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The Practices of At-Source Segregation of Plastic Bottles in Households in Yelwa Tudu Bauchi, Nigeria

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Abstract

This study explores household-level practices of at-source segregation of plastic bottles in Yelwa Tudu, Bauchi, and their implications for effective solid waste management. Employing a descriptive survey design, the research examines how households separate plastic bottles at the point of generation and the extent to which this practice contributes to sustainable waste management strategies. Primary data were collected from 107 respondents using Google Forms and structured interviews, while secondary data were sourced from a review of relevant literature. Findings reveal that only 36% of households actively segregate plastic bottles at the source. Notably, 84% of respondents reported not using plastic water bottles, a trend possibly linked to the community's socio-economic profile. Households manage used plastic bottles in diverse ways: 30% sell them to waste collectors, 48% reuse them for domestic purposes, 58% give them to informal waste pickers, and 23% discard them, often for scavengers to collect. Middlemen purchase these bottles at NGN10-NGN15 each, while industries offer NGN15-NGN20 per bottle. The study concludes that at-source segregation, supported by informal waste collection networks, plays a critical role in reducing landfill volumes, improving the quality of recyclables, and lowering greenhouse gas emissions, while also creating livelihood opportunities for low-income individuals. To enhance these outcomes, the study recommends targeted public education, infrastructural support, and enabling policy frameworks that encourage at-source segregation and integrated waste management.

Keywords

At-Source Segregation;
Plastic bottles;
Recycling.

INTRODUCTION

Waste will continue to increase for as long as humans continue to exist, consume, and use recyclables like plastic, metals, glass, paper, and electronics (scientiang insghts, 2024). The world's plastic production is staggering, with 391 million tons produced in 2021, and projected to exceed 1,100 million tons annually by 2050 (Plastics Europe, 2022). The environmental impact is significant, with plastics accounting for 15% of annual greenhouse gas emissions, which must be limited to prevent global temperatures from rising by 1.5°C (Al-Shihabi, 2024).

A worldwide issue that requires consistent attention is effective solid waste management, and at-source segregation of household solid waste is a crucial first step in achieving this goal. Sustainable solid waste management is a global concern (Tanwi Trushnaa Kavya Krishnan et al, 2024). An effective measure to improve the waste management levels and convert household solid waste into useful materials is to conduct source separation instead of just collecting and burning or burying it. Plastic waste is a major component of household solid waste, which poses significant environmental and public health concerns worldwide. Plastics have significant beneficial properties that are difficult to obtain using other materials, for example depending on the polymer type, it is possible to heat, sterilize and manipulate plastics while maintaining their structural properties (Horton, 2021).

Nigeria, with a population of approximately 186 million, lacks comprehensive data on plastic material usage, disposal, collection, and recycling methods in relation to city populations. Although a few plastic waste

recycling companies operate in select cities, most of the plastic waste poses immediate and future environmental dangers due to inadequate disposal practices (R. U. Duru et al, 2021). In terms of plastic bottle recycling, PET (polyethylene terephthalate) bottles are the most recycled type in Nigeria (scientiang insghts, 2024). The main driver of growth for PET (polyethylene terephthalate) bottles in Nigeria has been the food and beverage sector with water industry accounting for about sixty-five percent (65%) of PET (polyethylene terephthalate) usage in Nigeria (Foraminifera, 2018). The demand for PET (polyethylene terephthalate) plastics is estimated to rise at about seven percent (7%) annually over the next ten (10) years. With the growing demand for carbonated soft drinks, water and edible oil, PET (polyethylene terephthalate) Preform bottles are also increasing in demand (Foraminifera, 2018).

The rapid growth in population, urbanization, and consumption patterns has led to an alarming increase in household solid waste generation. Research has demonstrated that at-source segregation can significantly minimize landfill waste, enhance the quality of recyclables, and reduce greenhouse gas emissions. However, despite its benefits, this approach has been largely overlooked in developing countries, where it is often implemented informally. Several factors hinder the adoption of at-source segregation, including limited public awareness, inadequate regulatory frameworks and enforcement, insufficient economic incentives, and low prioritization in planning (Kihila, J. M. et al, 2021). Domestic waste management is a significant environmental and public health challenge worldwide, exacerbated by

population growth, urbanization, and consumerism (Kumar R. Samadder S. R. & Kumar V, 2022). Developing countries face significant challenges, including inadequate infrastructure, lack of resources, and poor governance, leading to improper waste disposal and contamination of water sources (Amoah S K et al, 2020).

