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BARRIERS AND SOLUTIONS FOR SUSTAINABLE HOUSEHOLD WASTE MANAGEMENT IN LAGOS, NIGERIA



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CONTEXT

Waste management is a growing challenge in Nigeria, with major environmental, health, and economic implications for its population. Globally, Nigeria ranks ninth among countries with the highest contribution to plastic pollution, with an estimated 2.5 million metric tons (MT) of plastic waste generated annually (Yalwaji, John-Nwagwu, and Sogbanmu 2022). Lagos State is the most populous urban area in Nigeria and generates more than 13,500 MT of waste per day. Located along the coast, with a vast network rivers and lagoons, waste in Lagos State often ends up in canals, drains, and the ocean instead of designated dumpsites, clogging waterways and causing floods (UNIDO 2021).

Several factors hinder adequate household waste management practices in Lagos. The infrastructure for waste collection and disposal is lacking, with insufficient waste collection trucks and storage capacity, overflowing and limited dumping sites, and inadequate recycling plants or companies.

While these structural gaps will have to be filled to promote sustainable waste management in Lagos, behavioral science can also play a vital role in uncovering how decisions that affect the environment are made. Understanding the psychological capacity, social influence, and motivations that drive waste management decisions among families in Lagos can support the design of effective policies and interventions.

This note sheds light on psychological, cognitive, emotional, cultural, and social factors contributing to waste mismanagement by Lagosians and provides recommendations for overcoming them. Based on a survey and qualitative data collected from residents of Lagos, this document summarizes the challenges that individuals face at various stages of the waste management journey—from planning and shopping, till final disposal.¹

¹ This note was prepared by Kaamila Patherya, Ailin Tomio, and Jorge Castaneda. The study was led by a team from the Mind, Behavior, and Development Unit (eMBeD) at the Poverty and Equity Global Practice and the Environment, Natural Resources and Blue Economy Global Practice of the World Bank. The study was part of the activity *Reducing Marine Plastic Pollution and Creating Plastic Recycling Market in Lagos State, Nigeria*. Survey data were collected by the Resource and Environmental Policy Research Centre, Environment for Development initiative (REPRC-EfD) at the University of Nigeria, Nsukka. The activity was jointly financed by the PROBLUE and the Sustainable Urban and Regional Development (SURGE) Multi-Donor Trust Funds, housed at the World Bank. For more information, visit the official websites:
- eMBeD: <https://www.worldbank.org/en/programs/embed>;
- PROBLUE: <https://www.worldbank.org/en/programs/problue>; and
- SURGE: <https://www.worldbank.org/en/programs/surge/about>.

DESIGNING BEHAVIORALLY-INFORMED SOLUTIONS

Behaviorally informed policy emphasizes the importance of context in decision-making and behavior. Sustainable waste management involves a collection of behaviors by individuals, communities, and organizations that reduce generation, promote reuse, and result in proper collection and disposal of waste.

Behavioral science can uncover the psychological and contextual barriers to adopting these behaviors, thereby supporting the development of evidence-based policies tailored to the needs and preferences of the people of Lagos.

There is ample evidence on how behavioral approaches have successfully induced sustainable behaviors in different contexts, such as targeting social norms, altering default options, and providing feedback (Egebark and Ekström 2016; Harder, Woodard, and Bench 2006; Sibley and Liu 2003; Tucker 1999).

ABOUT THIS STUDY

Context driven: Resources are devoted to carefully defining the behaviors underpinning sustainable household waste management and thoroughly diagnosing the barriers to sustainable behaviors, such as waste reduction, repurposing or reusing, sorting, and appropriate disposal.

Empirical: Multiple solutions are tested, based on different assumptions about individuals' choices and behavior.

Agile: Results are used to learn and adapt the solution design and feed into a new round of definition, diagnosis, design, implementation, and testing; this refinement process continues as the solution is scaled up.

