

ASSESSING FACTORS for INCREASING PLASTIC COLLECTION IN KABALE

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Executive Summary

This research study was undertaken as a capstone project for the Global Livingston Institute. The purpose of this study was to investigate the factors that are associated with plastic recycling in Kabale, Uganda, to enable the client to make changes to increase collection rates. The results of this study demonstrated that income, access, perceived economic benefits, economics, and disincentives such as access and health concerns, all are associated with recycling outcomes. Further studies in the region should be conducted to support and enhance the results of this study through quantitative analysis. Awareness campaigns conducted over the radio and in-person should be utilized to educate the populace on the environmental benefits of recycling but also the tangible and available economic opportunity available through recycling. Plastic drop-off points should be installed in communities around Kabale to increase public access to recycling opportunities and decrease transportation risks. Furthermore, raising the buyback value of the plastic should be done to incentivize a broader band of individuals to recycle at the center, increasing collection.

Assessing Factors for Increasing Recycling in Kabale

Over the last 50 years, the percentage of Uganda's population residing in urban areas has increased from 7% in 1971 to 26% in 2021 (World Bank, 2021). This substantial increase has led to rising administrative challenges. One of these is an influx of single-use consumer products that are then disposed into landfills or end up in nature (Temple, 2021). This increase places a burden on developing waste management systems, but offers an opportunity to turn towards sustainability. Despite the efforts of several large corporations that partner with Uganda to increase recycling, these efforts are largely concentrated in Kampala (Wansi, 2022). Many African nations are struggling to meet the waste management issues urbanization creates, with most recycling at lower than global average levels (United Nations Environment, 2018). However, some African nations have significantly higher percentages of consumed goods recycled when compared to Uganda. Last year, South Africa recycled 45.5% of its consumed plastic (Godfrey, 2021), whereas Uganda recycled just 6% (Planet Buyback, 2021). This Ugandan recycling rate means only 36 of the 600 daily metric tons of plastic consumed are recycled. Both nations rely heavily on private and nonprofit waste management organizations which supplement the public infrastructure, especially in the areas of recycling (Viljoen & Schenck, 2019).

This research serves the Global Livingston Institute (GLI), which is a non-governmental organization (NGO) operating in East Africa and out of Denver, Colorado. GLI is focused on community development and advancing best practices while finding "equitable, sustainable, and culturally responsive solutions to challenges in the areas of health, economic development, and the environment," (Van Leeuwen, 2021). Dr. Jamie Van Leeuwen is the CEO of this organization and this study's client. GLI maintains a commitment to the strategy "Listen. Think.

Act.,” throughout their organization while they host a variety of projects and programs, ranging from the recycling operations this research focuses on to women’s leadership retreats and a free concert series promoting culture sharing, public health, and economic development (Van Leeuwen, 2021). This organization hosts hundreds of students per year on immersion trips to facilitate re-thinking global communities and development as well as fostering greater understanding. One of GLI’s big initiatives has been to establish and operate two large-scale recycling centers located in the regions of Kabale and Lira, Uganda. These centers pay Ugandan citizens shillings per kilogram of plastic bottles brought (250/kg in Kabale, 500/kg in Lira to compensate for higher market saturation), where they then compress it and sell it to a center in Kampala for export.

Polythylene Terephthalates (PETs), a particularly prevalent type of plastic that is found in soda bottles, are a primary vehicle of plastic consumption and pollution in Uganda. Several organizations including GLI, in coordination with Planet Buyback, have worked to enable Ugandans to attempt a circular PET economy (Planet Buyback, 2021; Temple, 2021). PETs in the form of bottles are a significant source of improperly disposed solid wastes, with much of the materials that are not recycled ending up burned, creating toxic fumes. To help increase collection rates in Uganda, the two locations operated by GLI exclusively collect PETs in the form of plastic bottles, and these centers work to maintain the environments of their communities while injecting economic stimulus into their local economies (Global Livingston Center, 2021).