In Nigeria, the average person generates 0.74 kilograms of trash per day, translating to over 269 million tons of waste per year, equivalent to filling the Eko Atlantic City 12 times (World Bank, 2020). Bauchi, a city in northern Nigeria, faces significant waste management challenges due to rapid urbanization, influx of internally displaced persons, and inadequate legal provisions, institutional framework, economic incentives, and technical capacity (World Bank, 2020).

Effective domestic waste management necessitates a collaborative approach involving governments, private entities, and individuals. Strategies for improvement include implementing waste reduction and recycling programs, investing in waste infrastructure, and promoting public awareness and education (UNEP, 2020). Addressing waste management challenges is critical to mitigating environmental and health impacts. Bauchi, the capital city of Bauchi State, Nigeria, with a population estimated at 881,600 (CITY POPULATION, 2022), is experiencing rapid urbanization. This growth has led to the development of unplanned suburbs and an influx of internally displaced people from the north-east region. A walk through Yelwan Tudu, a suburb of Bauchi, reveals the community's struggles with waste management. The streets, open spaces, and

drainage channels are overwhelmed with garbage, often burned indiscriminately. The hazardous mix of biodegradable and non-biodegradable waste poses a significant risk to nearby residential areas. Notably, a closer inspection reveals a surprising scarcity of plastic bottles in the waste dumps. This observation prompts the following research questions:

- What is the average percentage household generation rate of used plastic bottles in Yelwa Tudu?
- How do households in Yelwa Tudu handle their plastic bottle waste?
- What are the average buying prices of plastic bottle waste in Yelwa Tudu?
- Why do households in Yelwa Tudu sell plastic bottles?

1. Methodology:

This study employed a mixed-methods approach, combining both qualitative and quantitative data collection and analysis methods. A survey questionnaire was administered to a sample of 107 households to gather data on their at-source handling of used plastic bottles. Additionally, interviews were conducted with waste management officials and stakeholders to gather data on the challenges and opportunities of implementing at-source segregation of used plastic bottles.

2.1 Study Area

The study area is Yelwa Tudu community, a ward in the suburb of Bauchi metropolis in Bauchi State, Nigeria. **Bauchi** (Local Government Area, **Nigeria**) has a projected population of 881,600 Population [2022] - Projection; 3,219 km² Area; 273.9/km²

Population Density [2022]; 3.7% Annual Population Change [2006 → 2022] (CITY POPULATION, 2022). Average Household size 6.0 (persons) in 2010 (National Bureau of Statistics Nigeria, Accessed 2024). The approximate population of Yelwa Tudu is put at 2000 people based on projection from the households, population and land area.

2.2 Population and Sample

The research population consists of the households in Yelwa Tudu a small segment of suburb of Bauchi Local Government and a state capital in Nigeria, West Africa. The segment of the suburb serves as part of the host communities to the satellite campus of the Abubakar Tafawa Balewa University (ATBU) and Government Unity College and has an approximate total population of 2000 people with sex ratio - males per 100 females of 103.3 (National Bureau of Statistics Nigeria, Accessed 2024) that is (1016 males and 984 females) and approximately 333 households based on 6 persons/household (National Bureau of Statistics Nigeria, Accessed 2024).

Yelwa Tudu is cosmopolitan with virtually all the major tribes in Nigeria represented. There is a small neighborhood market that serves the community with Sunday being observed as a market day. The approximate distance from Bauchi Central Business District (CBD) to Yelwa Tudu is around 5-7 kilometers (3-4 miles). However, this distance may vary depending on the specific location within the CBD and Yelwa Tudu. Travel time by car: 10-20 minutes (depending on traffic), whilst travel time by motorcycle is: 15-30 minutes (depending on traffic). The suburb is bounded by a Federal Trunk A Road (Bauchi - Dass - Tafawa Balewa Road) and is serviced by two asphalt concrete paved accessed roads into the community. The runoff within the community is drained by the roadside drainages and a small stream serving as an outfall to a double cell box culvert on the Trunk A road. Basically, Yelwa Tudu is an informal settlement where people live in mostly self-built structures (Plate 1 below shows a typical street in the informal settlement).



Figure 1: Plate I: a typical street in Yelwa Tudu informal settlement.