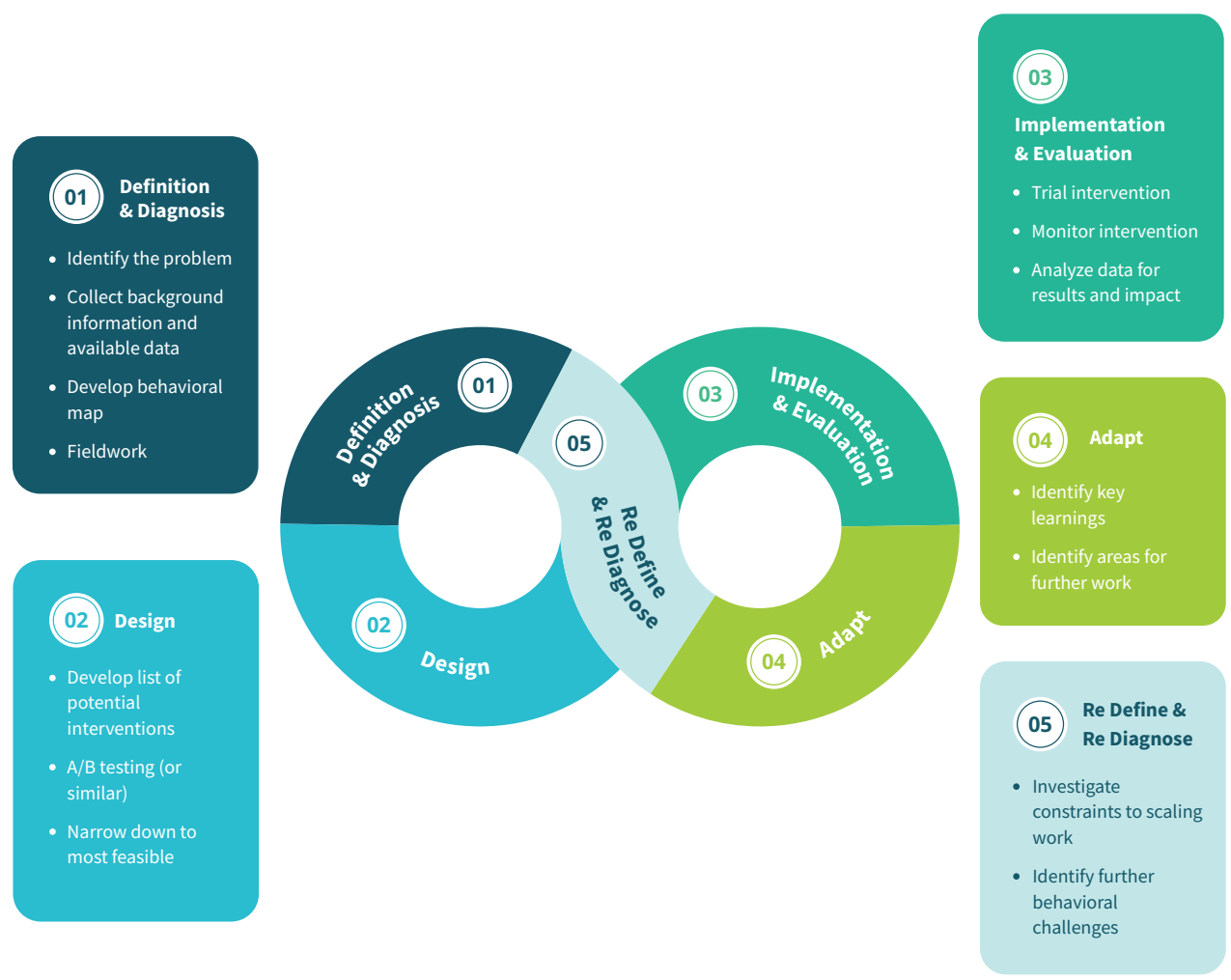


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Figure 1. Behaviorally-informed project lifecycle



Source: Adapted from Boudet et al. 2023.