This research paper begins with a review of the literature concerning solid waste management in both Uganda and the broad recycling efforts world-wide to evaluate how other studies have attempted to find ways to improve recycling outcomes in their regions. From there a brief outline of the research methods are outlined. The results of the data analysis inform

recommendations made to the Global Livingston Institute. In total, this study answers the question: what factors are associated with increased recycling outcomes?

Literature Review

This literature review informs the approach to answer the research question. The review begins with an introduction of the recycling and solid waste management norms in Uganda, followed by a review of what factors the waste management literature has found associate with recycling outcomes. Finally, recommendations in the literature are briefly addressed.

Solid Waste Management and Recycling Norms in Uganda

Solid waste management in developing regions depends on public and private participation to achieve high-levels of collection (Madinah, 2016; Viljoen & Schenck, 2019). Madinah (2016) posits that developing regions often are inhibited by inadequate recycling service coverage, poor collection rates, and low buy-in from citizen constituencies. Two studies have identified the significance of citizen stakeholder buy-in for solid waste management and recycling programs, making understanding the serviced population's perception of the recycling center so critical as a starting point for program analysis (Mekonnen & Dos Muchangos, 2022; Troschinetz & Mihelcic, 2009).. The variances in structural support for solid waste management and delivery methods of recyclable materials mean that there are no one size fits all recommendations for improving collection (Madinah, 2016).

Towns and municipalities in Uganda, when compared to some of the available studies in areas like Belgium, Spain, and Brazil, have less developed waste management programs. More developed programs often include government-sponsored recycling initiatives, as opposed to the private public agreement that takes place in areas like Kabale, Uganda. Kabale Municipality Constituency is the chief town of the Kabale District in Western Uganda. In 2014, the Ugandan

Bureau of Statistics' Census stated Kabale's population to be 49,186 people (Uganda Bureau of Statistics, 2017). Kabale has a robust city center that is surrounded by urban and suburban housing.

Often, developed programs have residential drop-off points for plastic, glass, and other recyclables, which encourage in-house waste separation. Recycling systems are occasionally classified into three categories of recyclables collection: curbside collection, neighborhood collection (drop-off points), and clean points, which are listed in descending order of convenience for participants (González-Torre & Adenzo-Díaz, 2005). The GLI recycling center in Kabale works as a clean point, which means collectors travel further than if they were dropping off at neighborhood collection locations. In an absence of household separation of waste, Uganda is primarily served by informal collectors. Informal collectors generally sort for recyclable materials from within unseparated disposal, whether that be on curbs, streets, or landfills (Viljoen & Schenck, 2019).

Different areas studied often diverge in terms of consumer behavior as well. One study demonstrates that Kigali collects a higher percentage of its waste when compared to other East African capitals, but also has lower annual consumption per capita (Kabera et al., 2019). These differences in behavior and environment can make findings in the same field and environment inapplicable to other settings. Acknowledging the differences in structures from the development to consumption levels, to collection types, is necessary to inform recommendations on recycling programs based on data collected on-site. As such, this literature review concentrates on identifying factors that improve recycling outcomes.

Awareness

Public awareness of both the study-specific recycling center and recycling in general are questions asked in the literature investigating perceptions around recycling (Abdelnaser et al., 2008). While awareness does not necessarily stand to increase recycling in a community, identifying general public awareness of these concepts is critical. Almasi et al. (2018) note that knowledge and awareness might improve attitudes towards recycling, but not necessarily participation. Adogu et al. (2015) concur with awareness not always resulting in recycling outcomes but recommends targeted awareness not only of the center or recycling, but of the health and environmental benefits produced by proper waste disposal.

In terms of this study, collectors of Kabale's recycling center are aware of both recycling and the center more specifically. The broader public of Kabale, however, may not be aware of its presence or functions. Knowing the level of awareness from Kabale residents helps formulate recommendations to increase recycling outcomes. Despite questions about its potency as a factor in contributing to increased recycling outcomes, there is no doubt that is a necessary condition to allow for recycling to exist in the first place, making it an important factor to explore.

