no significance influence of waste recycling on sustainable livelihood and there is no significance influence of waste reuse and sustainable livelihood. The study adopted survey design, the population and sample size of the study was 1,393,000 and 250 respectively. Purposive and simple random sampling technique were used. The statistical tool used in testing the hypotheses was One Way Analysis of Variance. The result indicated that waste recycling and waste reuse has significant influence on sustainable livelihood in Akwa Ibom State, Nigeria. Therefore, the following are recommended that; there is need for massive enlightenment campaigns to sensitize the people on sustainable waste recycling and reuse as well as outlining it economic benefits, and Government at all level should also consider the option of public-private partnership which has been adopted with huge success in other climes.
Keywords*:* Waste, Waste Recycling, Waste Reuse, and Sustainable Livelihoods

Introduction
Livelihood is the capabilities, assets, including both material and social resources and activities required for a means of living. It is sustainable when the society can cope with and

recover from stresses and maintain the assets both now and in the future without undermining the natural resource base. Livelihood also involves income earning as well as a wider range of activities required to sustain a means of living. These include gaining and retaining access to resources and opportunities, dealing with risk and negotiating social relationships. The urban poor who pursue livelihood from waste are often vulnerable except by deploying material resources, skills and rights of access or social resources (Addis, 2024).

Sustainable livelihoods is a function of how men and women utilize assets or investments on both short and long term basis to be able to cope with and recover from stresses through adaptive coping strategies that could be economically sound, ensuring that livelihoods activities do not irreversibly degrade natural resources within a given ecosystem. Sustainable waste management may best be enhanced from the view of the sustainable livelihoods approaches. Due to urbanization and globalization, people have lacked access to basic necessities of life and waste management has saved as a source of income providing livelihoods for many. The livelihood of the people and the income derived from waste management is partly determined by the type of waste that the people are engaged in. This is because the type of waste that is collected by the waste workers has an attached economic and social value and therefore will determine the profitability of the end product (Freduah, and George 2021; Lekan, and Charles 2023).

Also, waste Management is the collection, segregation, reduction, transfer, treatment, recycling, resource recovery, incineration and disposal of waste (Alabastor, 2020). Sustainable waste management protects the health of the people, particularly those of low-income groups who suffer disproportionately from poor waste management. It promotes healthy environmental condition by controlling pollution including water, air, soil and cross-media pollution and ensuring sustainability of ecosystem. It supports economic development by providing waste management services and ensuring the efficient use and conservation of valuable materials and resources and it generates employment and income in the sector itself. These could be achieved by establishing sustainable system of waste management that meets the needs of the people. The essential condition of sustainability implies that waste management system must be absorbed and managed by the society and its local communities. The system should be tailored to the particular circumstances and problems of the locality, employing and developing the capacities of all stakeholders, including the households and communities requiring their services.

Waste recycling is an important aspects of an efficient and effective solid waste management system. Recycling and reuse are process through which materials previously used are

collected, processed, remanufactured, and reused. Generally, there are two types of recycling for materials such as glass, metals, paper, and plastics. Primary or close-loop recycling is when wastes discarded by consumers are recycled to produce new products while secondary, or open-loop recycling is when waste materials are converted into different products. Thus, recycling of waste helps to reduce the amount of waste going into landfills and incinerators. Besides being an important solid waste reduction and management strategy, it is also a way to decrease resource throughput, as using recycled material means reducing the amount of new resources needed to manufacture a new product (Foday Pinka Sankoh, Xiangbin, Yan Quangyenm, and Tran 2023). Waste recycling and reuse entails the separation of the proposed useful materials from the waste stream at the point of generation. More so, waste reuse is using an object or material again, either for the same original purpose or for a similar purpose without altering the physical form of that object or material. Waste reuse in all spheres prevents objects and materials from becoming waste and can be considered as a sustainable waste management mechanism.

Waste reuse is using an object or material again, either for the same original purpose or for a similar purpose without altering the physical form of that object or material. It prevents objects and materials from becoming waste and can be considered as a sustainable waste management mechanism. Unsustainable waste management are lack of waste reduction technology, non-recycling and reuse of waste, as well as legislative bottleneck, inadequate waste disposal vehicles and poor town planning coupled with rapid growth of population and urbanization have all conspired to add to the waste congestion in the streets with grave implication for environmental sustainability and economic development (Ogwueleka, 2022).