Source: Field work

2.3 Data Collection Methods

- i. Survey Research: Conduct a household survey in Yelwan Tudu, Bauchi, to collect data on at source handling of plastic bottle waste to find out:
 - a. the average household percentage generation rate of plastic bottle waste in Yelwa Tudu
 - b. the handling of their plastic bottle waste
 - c. the average buying prices of plastic bottle waste in Yelwa Tudu; and
 - d. the reason households in Yelwa Tudu sell plastic bottles
- ii. Key Informant Interviews: Conduct in-depth interviews with:
 - a. The Bauchi State Environmental Protection Agency (BASEPA), government officials responsible for waste management
 - b. Waste management firm representatives
 - c. Community leaders and residents
 - d. Experts in waste management and environmental health
- iii. Observational Study: Conduct a waste observation study to assess waste composition and quantity of used plastic bottles on the collection centers/community refuse dumps.

- iv. Secondary Data Collection: Collect existing data from:

- a. Government reports and policies
- b. Academic literature
- c. International organizations' reports (e.g., World Bank, UNEP)

A total of 107 household representatives were randomly selected and interviewed for this study. The sample size was determined by time constraints, budget limitations, and the accessibility of potential respondents. Due to these constraints, a non-probability sampling approach was employed, utilizing convenience sampling to collect primary data using google designed to capture data from available and willing household representatives in four designated areas.

To gain a more nuanced understanding, this study combines the researchers' observations and insights from key informants within the settlement with a comprehensive review of existing data. A retrospective analysis was conducted using information obtained from BASEPA, the agency which oversees solid waste management in the town.

To gather more detailed information, field surveys were conducted in the study area and at the existing dumpsites, focusing on various types of waste generated. The field survey utilized global positioning equipment to pinpoint the locations of refuse dumps. The spatial data collected was integrated with Geographic Information System (GIS) technology to create a detailed map of waste collection points. The coordinates (Easting and

Northing) and names of these points were recorded and stored in a database, which was then imported into Arc Info GIS software for spatial analysis.

A layer of waste collection points was created and overlaid onto a digitized map derived from satellite imagery of the study area. The resulting map (Figure 1) illustrates the spatial distribution of waste collection points, providing valuable insights into waste management patterns in the area. A survey questionnaire was designed and administered using Google Forms, which was then

distributed to 107 randomly selected households through in-person interviews. The online form was accessible for a period of two weeks, allowing respondents to provide their answers. The collected data was automatically compiled into an Excel sheet and analyzed using Google Forms' built-in analytics. To ensure data validity, the survey was restricted to household representatives aged 18 and above. Additionally, well-trained field workers were employed to conduct the interviews, guaranteeing accurate representation of the households' responses.