Perception

The general perception of a recycling center comes down to a few factors. There are associations between perceived distances needed to reach the recycling location, awareness of the environmental consequences of improper waste disposal, and economic benefits through the buyback program, with perceptions of recycling and recycling centers (Abdelnaser et al., 2008; Banga, 2005; Bolaane, 2006; Crociata et al., 2015; Katusiimeh et al., 2013, Khan et al., 2019).

Perceived Distance

Access to often relates to increased recycling rates. Bolaane (2006) writes that recycling centers utilizing clean zones are associated with lower recycling outcomes than when utilizing curbside or neighborhood drop site collection methods. Abdelnaser et al. (2008) noted distance from recycling centers as a factor that influences recycling behaviors, with an increasing distance carrying a negative association. Conke (2018) identifies in their study the geographic concentration of waste recycling in Brazil as being a significant disincentive to recycling in the cities examined, indicating that when individuals feel separate from recycling facilities, they are less likely to recycle. González-Torres and Adenso-Díaz (2005) acknowledged an association between distance to recycling bins (this sample population utilized curbside and neighborhood pickups) and those who engaged in recycling. As distance increased, recycling rates decreased (González-Torres & Adenso-Díaz, 2005). Perceived distances demonstrate a potent association with recycling rates (Lange et al., 2014). Lange et al. (2014) note that their respondents' actual distances were less effective in predicting their recycling habits when compared to their perceived distances. Individuals often misjudge actual distance, which can be inflated or deflated by its relative convenience. For that reason, when inquiring about both collectors' and non-collectors' perception of the distance to the recycling center, the verbiage is focused on convenience and access rather than asking for a physical distance estimate or an address. There are undoubtedly niche, region-specific disincentives to recycling not discussed in this review, but access (measured here as perceived distance) is by far the most consistent and prevalent disincentive in the literature.

Environmental Benefit Perception

Two studies note that awareness of the environmental benefits of recycling demonstrate a positive association with increasing recycling outcomes (Crociata et al., 2015; Khan et al., 2019). When individuals display a specific knowledgebase in regards to the results of failure to recycle and connect those potential negative consequences with the services provided by recycling centers, they display more positive perceptions of recycling and recycle more (Khan et al., 2019).

The Kabale Recycling Center operated by GLI allows for the safe reclamation of consumed plastic bottles which avoids both excess waste on streets as well as the production of toxic fumes produced during improper disposal methods such as burning, and community members who do not currently recycle benefit from its existence. The recycling center is located near the city center, taking approximately ten minutes to reach the recycling center from the city center while walking. This center employs three casual workers and two full-time workers. There are approximately sixty regular collectors. GLI's recycling center in Kabale is in a partnership with PRI and Coca-Cola, which allows them to transport the bottles after collection.

It is important to investigate whether the community is aware of these environmental benefit. Moreover, it is crucial that the impacts are viewed as positive. Increased positive perception of the center's impact on the environment can lead to heightened recycling behaviors and is necessary to any recycling center program evaluation.

Economic Benefit Perception

One of the most frequently cited mechanisms for improving recycling rates in developing regions are economic incentives. Recycling can be costly in terms of time and resources, and as such the perceptions of economic benefits derived from recycling seem to play a role affecting recycling behaviors. For many, plastic is a waste product, not a commodity to be valued and

therefore restored via recycling. However, proper waste recycling when incentivized through buyback programs can provide a source of income for community members, and studies report economic benefits having association with recycling outcomes. One study notes that the economic impact of the informal recycling sector is significant in that the average waste picker makes a good bit more than minimum wage (Katusiimeh et al., 2013, pp. 2-3). This demonstrates the salience of buyback programs. It is a potential source of employment for many individuals.