In the light of the above, poor waste management strategy, inadequately planned, haphazard urbanization, along with industrial and commercial activities contributes to the substantial quantity of waste generated and its management problems mostly in the third world nations. Although waste can be considered as unrecovered wealth which need skills and technological facilities for its discovery and recovery, but lack of these skills and management facilities posed a major problem in many developing regions including Nigeria. This simply implies that millions of people in the developed nations are involved in some kind of waste businesses for their livelihood because of the availability of facilities and skilled personnel. Unmanaged flow of waste contributes to the disruption and destruction of the livelihood of the people. This also contributes to unhygienic living conditions, which worsens the situation for unsheltered people who live in extreme poverty. Usually local governments in developing countries are responsible for waste management, but they are facing serious problems in

dealing with large volumes and quantities of waste produced due to their lack of finance and other logistic capabilities (Zhiyong, Dan, Yunhui, Wu. and Shulan, 2021).

Waste recycling and reuse have contributed to sustainable livelihood in the developed nations where appropriate strategies, facilities and safety measures are put in place, but in developing countries, it has contributed to the high level of mortality and morbidity especially in Nigeria (Medina 2023). In addition, cities in developing countries face challenges in waste management in terms of their non-sustainability status. More often than not, waste management stands as a major threat to the fragile ecology of human environment which has both short and long term effect on environmental sustainability and development. The quantity of waste generated in cities in industrialized countries is unarguably higher than that of developing countries; yet sustainable waste management remains a problem in the developing countries and waste management processes in the developing countries also differ remarkably than those of developed countries in terms of composition, density, management, waste quantity, and access to waste collection, legislation, awareness and attitude. It is against on this background that the study seeks to examine the influence of waste recycling/reuse and sustainable livelihoods in Uyo Akwa Ibom State, Nigeria where little or no studies of this nature has been carried out.

Statement of Problem

Waste recycling and reuse as waste management strategies are critical environmental problems in developing countries including Nigeria. Unmanaged flow of waste contributes to the destruction of the environment. This also contributes to unhygienic living conditions, which worsens the situation for people who live in extreme poverty. People involved in waste recycling and reuse in an attempt to attain a livelihood, work in conditions that subject them to high risks which is detrimental to their health. Most of them do not take any health precaution while undertaking waste management processes which constitute real safety hazards, they cannot afford adequate protective clothing or equipment and often, for purposes of speed, do not want to use them.

In the light of the above, Nigeria has been facing with variegated environmental problems such as corruption on waste recycling and reuse decision making, natural disasters, poor waste management, various epidemic diseases, communal clashes, unemployment, strikes and poor governance in respect to waste recycling and reuse policies. It is pertinent to attempt the examination of sustainable livelihood of the people of Nigeria through their existing waste management strategies considering the economic, health and environmental benefits

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of waste recycling and reuse without undermining the reverse implications in the lives of the people and the environment.

The research aimed at evaluating the influence of waste recycling/reuse and sustainable livelihoods in Uyo Akwa Ibom State, Nigeria, the specific objectives are;

i. To assess the influence of recycling on sustainable livelihood.
ii. To determine the relationship of waste reuse on sustainable livelihood.

Research hypotheses

To attain to the research questions, the following hypotheses are formulated

i. There is no significance influence of waste recycling on sustainable livelihood.
ii. There is no significance influence of waste reuse and sustainable livelihood.

Review of Related Literature

Waste recycling and sustainable livelihood.

Waste recycling is the process of converting waste materials into new materials and objects. It is an alternative to conventional waste disposal that can save material and help lower greenhouse gas emissions. Recycling can prevent the waste of potentially useful materials. It is a key component of modern waste reduction and is the third component of reduce, reuse and recycle waste hierarchy (Lieng and Bruemmer, 2022). Recycling as an integrated waste management option is a key element of sustainable development because recycling is critical in the era of resources scarcity (Strange, 2021). The diversion of waste materials through recycling reduces air pollution (dioxin and furan from incinerators), water pollution (leachates from landfilling) and greenhouse gas emission. In contrast to the environmental consequences of waste disposal at landfills, recycling reduces greenhouse gas emission from waste materials disposal e.g. paper products by 7.37 MTCE/tonne (metric tons of carbon equivalent per tonne of material) and aluminum by 3.9 MTCE/tonne (Mohareb, Warith, and Narbaitz, 2020). Recycling and reuse are also of great economic benefits and creates green jobs. The Canadian Association of Recycling Industry (CARI) noted that the recycling industry in Canada creates more jobs and generates more revenue than other division of the waste industry (CARI, 2022).