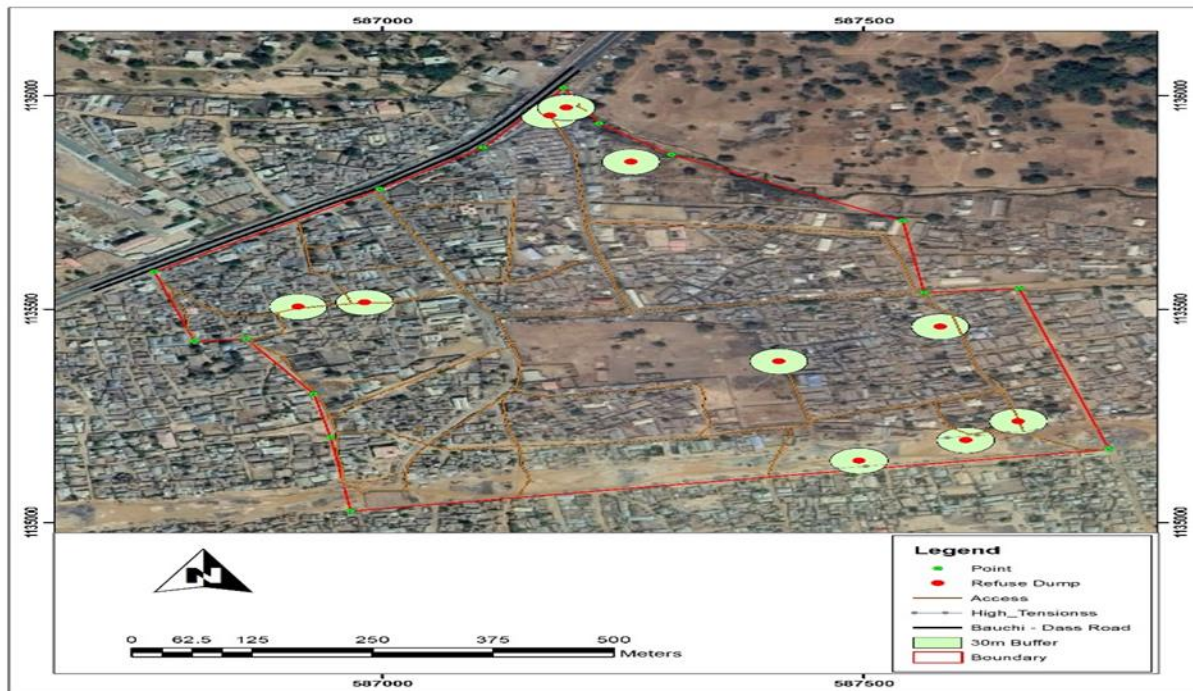


Figure 2: Satellite Imagery of Yelwa Tudu Community showing the spatial distribution of refuse dumps the study area

Source: Own Field work



Figure 3: Plate II: Refuse dump site showing absence of plastic bottles

Source: Own field work

2. Discussion of Results:

3.1 Average household percentage generation rate of used plastic bottles in Yelwa Tudu

The results from Table 1 below show that about 36% of the respondents indicated generating recoverable waste plastic bottles. According to respondent reports in Figure 3, 22 households generated 1-10 plastic water bottles daily, while 16 households reported generated other types of plastic bottles, all of which have potential for recycling or recovery. Many plastic bottles are made from a lightweight plastic material called polyethylene terephthalate (PET). PET bottles typically weigh between 8 to 12 grams for a 500ml size. A 1-liter bottle can weigh around 20 to 24 grams, and a 2-liter bottle usually

weighs around 42 to 52 grams. Keep in mind that these weights are empty bottle weights (Jones, 2023). This shows that the average disposal rate of plastic bottles per day in kilograms, based on a few assumptions as follows:

- Average weight of a 75cl plastic bottle: approximately 0.020 kg (or 20 grams) (Jones, 2023)
- Number of people disposing of 1-10 plastic bottles per day: 36% of 1000 = $0.36 \times 1000 = 360$ people
- Average number of plastic bottles disposed of per day: assume an average of 5.5 bottles per day (midpoint of the 1-10 range), therefore the total weight of plastic bottles disposed of per day: 360

people $\times$ 5.5 bottles/person/day =
 1980 bottles/day
 1980 bottles/day $\times$
 0.020 kg/bottle = approximately 39.6
 kg/day
 So, the average disposal rate
 of plastic bottles per day in the
 community is approximately
 39.6 kilograms. This figure is on the
 high side compared to the household
 plastic generation rate of Kimara, a

ward in Dar es Salaam reported as
 36.7 Kilograms by (Kihila, J. M. et al,
 2021). This could be due to the
 assumptions made in the average
 weight calculation. It requires a more
 in-depth study to determine the
 average plastic waste generation rate
 of Yelwa Tudu.

Table 1. Household Plastic Bottle waste average percentage generation values for Yelwa Tudu

Type of Plastic Bottle	Average NO/Day	Remarks
Waste water plastic bottle	22/Households(6Pers/Household) disposed between 1-10 bottles	A Total of 38 households out of 107 Households interviewed representing: (22+16)/107=36%
Other plastic bottles	16/Households(6Pers/Household) dispose between 1 - 10 other bottles	

A significant proportion (84%) of households in Yelwa Tudu reported not using plastic water bottles, which may be indicative of the community's socio-economic status. As a low-income urban slum, Yelwa Tudu's consumption patterns are consistent with global trends. According to the World Bank, waste composition varies across income levels, reflecting differences in consumption patterns. In high-income countries, waste is predominantly composed of dry, recyclable materials such as plastic, paper, and glass. In contrast, middle- and low-income countries generate a higher proportion of organic waste. Notably, low-income countries have a lower proportion of recyclable materials in their waste stream (The World Bank, 2025). (The World Bank, Accessed 2025).

Implications:

- Need for education and awareness: The findings suggest that households may not be aware of the importance of segregating plastic bottles at source, highlighting the need for education and awareness campaigns.
- Infrastructure for segregation and collection: The prevalence of plastic bottle waste emphasizes the need for adequate infrastructure to support segregation and collection, such as designated bins and regular collection services.
- Opportunities for recycling: The quantity of plastic bottles disposed per household presents opportunities for recycling and reducing waste sent to landfills.