In Dangamvura, a lower income neighborhood in Mutare City, Zimbabwe, it was estimated that the neighborhood lost approximately US\$45,000 a month, or 90 families at US\$500 a month in potential revenue from recycling (Muisa et al., 2022). The center in Kabale offers Ushs250 (Ugandan Shillings) per kilogram of plastic bottles collected. Working six days a week and bringing in approximately 20 kg/day, that means a collector could take in as much as Ushs1,560,000 annually. This is a significant sum, especially for an individual using this as their primary or only source of income. This sum keeps individuals in the lowest personal individual income tax bracket (Uganda Revenue Authority, 2021). However, for many, this is just enough to keep them housed and fed. As referenced earlier, most recyclable material collectors in Uganda are informal, sorting through waste themselves and often utilizing the currency from selling plastic as their primary source of income.

The literature notes economic incentives as a highly influential factor encouraging higher collection rates of recyclable products, even in more developed nations such as Belgium (Khan et al., 2020). The value of the economic incentive (the buyback program set at Ushs 250/kg) is linked in this research with the general perception of the benefits the center brings to Kabale.

Demographic Characteristics

In evaluating the factors that result in recycling, it is important to evaluate the characteristics of individuals engaged in recycling. Understanding the perception of the center and recycling in the community informs recommendations for improving recycling outcomes, having a sense of the individuals either engaged or not, and their various demographic characteristics, helps to inform next steps for GLI.

Education Level Completed

Formal education level achieved is an element in the literature that demonstrates different outcomes in different environments. In some systems of education, the curriculum adequately addresses recycling and the benefits associated with the practice. Bennett and Alexandridis (2021) explicitly list extensive educational recycling programs instituted by the governments of Japan, Hong Kong, Taiwan, Ghana, Malaysia, and Germany as being effective and thorough in educating constituents on environmental issues.

However, a great many systems fail to adequately instruct their students on these issues, which can leave educational factors with nonexistent or negative associations with increased formal educational level completed. Bolaane (2006) notes that while education *can* be a factor in raising awareness of recycling, uptake in participation requires targeted incentives to the participating public. Conversely, Banga (2011) argues that education seems not to play a positive role in influencing individual awareness of recycling opportunities. The supposition behind this is the Ugandan system does not emphasize recycling as part of its curriculum. The literature is not consistent as it comes to education level's association with recycling outcomes.

Beyond education merely not having an association with recycling, Banga (2011) demonstrates that in Kampala, Uganda, higher educational achievement tended to result in lower

likelihood of recycling. This may be a result of commensurately higher income (the affects of income on economic incentives are discussed below), but whatever the reason, education can be beneficial in improving awareness and participation but that is not consistent field-wide. The education level is a factor that further demonstrates the differences in context between areas studied within the field, and why it is important to understand the population served in order to increase recycling outcomes. In the instance that those that have higher educational attainment rarely or never recycle, it is important that the Global Livingston Institute know what disincentives are preventing them and how they might be enticed to do so.

Income-Level

As is discussed in prior sections, income and economic incentives are intrinsically related. Economic status certainly impacts the salience of an economic benefit. Banga (2011) notes in their study of Kampala, Uganda, where collection is more established than in other regions such as Kabale and Lira, higher income communities were less likely to recycle than their lower income counterparts. This does not imply reduced economic benefits of the center in Kabale to its primary economic beneficiaries, informal waste-collectors significantly below the high-income tax brackets (Uganda Revenue Authority, 2022). It may indicate that the community members not actively recycling who make more annually are less motivated by the buyback than by other factors (such as the environmental impact of the center).

It is important to examine income-level to discover the recycling behaviors of different economic ranges. Different socio-economic groups have different challenges. Identifying differences in disincentives to recycling at income level, as well as what might motivate various income levels to recycle, is important when crafting recommendations for improving recycling outcomes.

Recommendations in the Literature

The recommendations for improving recycling outcomes in the literature vary, which is unsurprising from a field of research covering such disparate regions. They largely stem from the promotion of the factors present in the literature review. The most common recommendations to improve recycling outcomes are improving awareness and distance reduction (Banga, 2011; González-Torres & Adenso-Díaz, 2005; Lange et al., 2014). One of the biggest disincentives to individuals when choosing to recycle or not, awareness is one of the recommended first steps an organization should take to improve recycling outcomes. If the population serviced does not know either about recycling in general or the recycling center under study, or the benefits provided by recycling and the center, this reduces recycling outcomes.