THE WASTE MANAGEMENT JOURNEY: IDENTIFYING BEHAVIORS AND BARRIERS

The journey of individuals was mapped in order to better understand their constraints to sustainable household waste management (figure 2). The journey begins when families plan their shopping and decide, for example, the packaging materials of products. They buy the desired products and transport them in bags or containers, which are often reusable. Finally, families consume their products and dispose of the remaining objects in containers in their houses or communities to be discarded or collected.

Along the journey, there are several desired sustainable behaviors:

- Reducing waste generation
- Repurposing and reusing generated waste materials
- Sorting waste generated at the source
- Disposing of waste properly.

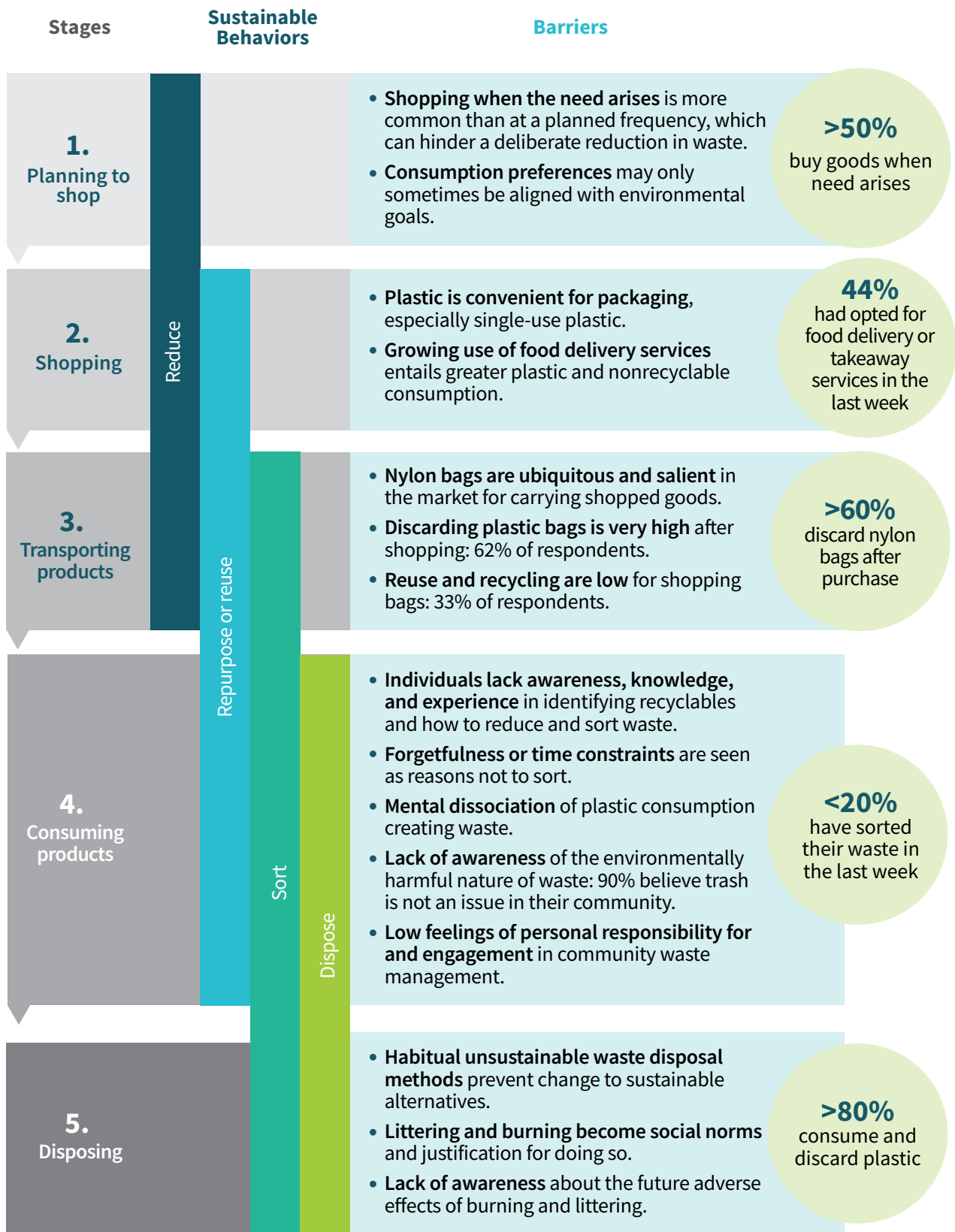
This study reveals several barriers to achieving these sustainable behaviors in Lagos.