Recommendations:

- Implement education and awareness programs: Conduct targeted education and awareness campaigns to inform households about the importance of segregating plastic bottles at source.
- Develop infrastructure for segregation and collection: Provide designated bins and regular collection services to support

households in segregating and disposing of plastic bottles.

- Establish recycling programs: Develop recycling programs to process collected plastic bottles, reducing waste sent to landfills and promoting a circular economy.

By addressing these recommendations, households in Yelwa Tudu can adopt more effective at-source segregation practices, reduce plastic bottle waste and promoting a more sustainable environment.

How many plastic bottles do you generate/use daily?

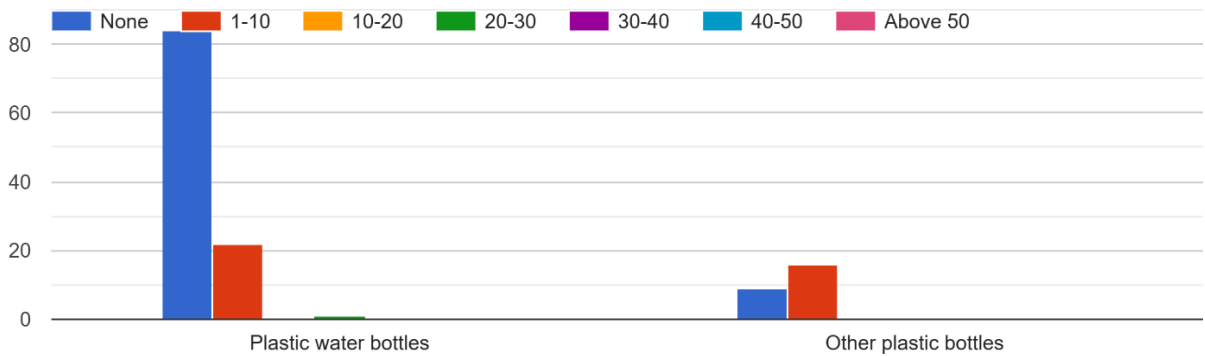


Figure 4: Plastic bottle waste generated in Yelwa Tudu

3.2 Handling of plastic bottle waste at households in Yelwa Tudu

Table 2 below reveals that 30% sell to waste collectors, 48% retain the bottles for own/use, 58% would give freely to waste pickers and only 23% have no use but would dispose off the bottles which eventually gets picked up by scavengers/waste pickers. A significant proportion (58%) of waste plastic bottles was observed to be freely given to

recyclers which suggest that recycling business does not yield high incomes and community members do not consider selling recyclables as an important source of income. Therefore, waste recycling was affected by both the community's perceived value of recyclables and the practice of mixing all waste components. Even though waste is not segregated, recycling is to some extent is informally practiced in Yelwa Tudu through

waste pickers- plastic bottle recyclers route whereby recyclables waste plastic bottles are picked by waste pickers and sold to the recyclers. Community members are involved in the recycling chain through either picking or allowing waste pickers to sell the recyclables.

Implications:

- Informal waste management systems: The prevalence of selling to waste collectors and giving away to waste pickers underscores the significance of informal waste management systems in Yelwa Tudu.
- Environmental awareness and education: The findings suggest that while some households demonstrate environmental awareness through reusing plastic bottles, there is a need for education and awareness campaigns to promote sustainable waste management practices.
- Waste reduction and recycling: The data highlights opportunities for waste

reduction and recycling, particularly through reusing plastic bottles and promoting recycling programs.

Recommendations:

- Strengthen informal waste management systems: Support and formalize informal waste management systems, including waste collectors and waste pickers, to improve waste collection and recycling.
- Promote environmental education and awareness: Conduct targeted education and awareness campaigns to promote sustainable waste management practices, including reusing and recycling plastic bottles.
- Develop waste reduction and recycling programs: Establish waste reduction and recycling programs, including recycling facilities and collection services, to promote a circular economy and reduce waste sent to landfills.

Table 2. Handling of the Plastic Bottle waste at households in Yelwa Tudu

Handling of water plastic bottle waste at household level	Yes	No
Sell to waste collectors	32 (30%)	75 (70%)
Own/ reuse	51(48%)	56(52%)
Give free to waste pickers/collectors	62(58%)	45(42%)
No use rather than disposing them	25(23%)	82(77%)

Source: Field work

What do you do with the plastic bottles generated?