Recycling embodies a series of activities that convert valuable resources, which may have ended up as waste, into recyclables for raw materials production. Therefore, energy efficiency is increased and the need to further exploit resources for raw material is reduced. For instance, in the case of metal recycling, the energy efficiency is two to ten times more than extracting metals from ores (United Nations Environmental Programme UNEP, 2019).

In fact, the extraction of metals from ores accounts for about 7% of the world's energy consumption and a major contributor to climate change due to emission of greenhouse gases during the primary production processes (UNEP, 2019). Recycling metals compared to primary production saves a lot of energy, e.g. steel recycling saves up to 75% energy while aluminum and metals of the platinum group saves about 90% (UNEP, 2019). About 16 to 18 million tonnes of scrap metals are recycled in Canada each year (CARI, 2022).

Recycling initiatives vary from municipality to municipality since some municipalities are embarking on awareness programmes of waste management. In some areas recycling occurs informally at landfills, uncontrolled dumps and on streets. Waste pickers often collect materials for re-use or sale without any organization, supervision, or regulation. Although waste pickers can be very effective to reduce the amount of plastic, glass, metal and paper, ultimately requiring disposal, pursuing these activities can be harmful to workers' health. Nevertheless, incorporating waste pickers into organized or formal recycling programmes can improve the quality of their working conditions and the local environment (Mohammed, 2022; Rampedi, 2019).

The occupations involved in metal recycling activities include haulers, dismantlers, scrap dealers, shredder plant operators etc. (UNEP, 2019). Effective recycling requires sorting of waste materials into fractions (Zickiene, Tricys, and Kovierienė, 2024). Cleaner and high quality recyclable materials are recovered (up cycling) if waste materials are subjected to sorting at source (Zickiene *et al.,* 2024). However, a technology, such as the Material Recovery Facility (MRF), enhances the potentials for recovery of recyclable materials, which were not sorted at source. In general, recycling improves the availability of resources whilst reducing the overall environmental impact of material production (UNEP, 2019).

In Canada, access to recycling facilities has continued to increase significantly. Between 2015 and 2022, about 75% of the wastes generated in Canada were successfully diverted from landfills and incinerator through recycling (Babooram and Wang, 2024). In a 20014 bulletin, Environstat*,* Statistics Canada noted that people's attitude towards recycling in Canada is neither affected by income nor level of education (Babooram and Wang, 2019). Rather, access to recycling facilities is the major determinant of willingness to participate in recycling programs (Babooram and Wang, 2024). In a book on the subject of solid waste management, Strange (2021) discussed the reasons recycling activities often fail in the market: low cost-benefit; government failure- inadequate policies, which encourages unsustainable practices and institutional failure. On the little downside, Bonam (2022) noted that since recycling does not provide 100% waste diversion, environmental impacts are

inevitable, because the residue from recycling though of minor fraction of the initial waste ends up in landfill.

The World Bank estimates that up to 1 percent of the urban population in developing countries between 15 and 20 million people worldwide are engaged in informal waste picking activities, (Dias 2023). Their actions help reduce greenhouse gas emissions, flooding and the spread of diseases (Eunomia, 2021). This implies improve livelihood for the people, therefore the practice should be encouraged by government, and NGOs, unfortunately, informal sector waste pickers are often marginalized and they face considerable prejudice because of their work. Bhatt (2019) observed that waste pickers among the people at greatest risk from the adverse effects of climate change. They often reside in informal settlements close to dumpsites with inadequate infrastructure, exacerbating their exposure and sensitivity to extreme weather events. Health problems from exposure to waste reduce their ability to cope with heat and other stresses. They also opined that protecting waste pickers livelihoods and improving their occupational health can help build their resilience to climate-related shocks. However, (Colenbrander, Gouldson, Roy, Kerr, Sarker, Hall, Sudmant, Ghatak, chakravarty, Ganguly and McAnulla, 2020) noted that a pro-poor waste management strategy that balances environmental objectives with the interests of low-income urban residents therefore presents an opportunity to move towards both more efficient climate action and more effective poverty alleviation.