POOREST HOUSEHOLDS FACE STRONGER BARRIERS

Individuals from the poorest households face more significant barriers to sustainable waste management.² They have lower access to waste collection services: 27 percent in the lowest quintile have no collection service compared to 7 percent from the highest quintile. Also, they show lower satisfaction with collection services. The poorest households have less possession of dustbins and mainly use plastic bags to collect waste. Waste sorting is lower in the lowest quintile (8 percent) compared to the top (25 percent). Finally, members of households in the bottom quintile consistently have less knowledge regarding the recyclability of primary materials such as metals and cardboard.

2 As measured by their monthly expenditure level.

Figure 2. Behaviors, stages, and barriers to sustainable waste management



DESIGNING SOLUTIONS

The complex web of behavioral barriers requires innovative and evidence-based solutions to shift to sustainable waste management. The following recommendations are made, based on behavioral science insights that can address the barriers identified in the study. At the end of this section, barriers that can be addressed by each solution are also shared.

1 Generate mass awareness through simple, timely, and targeted messaging:

Some people in Lagos lack awareness that plastic consumption generates waste with environmental consequences. Mass awareness campaigns across channels can build consciousness of waste as a problem and include simple steps that people can take to tackle it, especially for those from the poorest households. Messaging can harp on themes of health and cleanliness, which Lagosians commonly associate with the consequences of waste. Based on behavioral science evidence, messages that use a positive framing and the ‘fresh start’ effect can be more effective in eliciting emotional engagement.³

The timing and placement of messages can also act as an effective nudge, for example, sorting messages delivered right at the time of disposal. Individuals will benefit from concrete measures they can follow, such as reusing plastic containers for storage or buying water by the gallon instead of small plastic sachets. For example, a study in Bhutan found that households receiving trash cans with informational stickers on disposal and feedback via text messages to correct common segregation errors increased the quality of dry waste segregation (Dutta-Powell, Court, and Clark 2021).

2 Reduce hassles of sustainable choices by improving accessibility:

Ease and convenience are essential drivers of people’s behavior and preferences. In Lagos, people prefer plastics as they are readily available. Sustainable behaviors are harder to adopt as they require additional work. Infrastructure should be provided, such as recycling bins in convenient places and drinkable water stations, to make it easier to adopt sustainable behaviors. This is especially relevant for the poorest, who usually lack access to collection services and public bins.

A study in the UK used drone mapping and AI to identify the type and location of litter. Innovative trash cans that light up and play music were installed in these strategic locations to make waste disposal easy and fun. The project reduced litter by an average of 75 percent (Ellipsis Earth 2021).

³ According to the ‘fresh start’ effect, the psychological sensation of a new beginning makes people more likely to form aspirations and take steps toward a new goal. Framing messaging, campaigns, and cleanup drives as part of a ‘New, Cleaner Lagos’ can motivate people to adopt sustainable behaviors (Dai, Milkman, and Riis 2014).



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3 Alter the choice architecture for more sustainable consumption:

A crucial step to stop plastic waste generation is changing consumers' default options, or 'choice architecture' from plastic to fabric bags.⁴ While Nigeria has introduced plastic bans, these have not been successfully enforced. Instead, supply-side actors such as supermarkets and shops need to step in and expand the choice of products, shopping bags, and packaging material they offer to make it easier for consumers to shift to more sustainable options.