Perceived distance often demonstrates an association with recycling outcomes (Lange et al., 2014). To help reduce the perceived inconvenience caused by large distances to clean zones like the ones used in the recycling center in Kabale, Abdelnaser et al. (2008) suggest creating intermediate drop-off points in smaller residential areas to promote convenience of participation and reduce the time and effort spent locating the center and then transporting the plastic.

Improvements in education are suggested by some to help improve recycling outcomes (Abdelnaser et al., 2008; Banga, 2011). Some specify the need for environmental health-oriented curriculum (Adogu et al., 2015). Despite inconsistencies in the literature on education's affect, several studies recommend expanding knowledge of recycling generally, including through informational programs focused on the *hows* of recycling rather than the *whys* (Adogu et al., 2015; Conke, 2018).

Overall, the literature is focused on finding ways to promote the broadly accepted factors that affect recycling, including reducing perceived distance, increasing awareness of the center,

maximizing public understanding of the environmental and economic benefits available as a result of centers, and understanding the serviced population's demographic characteristics as to better target recommendations.

Methodology

This project's methodology consisted of qualitative data collected through semi-structured interviews to ascertain perceptions of disincentives and incentives to recycling behavior. One interview instrument gathers data from collectors at the recycling center, the other gathers data from a sample of randomly selected Kabale residents. The interview instrument (see Appendix A) uses questions drawn from the literature review to inquire about disincentives and incentivizing factors as they concern their personal recycling habits and perception of the impact made by the Global Livingston Institute recycling center in Kabale. A pilot was conducted to inform the revision of the interview protocols before full implementation in the data collection stage. The pilot primarily resulted in the reordering of questions and minor linguistic alterations to better facilitate understanding. Coding and enumeration enabled descriptive statistics such as frequencies for factors like incentives, disincentives, incomes, educational attainment, and more (Babbie, 2001).

Research Question

What are the factors that affect recycling in Kabale?

Measurement and Data Collection

This project follows a qualitative research approach using primary data collected in semi-structured interviews. In lieu of a transcript, detailed notes were taken for each response in preparation for coding. A translator was used 22 out of 24 interviews in cases where the interviewees preferred to speak a language other than English, so some language may have been

adjusted throughout to accommodate language and cultural differences. The data was collected on October 4th and 5th, 2022, and were originally recorded via pen and paper.

Appendix B has a breakdown of the questions and their possible answers. Some questions were closed to facilitate easy tabulation, whereas some were left open to avoid directing participants towards answers. The questions are designed to evaluate frequency of recycling from individuals with a variety of different backgrounds as well as discover the incentives and disincentives affecting those frequencies without providing too narrow a list of options to participants answers simply because they were present in the literature.

Sampling Plan

The unit of analysis in this study is the individual in Kabale. The first population is collectors, and the sample is drawn from those collectors who were present at the GLI recycling center on data collection days. Collectors are individuals who collect and sell plastic bottles to the recycling center in a freelance manner, without contract or written agreement. This is common to the operations of the other GLI recycling center located in the city of Lira, Uganda and of informal collectors more broadly. They were selected according to availability on the day of collection and willingness to participate. The second population present in the study is individuals in Kabale at the time of data collection who do not identify their place of employment as the recycling center. The sample was drawn from those individuals who were present on the main street of Kabale on the days of data collection. Inquiries to residency were made prior to the interview, though verification is not possible without collecting personal information. They were also selected according to their presence and willingness to participate. These two populations represent views from Kabale people, both those actively participating in the recycling industry and those not. While the ideal goal for sample size is theoretical

saturation, given time constraints in-country this study has a sample size of twenty-four, twelve interviewees for each group. For each population, the sampling technique is convenience, a non-probability sample, with participants being asked to participate in the interview at their respective sites.