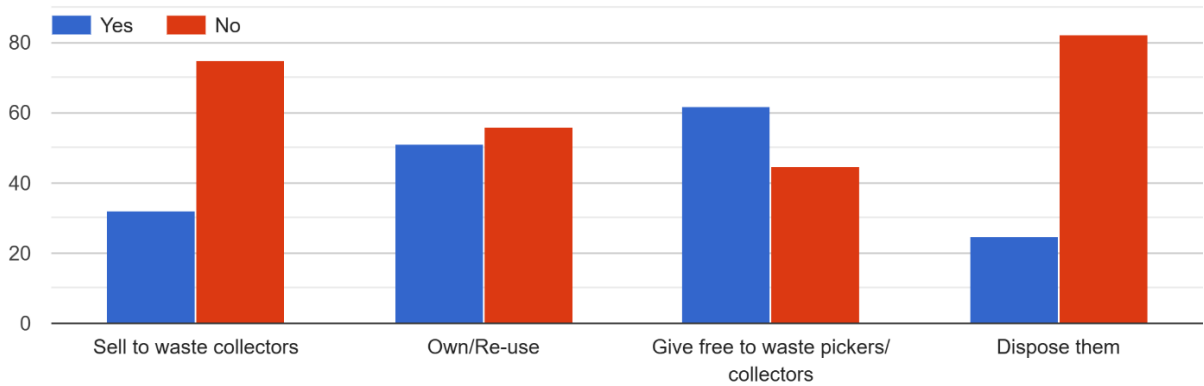


Figure 5: Handling of plastic bottles in Yelwa Tudu (Source: Field work)

3.3 Average buying prices of plastic bottle waste in Yelwa Tudu

Informal recycling centres situated along the main trunk road were observed during the fieldworks. The normal practice is that used plastic bottles from households and dumping sites are collected by waste pickers and sold to the recycling centres (who act as middlemen in this business), who eventually sells them to the recyclers (Industries). The recycling centres by middlemen are unregistered and the business is informal. The type, amount and price for selling the waste are recorded in Table 3 with observations, implications and recommendations outlined below:

Key Observations:

- Price range: The buying prices of plastic water bottle waste range from NGN 5 to NGN 30, with varying prices offered by middlemen and industries.

- Middlemen prices: Middlemen offer prices between NGN 5-15, with 68% offering NGN 5-10 and 32% offering NGN 10-15.
- Industry prices: Industries offer higher prices, ranging from NGN 10-30, with 74% offering NGN 15-20 and 16% offering NGN 20-30.

Implications:

- Economic incentives: The prices offered by middlemen and industries provide economic incentives for households and waste collectors to participate in the plastic water bottle waste market.
- Market dynamics: The price range and variation between middlemen and industries suggest a dynamic market with opportunities for negotiation and price setting.
- Value chain: The prices highlight the importance of the value chain in plastic water bottle waste management, with

different actors playing roles in collecting, sorting, and processing waste.

Recommendations:

- Price standardization: Consider standardizing prices for plastic water bottle waste to ensure fairness and transparency in the market.
- Market development: Support the development of the plastic water bottle

waste market by providing infrastructure, training, and access to finance for waste collectors and industries.

- Value chain optimization: Optimize the value chain by improving efficiency, reducing costs, and increasing the quality of plastic water bottle waste collected and processed.

Table 3. Buying prices of water plastic bottle waste in Yelwa Tudu

Type of waste	Buying prices			
	Middlemen	N0	Industries	N0
Plastic water bottle waste	NGN5 - 10	73(68%)		
	NGN10 - 15	34(32%)	NGN10 - 15	11(10%)
			NGN15 - 20	79(74%)
			NGN20 - 30	17(16%)

.How much are the plastic bottles sold for?

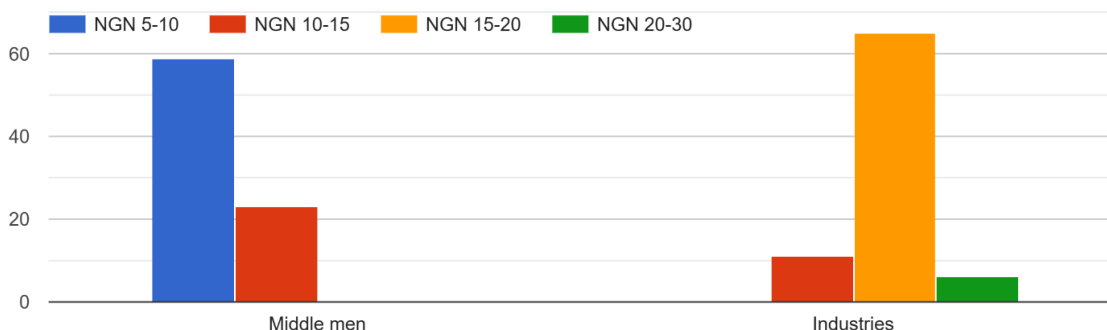


Figure 6: Cost of plastic bottle waste in Yelwa Tudu

3.4 Reasons for selling waste plastic bottles in Yelwa Tudu

Figure 6 illustrates the motivation behind selling plastic bottle waste in the community. The results indicate that community members are driven to sell plastic waste bottles for various reasons, including:

- Pollution prevention (93% of respondents)
- Converting waste into valuable resources (92% of respondents)
- Reducing environmental impact (92% of respondents)
- Cost savings and income generation (100% of respondents)
- Promoting a circular economy (95% of respondents)

Interestingly, while financial gain is a significant motivator, the community's commitment to preventing pollution and addressing environmental concerns is equally important. This finding aligns with studies conducted in Malaysia and Ethiopia, which highlighted intrinsic motivation and individual commitment as primary drivers (Aini Mat Said et al, 2002).

Table 4. Reasons for selling

Reasons for selling	Yes	No
Reduced Waste Volume	99(93%)	8(7%)
Improved Resource Recovery (turning waste into valuable resources)	98(92%)	9(8%)
Reduced Environmental Impact (greenhouse gas emission, air and water pollution)	98(92%)	9(8%)
Cost Savings	107(100%)	0
Promotes a Circular Economy (resources are reused and recycled rather than being discarded)	102(95%)	5(5%)

QWhy do you sell the plastic bottles?

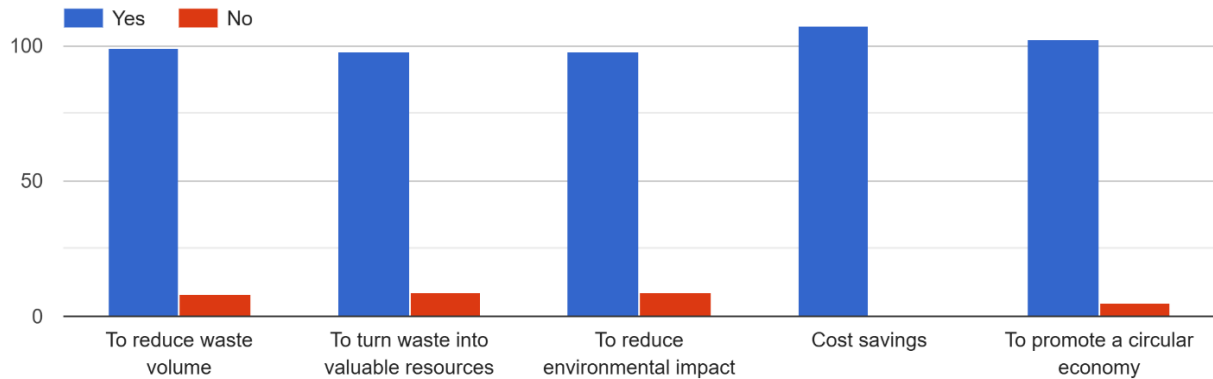


Figure 7: Reasons for selling waste plastic bottles in Yelwa Tudu

Key Observations:

- Overwhelming motivation: Cost savings is the primary motivation for selling plastic water bottle waste, with 100% of respondents citing this reason.
- Environmental considerations: Reduced environmental impact (92%), reduced waste volume (93%), and promotion of a circular economy (95%) are also significant motivations.
- Resource recovery: Improved resource recovery (92%) is another important reason for selling plastic water bottle waste.

Implications:

- Economic benefits: The primary motivation of cost savings highlights the economic benefits of selling plastic water bottle waste.
- Environmental awareness: The significance of environmental considerations suggests

that households in Yelwa Tudu are aware of the environmental impacts of their actions.

- Circular economy: The promotion of a circular economy through the sale of plastic water bottle waste indicates a willingness to adopt sustainable practices.

Recommendations:

- Incentivize sustainable practices: Offer incentives, such as subsidies or tax breaks, to encourage households to adopt sustainable practices like selling plastic water bottle waste.
- Improve waste management infrastructure: Develop adequate waste management infrastructure to support the collection, sorting, and processing of plastic water bottle waste.
- Promote education and awareness: Conduct education and awareness campaigns to promote the benefits of selling plastic

water bottle waste and encourage households to adopt sustainable practices.