It should be noted that the amount of materials used on a product and the way the product has been built from these materials affects its recyclability and the technology needed for it, separation of parts and the quality of the recycled materials (Sas, Thoney, Joiness, King and Woolard, 2022). It must also be taken into consideration that some materials are very difficult to separate from each other, making the recycling process a lot more difficult, if not even impossible. Such materials include different kinds of plastics. In such cases, the benefits of recycling and/or separating the product materials from each other might result in low quality products, which in turn diminish the economic benefits in such measures that the product might not be worth recycling anymore. The only option to get any benefits of the product is to use it as a resource of energy by burning it (Jonsson, Felix, Sundelin, and Johansson, 2021)). Therefore, it is wise for an organization to design their products so that they are easily recyclable in the first place, as it will decrease the cost of the overall process ((Sas, Thoney, Joiness, King and Woolard, 2022)

A study on the relationship between value orientation and recycling behaviour suggested that inconvenience was the key factor for predicting the recycling behaviour of people who were

more individualistic or had a lower economic status. For people who had collectivistic value orientation whereby sharing, duties, and obligations were strongly valued, or for people who had more internal locus of control, beliefs about the importance of recycling were positively related to the tendency to recycle (McCarty and Shrum 2024).

Thogersen (2023) also suggested that people tended to classify environmental behaviour like recycling as a moral responsibility and obligation, especially in affluent industrial societies. Therefore, offering reward programs to encourage recycling behaviours may actually reduce the feeling of obligation, causing negative effects on the targeted behaviour. Instead of feeling morally obligated to recycle, people may start weighing the private costs and benefits of recycling. This may result in a decrease in recycling behaviours, as people realize they can afford to forgo the reward in view of the higher cost they incur when they recycle.

Mehe, Chamhuri, and Rawshan, (2024) investigates the effectiveness of poverty reduction projects and the reasons for the failure and success. It was found that programmes and projects should be built based on the full knowledge and awareness of all stakeholders. Dynamic collaborative environmental knowledge can assist in achieving this. Knowledge creation is an essential prerequisite for successful poverty alleviation. Experience shows that it is indeed possible to make successful poverty alleviation interventions. It has to be comprehensive, people-centric, and concentrated on actions and learning if it is to be to be successful (Mehe, *et al*, 2024). In Malaysia, there are four kinds of scavengers who deal with recycling. Several factors affect the recycling activities and the productivity. Price of recyclable items, traders' behaviour, regulations, and diseases and infection have been observed (Zhiyong, Dan, Yunhui, Wu. and Shulan, 2023).

Olabode, William and Kim (2020) in a study on An Assessment of Material Waste Disposal Methods in the Nigerian Construction Industry observed that Potential waste disposal methods, including incineration, burning, land filling, recycling, reuse, open dumping, pyrolysis, and shredding have emerged from the literature around the globe. Despite various waste minimization and sustainable disposal options that are available, construction material waste is still increasing in Nigeria, while disposal remains a major issue for firms and government. Therefore, Olabode, William and Kim (2020) assess disposal methods among construction firms to determine whether there is a relationship between their practices towards waste disposal. The research followed a concurrent triangulation design in a cross sectional survey, while data were collected via a convergent parallel mixed methods. The quantitative phase employed a structured questionnaire to collect data from 243 building construction firms, while the qualitative phase involved semi-structured interviews with 65

professionals from 10 on-going construction projects in Lagos, Nigeria. The research revealed that land filling is the most common method of waste disposal, which is closely followed by reuse as backfill and recycling. In addition, the study revealed no association between company's ownership statuses, age, project specialization, and disposal methods, except company's size. In conclusion, the study establishes the need for regulatory policies, such as site waste management plan (SWMP), pay as you throw (PAYT), and landfill ban, which would minimize material waste and divert them from landfills. Recycling and reuse are recommended as sustainable approaches for waste disposal.

Ahmed (2021) carried out a study on solid waste management practices in two Northern Manitoba first nation's communities; community perspectives on the issues and solutions. In his study, Solid waste management practices were investigated through interviews, participatory documentary video and laboratory analysis. Findings indicated that poor funding, absence of any recycling programs and lack of waste collection services contributed to indiscriminate burning and disposal in public places. Laboratory analyses revealed that soil samples from the dumpsites had arsenic, chromium, lead, zinc and copper above regulated guidelines. These elevated levels of toxic metals are of significant concern as the dumps are both nearby to water bodies, and have no restrictions, such as fence, to prevent public access. Appropriate funding for solid waste programs, including waste collection and disposal facilities, recycling and training programs are highly recommended to safeguard community health.