Credibility and Validity

Bias is a substantial issue in qualitative analysis. Selection bias with the collector population was mitigated by asking to interview every collector present during the data collection period. The population of individuals in Kabale on the main street was harder to mitigate selection bias with, as it largely depended on availability. Everyone that passed was asked to partake during the data collection period, any selection bias was self-selected. The interviewer maintaining a reflexive journal to reflect on their own biases and reactions helped eliminate bias during the analysis process. Being on-site in Uganda and utilizing a translator to conduct interviews also helped eliminate bias that might arise through miscommunication and cultural differences (Orcher, 2014).

This study attempts to achieve credibility in several ways. Initially, exemplifying prolonged engagement, interviews were conducted until theoretical saturation is achieved, time permitting. Saturation is achieved when further interviews fail to give new responses to open ended questions to generate unique codes. External validity is limited in this study, due to its small sample size and qualitative nature. However, as it is specifically designed to inform recommendations to a client, the generalizability of its conclusions to other populations is of reduced importance.

The reliability of this study was strengthened through the running of pilot interviews before the beginning of data collection, ensuring the clarity of the questions as well as their efficacy in provoking answers appropriate to the research.

Data Analysis

The respondents' answers to questions, both open ended and otherwise, were enumerated using descriptive statistics relevant to the research questions, primarily frequencies. Open ended responses were coded individually and then grouped axially to form broader categories to more clearly represent the data. This primarily occurred when discussing incentives, disincentives, and awareness. The four categories of questions, Knowledge Attitude and Awareness (KAA), Demographics, Incentives, and Outcomes are represented in descriptive statistics as to best outline the characteristics, knowledge, disincentives, and recycling practices of the individuals interviewed. Some are further broken down, such as how different demographic groups' knowledge, outcomes, and disincentives vary.

Results

The interviews with 24 individuals (12 collectors and 12 residents) in Kabale yielded data revealing some trends regarding incentives, disincentives, and demographic characteristics in association with recycling outcomes. Awareness, incentives, perceptions, and demographic characteristics data are provided as they relate to recycling outcomes in Kabale, Uganda.

Awareness

Amongst those in the collector population, awareness of the recycling center was 100% (n=12). Among the resident population (n=12), however, seven interviewees responded as being aware of the recycling center, whereas the remaining five had never heard of it. These interviews were conducted approximately ten minutes from the center on foot. Of the 58.3% (n=7) of

interviewees that were aware, only three actively recycled at the center, though one had formerly done so but stopped due to health difficulties, and one recycled elsewhere (location not specified).

When asked how they learned about the recycling center, two categories of answers were most prominent. Among the collectors, nine individuals said they had heard of the center through oral communication, generally by passing collectors and inquiring as to what they were doing, from a friend, or from family. The remaining three collectors all reported having discovered it on the radio.

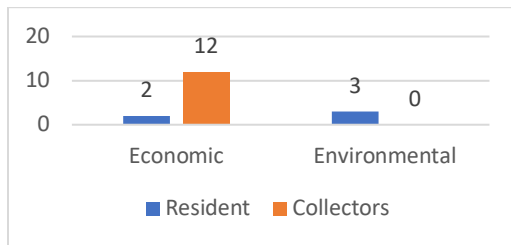
Of the seven residents that were aware of the center, four had heard via oral communication, two from the radio, and one had heard of it through a public recycling event that GLI had held.

Incentives

When asked what their primary reason to recycle was, the motivations of individuals to recycle were consistent for collectors interviewed. The residents, conversely, had a broader range of incentives driving them to do so. As an aside, only five residents interviewed reported recycling (three of which did so at GLI's center), which explains the discrepancy in the column totals below. Responses were coded and grouped, which resulted in two categories: economic and environmental.

Figure 1

Incentives to Recycle



When residents were asked as to whether the buyback made them more likely to recycle, three said yes, nine said no. Of that nine, five indicated the buyback sum was too low to incentivize them.

Disincentives

Figure 2.