For example, a study in the Solomon Islands found that having schools provide lunches in reusable containers was more effective than trying to incentivize students to bring a reusable container from home. Reusable containers became the default due to greater ease (Wodak, Cremen, and Tindall 2020). Companies such as Unilever, Nutri Asia, and Coca-Cola have also started piloting refillable stations and package-less delivery options to make it easier for consumers to reduce their plastic use (Coca-Cola Company 2019; NutriAsia 2020; Unilever 2019).

4 Create role models to influence new social norms:⁵

Evidence suggests that people who sort their waste mostly follow this behavior without slipups. This indicates that once a sorting habit is created, people will continue practicing it. Comparison within peer groups is a strong driver of behavior change (Allcott 2011; Dupré and Meineri 2016; Mertens and Schultz 2021). Leveraging this, active waste sorters can be elevated to community role models to encourage neighbors to sort waste and promote new social norms, especially in the poorest communities. Proprietors, community associations, politicians, and religious leaders were identified as influential figures and can help disseminate messages. Contests and public rankings can be used to create community accountability. On the supply side, the government can reward businesses that adhere to sustainable practices such as offering paper or fabric shopping bags and reducing the selection of plastic-based products to nudge other businesses to follow suit.

For example, a study in New York City found that residents of buildings that received weekly messages comparing their recycling habits to their neighbors demonstrated more significant behavior change toward recycling than those that received non-comparative messages (Hewitt et al. 2023).

4 Choice architecture refers to how the presentation of choices in different ways can affect decision-making (Thaler, Sunstein, and Balz 2013). Presenting a default option or predetermined outcome results in its easy adoption. In the context of Lagos, changing the default option from plastic to fabric bags makes it easier for individuals to change their consumption behavior.

5 Social norms are the unwritten codes and informal understandings that govern social interactions and define what people expect of one another. They are self-enforcing within a group and often sustained by multiple mechanisms, including a desire to coordinate, fear of being sanctioned, signaling membership in a group, or following the lead of others (Farrow, Grolleau, and Ibanez 2017; Young 2015).



5 Use nudges and reminders for waste disposal through existing entry points:

Forgetting to sort and dispose of waste was identified as a common problem. Using existing communications from waste collection service providers to send information to households can be effective. For example, families can receive alerts via apps or utility bills reminding them when the waste will be collected. This can help them plan waste collection and disposal accordingly. In Wigan, England, timely reminders, and social norms messaging led to increased uptake of underused waste disposal services. Food recycling bin orders increased by 1,500 percent, and the number of residents that missed collection dates reduced (The Behavioural Insights Team 2018).

6 Incentivize communities using innovation and gamification:⁶

Innovative practices can help engage communities by making sustainable behaviors attractive and easy to adopt. For example, apps such as ZeLoop are gamifying recycling by awarding blockchain tokens to high-performing recyclers (ZeLoop 2021). Wecyclers is a startup in Lagos using an SMS-based incentive program to reward points when families recycle, which can be redeemed for food items and other goods (Matheson 2015).

7 Tap into reciprocity and empathy to engage the community:

People have an innate inclination to reciprocate when they feel a moral obligation to contribute to a common good. The study revealed that Lagosians mainly considered the government or collection services responsible for waste management. The government can demonstrate positive actions on its end first to stimulate reciprocal sustainable behaviors among community members. Fostering social relationships between waste pickers and household members can promote reciprocal waste sorting and recycling behaviors. In France, the Yoyo company uses face-to-face interactions between community residents and sorting ‘coaches’ to engage their empathy and desire for acceptance. Coaches use continuous interactions with exciting and empowering language to foster personal relationships and motivate residents to sort their waste (Barnosky, Delmas, and Huysentruyt 2019).

⁶ Gamification refers to the use of game design elements in nongame contexts (Deterding et al. 2011). Gamification is being widely used as a behavioral nudge as it introduces hedonic aspects such as enjoyment and fun to tasks or behaviors which are perceived as uninteresting or utilitarian (Koivisto and Hamari 2014). Gamification applications have been developed for positive behavior change to address climate change in areas such as energy reduction, sustainability education, and water conservation (Douglas and Brauer 2021).