Waste management is essential to meet the climate agreement goals. Waste is already responsible for up to five percent of global greenhouse emissions and waste production from cities is set to almost double by 2020. Cutting waste generation through prevention, reduction, recycling and reuse is the fifth target of the 2030 Sustainable Development Goal (SDGs) No 12 which focuses on sustainable consumption and production. Waste recycling is essential for supporting sustainable economic development and reducing poverty in the long run by decoupling resource use and economic growth; limiting air, soil and water pollutants; and creating jobs and livelihoods (Oates, Sudmant, Gouldson and Gillard 2022). Informal sector waste workers provide valuable services by recovering materials that would otherwise be directed to landfill and returning them to the value chain.

Agbaeze, Onwuka and Agbo, (2022) reported that current waste management system has no room for waste recycling, reuse and repair. There was also no provision for waste segregation and reduction at source technology. Majority of the waste is dumped at open landfill. The study also analyzed the newly proposed solid waste management system in the state and

found that the proposed system will be better than the existing one if efficiently implemented. The proposed system outlined a framework of waste segregation, recycling, reuse, reduction, repair and abolition of certain polythene bags with less or no economic value. The authors recommend that a massive enlightenment campaigns should be embarked upon to sensitize the people on the proposed waste management system so that they can key in to it and contribute meaningful to its sustenance. There is need also to encourage the reuse of plastic bags, reduce litter, raise public awareness about environmental issues and encourage recycling as thicker bags will make recycling more economically viable The state government should also consider the option of public-private partnership which has been adopted with huge success in other climes.

Waste reuse and sustainable livelihood

Reuse is using an object or material again, either for the same original purpose or for a similar purpose without altering the physical form of that object or material. In the light of the above, reuse in all spheres prevents objects and materials from becoming waste and can be considered as a sustainable waste management mechanism. Unsustainable waste management is characterized by inefficient collection methods, improper disposal, and inadequacy of solid waste transportation. Other factors inhibiting efficient and sustainable waste management are lack of waste reduction technology at source, non-recycling of waste, lack of repair and reuse of waste, legislative bottleneck, inadequate waste disposal vehicles and poor town planning coupled with rapid growth of population and urbanization have all conspired to add to the waste congestion in the streets with grave implication for environmental sustainability and economic development (Ogwueleka, 2022).

According to Agbaeze, Onwuka, and Agbo, (2022) solid waste management system in Enugu State, Nigeria is inefficient and unsustainable largely due to the crude and unscientific methods employed. The current practice, process and programme of waste management in the state do not in any way conform to what is obtainable in other modern cities of the world. They sought to find out the current state of solid waste management system in the state, and to identity factors that influences waste management and the type of solid waste management system that will aid economic development of the State. These objectives were addressed primarily using structured questionnaire administered to a cross section of people in three selected local government areas (Enugu East, North and South LGAs respectively). Personal interviews were conducted to augment the questionnaire.

Agbaeze, *et al*, (2024) observed that the solid waste management system in practice in the state is unscientific, unsustainable and at the prerogative of people in power. It was

discovered that the current waste management system has no room for waste recycling, reuse and repair. There was also no provision for waste segregation, reuse and reduction at source technology. Majority of the waste is dumped at open landfill. The study also analyzed the newly proposed solid waste management system in the state and found that the proposed system will be better than the existing one if efficiently implemented. The proposed system outlined a framework of waste segregation, recycling, reuse, reduction, repair and abolition of certain polythene bags with less or no economic value. The authors recommend that a massive enlightenment campaigns should be embarked upon to sensitize the people on the proposed waste management system so that they can key in to it and contribute meaningful to its sustenance. There is need also to encourage the reuse of plastic bags, reduce litter, raise public awareness about environmental issues and encourage recycling as thicker bags will make recycling more economically viable The state government should also consider the option of public-private partnership which has been adopted with huge success in other climes.

Also, attitudes of the waste generators in the community appears to be critical as their points of understanding in waste reuse eventually play a significant role in providing answers to municipal solid waste management problems in Lagos State. Individual involvement has a direct bearing on an effective practice (Tunmise 2024). Tunmise (2024) investigates factors influencing individual waste reuse and recycling performance and their likelihood to participation in Lagos State. The result shows that gender is significant towards waste reuse and recycling participation in Lagos. Result also shows that the lack of knowledge is the major limiting factors preventing individuals from waste reuse and recycling in Lagos State. The result also shows a significant difference between waste recyclers and non-waste recyclers on their requirements for participation towards regular awareness, workshop & exhibition likewise also showing an insignificant difference on individual requirements towards the provision of facilities, regular collection, incentives, and legislation in waste reuse and recycling.