3.5 Policy framework on water bottle waste segregation

The Bauchi State Environmental Protection Agency (BASEPA LAW, 2017) is the organ of government with the mandate to amongst other functions: a) Re-introduce and strengthen sanitary inspection of premises (House to House Sanitary inspection) for detection and abatement of nuisance. b) Promote a healthy environment by ensuring sanitary solid waste management. c) Minimize waste generation and promote sorting at source, reuse, recycling and energy recovery (RRR). Ensure safe and nuisance-free disposal of urban and rural domestic medical and industrial wastes to adequately protect public health during and after collection, transportation, treatment and final disposal, etc.

The Law also includes provision to honour, adopt and execute all existing bilateral and multilateral agreements, memorandum of understanding cultural obligations including entering mutually beneficial joint venture with international agencies non-governmental organization, private voluntary organizations and individuals. i) Research, collect and collate information and research findings in various environmental disciplines. j) Store information, develop libraries and archives and develop and maintain a data base on the environment. k) Stimulate public interest on environment by dissemination of information, sponsor environmental education programmes in schools, mass media and other formal and informal sectors. l) Sponsor and conduct training programmes for industrial, commercial

and public institutions and recruit and train sanitary engineering managers and environmental extension workers for the purpose of effective mobilization of the public towards environmental education and awareness.

To support the implementation of the policies and regulations and attain sustainable waste management (including RRR), several strategies have been attempted by BASEPA. The established monthly sanitation day and routine collection of refuse from designated dump sites in Yelwa Tudu is a notable achievement in waste management. However, inadequate resources have limited the effectiveness of this initiative. In addition, reforms to the management cycle have been introduced by BASEPA where waste management companies are registered and licensed in public private partnerships where the aim is to bring the private sector into a more active role in the solid waste management chain, including the collection, recycling and disposal of waste. Despite the existence of the public private partnership policy its implementation continues to face challenges and inadequate operationalization due to inadequate funding.

4. Conclusion:

The study on the practices of at-source segregation of plastic bottles in households in Yelwa Tudu has provided valuable insights into the current state of plastic waste management in the area. The findings highlight the significance of informal waste management systems, the economic benefits of selling plastic water bottle waste, and the environmental awareness of households. This

study reveals that households in Yelwa Tudu informally practice at-source segregation through the efforts of waste pickers who collect plastic bottles for economic benefits. Observations of 10 refuse dumps in the area confirmed this, showing a noticeable absence of used plastic bottles, thereby contributing to waste reduction in line with the Reduce, Reuse, Recycle (RRR) principle.

Households that practiced at-source segregation of plastic bottles, regardless of motivation, achieved significant reductions in waste sent to landfills and improvements in recyclable quality. However, focus group discussions with waste management officials highlighted challenges hindering widespread adoption of at-source segregation, including inadequate funding, lack of awareness, insufficient infrastructure, and insufficient policy support.

Encouraging waste segregation and recycling practices necessitates the development and enforcement of effective policies and guidelines. Scholars recommend policy options that provide economic incentives for reuse and recycling, which could be beneficial in this context. To transform waste management practices, policymakers should initiate a review of existing policies to incorporate measures that promote and formalize recycling practices, offer economic incentives for recycling and reuse. By integrating these policy options, governments can create an enabling environment that fosters sustainable waste management practices (Kihila, J. M. et al, 2021).

The policy framework outlined by the Bauchi State Environmental Protection Agency (BASEPA LAW, 2017) is quite comprehensive,

aiming to promote a healthy environment, minimize waste generation, and ensure safe disposal of waste. However, the findings of the study reveal a gap between the policy's intentions and its implementation.

On one hand, the policy's emphasis on sorting at source, re-use, recycling, and energy recovery (RRR) is commendable. The establishment of a monthly sanitation day and routine collection of refuse from designated dump sites in Yelwa Tudu is a step in the right direction. Additionally, the introduction of reforms to the management cycle, including public-private partnerships, is a positive move.

On the other hand, the study highlights the challenges faced in implementing these policies, particularly due to inadequate resources and funding. This has limited the effectiveness of the initiatives, and the public-private partnership policy, despite its potential, remains underutilized.

To bridge this gap, it is essential to address the funding constraints and provide adequate resources to support the implementation of these policies. Moreover, increased community engagement and education are crucial to promote awareness about the importance of waste segregation and management. By addressing these challenges, the policy framework can be effectively implemented, leading to improved waste management practices in Yelwa Tudu.

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