Table 1. Behavioral barriers to waste management in Lagos and proposed levers

Lever →	i. Simple, Timely, Targeted Messaging	ii. Accessibility	iii. Choice Architecture	iv. Role Models	v. Reminders	vi. Innovation and Gamification	vii. Empathy and Reciprocity
Barrier ↓	Concrete steps for sorting and disposal; Sorting information at the time of disposal	Bins in high transit areas; Access to sustainable products	Removal of plastic bags at shops to change the default	Influential figures and active sorters in the community to lead campaigns	App-based or utility bill reminders to sort waste before the collection date	Use of games and rewards to make sustainable activities fun and attractive	Face-to-face interactions with waste pickers; Demonstrate positive actions by the government
1. Consumption preferences may not be sustainable ^a	✓	✓	✓			✓	
2. Convenience and salience of plastic	✓	✓	✓			✓	
3. Lack of knowledge and experience to sustainably manage waste	✓	✓	✓	✓	✓	✓	✓
4. Forgetfulness and limited time to sort waste	✓	✓			✓	✓	
5. Mental dissociation of plastics creating waste or waste being a problem ^b	✓			✓		✓	✓
6. Low responsibility towards community				✓		✓	✓
7. Habituation of unsustainable waste disposal practices		✓		✓	✓	✓	✓
8. Littering and burning are social norms	✓			✓		✓	✓
9. Lack of awareness of future adverse consequences of waste ^c	✓			✓		✓	

Notes:

a. A driver of this may be ‘cognitive bandwidth constraints’ whereby too many options and stimuli can reduce people’s cognitive bandwidth and thus their ability to evaluate all options rationally (Tversky and Kahneman 1981). Being faced with too many purchase options may hinder people’s ability to make sustainable purchase decisions.

b. This dissociation is also known as a ‘mental model’, which is a representation of how something works in the real world. In this case, we refer to the representation of the plastic life cycle and consequences of waste in Lagos (Atran, Medin, and Ross 2005).

c. This lack of awareness of future effects is known as ‘present bias’, which is the tendency to focus more on the present situation than the future when making decisions, give more prominence to present needs, and not consider the future consequences of present actions (O’Donoghue and Rabin 2015).



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METHODOLOGY OF THIS STUDY

The research followed a mixed methods approach. An exploratory study was based on qualitative instruments, including focus group discussions (FGD), in-depth interviews (IDI), key-informant interviews (KII), and non-intrusive observations (NIO). The quantitative component included a household survey questionnaire.

1. Survey sampling

For the exploratory study, five local government areas (LGAs) were selected based on their proximity to coastal areas, poorer communities' prevalence, and government-run programs' presence. A total of 10 IDIs, five FGDs, and KIIs with nine stakeholders were conducted. Participants were mostly between 36 and 50 years, and steps were taken to represent women adequately.

For the survey, a multi-stage sampling procedure was employed. In the first stage, 10 LGAs in Lagos were randomly selected. In the second stage, 10 enumeration areas (EAs) were purposively selected from each of the selected LGAs, resulting in 100 EAs. These EAs were delineated by the National Population Commission and used by the National Bureau of Statistics. The purposive selection of EAs was to ensure the inclusion of low-income households. Lastly, 11 households were randomly selected from each EAs, resulting in a final sample size of 1,100 households.

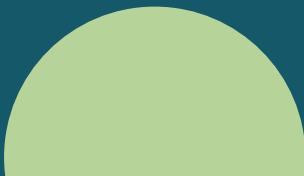
2. Data collection and analysis

Data collection was carried out in May 2022 (KII), December 2022 (FGD, IDI, NIO), and February–March 2023 (survey). The World Bank team designed the survey questionnaire, and REPRC-EfD administered it in English and Yoruba through Survey Solutions. Enumerators were recruited from the National Bureau of Statistics and trained for two days. Ethical clearances were obtained from the University of Nigeria Research Directorate. The questionnaire was pilot tested across 30 households in two LGAs. Responses were monitored regularly to ensure quality. Data were analyzed using descriptive statistics.

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