Afangideh, Joseph, and Atu, (2017) examine the attitude of urban dwellers to waste reuse in Calabar. One hundred and fifty copies of questionnaire were administered to residents in the area. Information such as the various classes of waste and frequency of waste reuse were obtained from the questionnaire. Finding revealed that family size has a great influence on waste reuse which was evidence in the hypothesis with a calculated value of 7.32 greater than the critical value of 2.43 at 0.05 level of significance. Besides, environmental enlightenment has changed people's attitude towards waste reuse in the area. This was affirmed in the calculated f-value of 3.18 greater than critical t-value of 1.97 at 0.05 level of

significance. However, the result indicates that effective environmental enlightenment would help promote the attitude of urban dwellers to waste reuse the area.

According to Michael, Akinwale, Ronke, Sesan, Colin, Michael, Felix and Kim (2020), waste is a global environmental issue that is becoming most noted in developing countries. Public attitudes towards reducing, reusing and recycling solid waste in the Makurdi Metropolitan area of Nigeria have been sought, in tandem with their awareness of waste management options, to determine the extent to which these various approaches are utilised and to identify strategic avenues for improvement. The waste management strategies of the study area, which are typical of many developing countries, remain focused on more traditional waste collection and storage methods (dumped outside the city limits in an uncontrolled landfill site) that are not conducive to sustainable futures. Questionnaires were distributed (n = 560) throughout low (Zone I), medium (Zone II) and high density (Zone III) population areas, with different income levels, and the respondent data analysed (n = 545).

Michael *et al*, (2020) reveal that most respondents (>80%) in all of the three zones are aware of solid waste reuse, recycling and reduction from source and that many of them (>90%) are willing to participate in any associated schemes. Opinion on the responsibility for managing waste was divided, with the most affluent neighbourhood (Zone III) believing the government was accountable and the less affluent neighbourhoods disagreeing. Moreover, many from the least affluent neighbourhood (Zone I), considered solid waste to be both a serious environmental and public health risk. Concomitant with these findings, it is apparent that the infrastructure and the societal means to facilitate solid waste reduction, reuse and recycling is drastically lacking. Since there is a clear public knowledge and willingness to engage in sustainable waste management approaches, across all levels of society, it is recommended there is a shift in local authority strategy towards a sustainable hierarchy and federal government funding be forthcoming to make necessary infrastructure improvements and embrace public attitudes to solid waste reduction, reuse and recycling.

Konya, Zitte, and Ugwulor (2023) studied wastes along the Port Harcourt axis of East West Road from Choba Bridge to Rumukwurushi tank. The study was based on the characterization of wastes and its reuse and recycling potentials. Eight different waste receptacles were studied. Wastes in these receptacles were characterized and their reused and recycling potentials evaluated. Predominant wastes at each receptacle were identified through direct waste sorting and characterization. Waste scavengers were interviewed to appreciate the trend of waste sorting and characterization in Port Harcourt. Common waste discovered at the receptacles were cartons, papers , animals bones, plastics , aluminium

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plates, nylon bags, ceramic materials, vegetable stems, hospital wastes, old and damaged electronics, old computers, photocopying machines etc. The wastes in the area could be grouped into municipal wastes and they express the type of activities carried out within the study area. Reuse and recycling potentials of the characterized wastes were identified and the likely benefits of waste reuse and recycling emphasized. It was observed that: plastics could be reused or recycled into fleece jacket; aluminium cans could be reused or shredded, ground and melted to form another aluminium sheet. Bottles, glass and ceramics were observed to be reusable or recycleable into their original products. Vegetable stems and garbage could be used to produce compost and animal bones crushed and used to produce vim. Other combustible materials could be used as fuel. Awareness on reuse and recycling should generally be encouraged in society.