Residents' Disincentives to Recycling

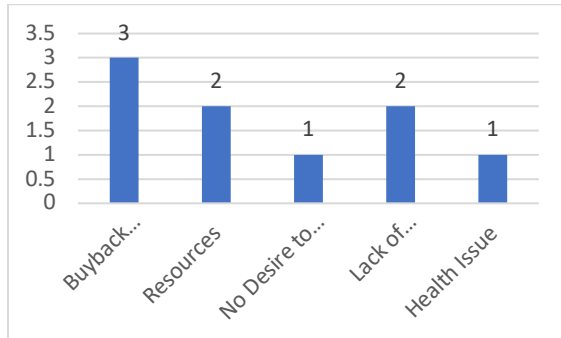
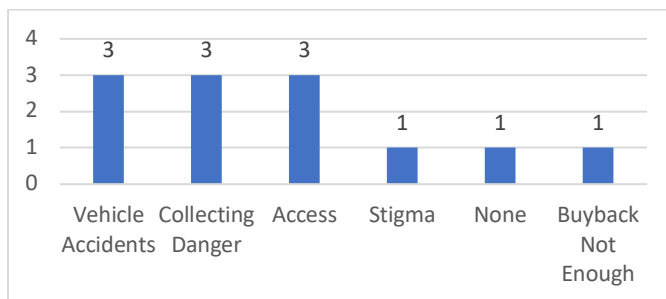


Figure 3.

Collectors' Disincentives to Recycling



As discussed in Figure 3, Collecting Danger was the coded group for three responses, all of which detailed dangers posed by glass and other sharp objects cutting their hands and feet during collection. The stigma referenced was described as insults levied at collectors during their work.

Perceived Distance to Recycling Center

For both collectors and residents, the majority identified the location as being convenient to access. Eight interviewees from each population described it as convenient, with four from each labeling it as inconvenient or very inconvenient. It is worth noting again that the distance to the center did come up three times from collectors as something that makes it difficult for them to recycle, although it does not prevent them from doing so regularly.

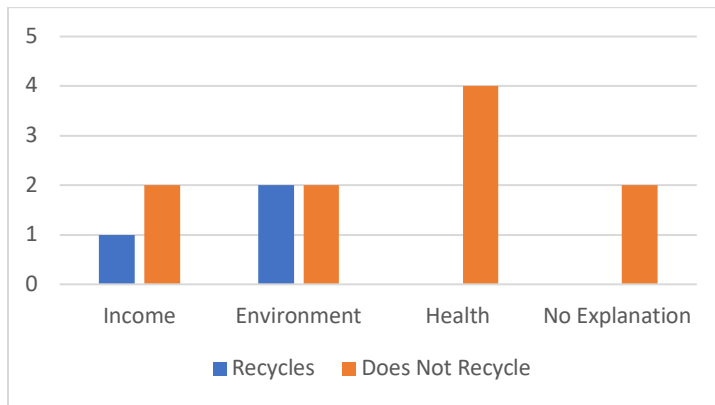
Perceived distance as it relates to recycling outcomes demonstrates an association between a convenient perception and recycling. Of the twelve residents interviewed, the three that reported actively recycling at the center had identified the location as convenient.

Perceived Benefits from Recycling

Amongst all interviewees, their perception of recycling, which was identified by inquiring about what they thought was good or bad about recycling, was positive. All twelve collectors identified recycling as a positive, and each of them linked that positivity with its potential to be a source for income. One interviewee did stipulate that it also came with negative risks associated with the dangers of recycling. The residents interviewed split their positive associations into a variety of topics.

Figure 3.

Categories of Positive Perceptions (Residents)



Demographic Characteristics

Education

Table 1.