Materials and Methods

Study Area

The research area is Uyo Local Government Area of Akwa Ibom State, Nigeria. Geographically, located approximately between latitudes 4°53′ to 5º04’ North and longitudes 7°48′ to 8º02’ East of the Greenwich Meridian. Also, the area is located on an elevation of about 60.96 meters (2090ft), above sea level. The estimated population of Uyo based on 2025 projected population is 1,393,000 inhabitants. Uyo, which serves a dual role of State capital as well as Local Government Headquarters, is bounded by Abak, Itu, Uruan, Ibesikpo Asutan and Etinan Local Government Areas. The clans of the Local Government Area include Offot, Etoi, Oku and Ikono with a total of 79 villages (Ekpo and Essien-Ibok, 2013). Uyo people are of the Ibibio stock and speak Ibibio language. There are unique traditions of the people which are expressed in Ekpo, Ekpe masquerades and dances. The area is drained by tributaries of rivers which favour fishing activities. Its natural resources include limestone, clay, gravel, fine sandy, crude oil, and iron ore. The forest region provides timber and firewood. Because of the land expanse of the area and a favourable climate with rainfall lasting about 10 months in the year, the people are predominantly farmers producing such food items as upland rice, cocoa, palm produce, banana, cassava and other root crops.

Research Design and methods

The research design adopted for this study was survey design. Survey is the process of collecting data from a target population through either questionnaires or interview instrument and subjecting such data to statistical analysis for the purpose of drawing conclusion. The survey research design was adopted because sample that can represent the whole population of the study was chosen and inferences drawn from the results of analysis of available data. It involved the collection of data using observational method such as questionnaire to

accurately and objectively described research variables of the study. The population used in the study was also qualified for generalization.

Study Population and Sample Size

The population of this study consisted of all inhabitants of Uyo Local Government Area of Akwa Ibom State. Available statistics show a total population of 1,393,000 inhabitants. (NPC projected population, 2025). The sample for the study was 250 respondents purposively selected from five wards randomly drawn from the population. The researcher drew 50 respondents from each community, thus giving a total of 250 respondents which constitute the sample of the study.

Sampling Techniques

Simple random sampling was used to select the samples for this study. The entire population of the study was grouped into their respective wards in the area. Then, five wards out of eleven were chosen using simple random technique. From each selected wards two communities were selected using simple random technique making a total of ten communities in all. Thereafter, names of the ten communities were written on pieces of paper, folded, placed inside a basket and thoroughly mixed to avoid bias. Five communities were selected from the basket one after another with replacement using the blind folded method. Replacing each piece of paper after selection was to ensure that at each time, there were ten pieces of paper in the basket, thus giving the researcher equal chance of selecting each community.

Any piece of paper picked the second time was dropped back into the basket without recording until the desired number of communities was obtained. After picking the 5 communities, 50 adults with age range of 18 and above were selected from each community making a total of 250 respondents. The statistical tool used in testing the null hypotheses was One Way Analysis of Variance.

Result

HO_1: There is no significance influence of waste recycling on sustainable livelihood.

In the hypothesis one, the independent variable is waste recycling and the dependent variable is sustainable livelihood. The statistical tool used in testing the null hypothesis was One Way Analysis of Variance. The Analysis on table 1 shows that the calculated P – level of 0.000 was found to be less than the Critical P – level of 0.05 level of significant with the degree of freedom (Df) 2,247 indicating that waste recycling has significant influence on sustainable

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livelihood. Thus Null Hypothesis was rejected which the alternate hypothesis was accepted (see Table 1).

Table 1: Analysis of Variance to Determine the Level of Influence of Waste Recycling on Sustainable Livelihood (n=250)

Source of variance	Sum of Squares	Df	Mean Square	F- ratio	P-level
Between	8,658.092	2	4,329.046	154.084	0.000
Within	6,939545	247	28.095		
Total	15,597.637	247			

P > 0.05: df 2,247:

HO_2: There is no significance influence of waste reuse and sustainable livelihood.

In the hypothesis two stated above in null form, the independent variable is waste reuse and the dependent variable is sustainable livelihood. The statistical tool used in analyzing the null hypothesis was One Way Analysis of Variance. The Analysis on table 2 shows that the calculated P – level of 0.000 was found to be less than the Critical P – level of 0.05level of significant with the degree of freedom (Df) 2,247 indicating that waste reuse has significant influence on sustainable livelihood. Thus Null Hypothesis was rejected which the alternate hypothesis was accepted (see Table 2).

Table 2: Analysis of Variance to Determine the Level of Influence of Waste Reuse on Sustainable Livelihood (n=250)

Source of variance	Sum of Squares	Df	Mean Square	F – ratio	P- level
Between	15,281359	2	7,640.679	291.521	0.000
Within	6,473.806	247	26.210		
Total	21,755.165	249			

P > 0.005: df 2,247

Discussion of findings

Waste Recycling on Sustainable Livelihood

The result of the study indicated that waste recycling has significant influence on sustainable livelihood in Akwa Ibom State. The result is in line with the assertion of United Nations Environmental Programme (UNEP, 2019) that recycling improves the availability of resources whilst reducing the overall environmental impact of material production. Also, as the recycling and reuse of materials is an economically viable undertaking, small enterprises have and will continue to spring up whenever there is an opportunity. In fact, the theft of

source-separated recyclable materials has been documented in many pilot schemes in both developed and developing nations (UNEP, 2019). Municipalities should not only recognize the trade in recyclables, they should embrace it. In the contrary, Mohammed (2022), posited that waste pickers can be very effective to reduce the amount of plastic, glass, metal and paper, ultimately requiring disposal, pursuing these activities can be harmful to workers' health. Nevertheless, incorporating waste pickers into organized or formal recycling programmes can improve the quality of their working conditions and the local environment (Mohammed, 2022). Furthermore, the study correspond with that of Lieng and Bruemmer, (2022) who posited that waste recycling is an alternative to conventional waste disposal that can save material and help lower greenhouse gas emissions. The authors noted that recycling can prevent the waste of potentially useful materials and it is a key component of modern waste reduction as well as the third component of reduce, reuse and recycle waste hierarchy. In the same vain, recycling as an integrated waste management option is a key element of sustainable development because recycling is critical in the era of resources scarcity (Strange, 2021).

Waste Reuse on Sustainable Livelihood

The study showed that waste reuse has significant influence on sustainable livelihood in Akwa Ibom State. The result of the study is in tandem with the assertion of Bonnie (2023) who posited that sustainable waste management is the collection, transportation, processing, monitoring and reuse of waste. The author further noted that waste reuse is a way to recover resources from wastes and also involves managing of solid, liquid, or gaseous waste in an environment friendly manner to enhanced sustainable livelihood. In contrary to the result of the study, Agbaeze, Onwuka, and Agbo, (2024) observed that the solid waste management system in practice in the Enugu state is unscientific, unsustainable and at the prerogative of people in power. It was discovered that the current waste management system has no room for waste recycling, reuse and repair, therefor, affecting the livelihood of the people and the environment at large. Agbaeze, Onwuka, and Agbo, (2024) also noted that there was no provision for waste segregation, reuse and reduction at source as waste is dumped at open landfill causing environmental pollution. The of study corresponded with that of Agbaeze, Onwuka, and Agbo, (2024) who proposed system that outlined a framework of waste segregation, recycling, reuse, reduction, repair and abolition of certain polythene bags with less or no economic value. Also, the result of the study is similar to that of Tunmise (2024) who posited that attitudes of the waste generators in the community appears to be critical as their understanding in waste reuse eventually play a significant role in providing answers to municipal solid waste management problems in Lagos State. Individual involvement has a direct bearing on an effective practice of waste reuse for promotion if environmental

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sustainability (Tunmise 2024). Tunmise (2024) investigates factors influencing individual waste reuse and recycling performance and their likelihood to participation in Lagos State. The result shows that economic benefits and gender are significant towards waste reuse and recycling participation in Lagos.

Conclusion

Waste recycling, reuse and sustainable livelihood has emerged as one of the challenges of urban cities especially in the developing countries. Waste recycling and reuse are process of converting waste materials into another use or new materials and objects. The study indicated that it is an alternative to conventional waste disposal that can save material and help lower greenhouse gas emissions. The aimed of the study was to evaluate the influence of waste recycling/reuse and sustainable livelihoods in Uyo Akwa Ibom State, Nigeria. The specific objectives include; to assess the influence of recycling on sustainable livelihood and to determine the relationship of waste reuse on sustainable livelihood. The result indicated that waste recycling and waste reuse has significant influence on sustainable livelihood in Akwa Ibom State, Nigeria.

Recommendations

The following are recommended that:

There is need for massive enlightenment campaigns to sensitize the people on sustainable waste recycling and reuse as well as outlining it economic benefits. .

There is need also to encourage the reuse of reuse-able waste materials, raise public awareness about environmental issues and encourage recycling as it is economically viable.

Government at all level should also consider the option of public-private partnership which has been adopted with huge success in other climes.

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