Educational Attainment

Educational Level	None	Primary	Secondary	High School	Advanced	Bachelors
Residents (Total)	1	3	3	2	1	2
Residents (Recycling)	0	2	1	0	0	0
Collectors	4	8	0	0	0	0

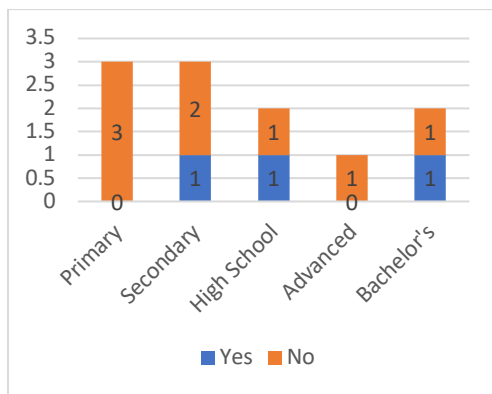
Nine of the residents interviewed were aware of the recycling center and all nine of those completed either secondary school or less. Every individual completing or stopping before the completion of secondary school reported awareness of the recycling center, whereas no one who progressed beyond secondary school reported awareness of the center.

Related to education, when asked about what they had been taught in school about recycling, both the collectors and residents gave differing recounts even within the same

completed educational category. Within the collectors, of the eight that had attended school (all of which were still in or stopped after primary school), five responded that they had learned about recycling while the other three said they had learned nothing. Those who responded the affirmative gave varying explanations of what they had learned, some saying it had only been described as a source of income, with others noting the explained environmental benefits.

Figure 4

Recycling Taught in Schools (Residents)



Note. Residents' responses as to whether they learned about recycling in school.

Of the three that indicated they had learned about recycling in school, one indicated not remembering specifics, one said they were told to pick up recyclables and relocate them, and one indicated being taught to bring plastic and paper to incinerators.

Income

Residents reported a mean income of Ushs 225,625, whereas collectors reported a mean income of Ushs 159,000. It is worth knowing that the collector mean includes one individual that works three other jobs in addition to their collecting, and collection only constitutes 30-40% of their monthly income. Excluding their income, which was far and away above the others in the population, the mean income drops to Ushs 112,360 a month.

*Other Demographic Characteristics***Table 2.***Age (Years)*

Age	Mean	Minimum	Maximum	Range
Collectors	31.42	9	83	72
Residents	26.5	17	50	33

Each adult collector reported recycling every day in quantities ranging from 70 kg/week to 175 kg/week, with the population averaging 122.5 kg/week. Of the three residents who reported actively recycling their ages were 18, 21, and 50 respectively.

Table 3.*Marital Status*

Status	Married	Single	Widowed
Residents	2	6	1
Collectors	2	2	2

Table 4.*Gender Demographics*

Gender	Male	Female
Residents	7	5
Collectors	7	5

Table 5.***Household Size***

Household	Median	Mean	Range	Minimum	Maximum
Residents	4.5	5.083	9	1	10
Collectors	3	3.5	5	2	7

Discussion and Recommendations

The findings in relation to factors that affect recycling in Uganda are largely consistent with the trends identified in the literature review. Awareness levels, the motivation to recycle, incentives and disincentives to recycle, perceptions of benefits and distance, incomes, and education all affected recycling in Kabale, Uganda. Conversely, due to both sample size and relatively ambiguous data, other demographic characteristics such as household size, age, marital status, and gender demonstrated little reason to believe they made a substantial impact on recycling outcomes. In short, income, awareness, motivation, incentives, and perceptions are all factors that affect recycling in Kabale, Uganda.

Awareness is a factor that affects recycling in that those without prior knowledge of the recycling center cannot bring their plastic there whether they want to or not (Almasi et al., 2018). Five of the twelve residents interviewed did not know about the center's existence despite being less than a ten-minute walk away. In terms of how they found out about the recycling center, both populations overwhelmingly identified oral communication and radio as their source. Acknowledging the inter-educational attainment categories' discrepancies in what interviewees had reportedly been taught on recycling, it seems unlikely that the formal educational system can be counted on to raise awareness levels of recycling in Kabale.

GLI should make a concerted effort to increase radio coverage of the center as well as do a form of canvassing, where volunteers or collectors spend time throughout Kabale talking to individuals about the center. These forms of communication are in line with the results, and align with the literature which notes higher rates of low-income recyclers who have reduced access to communication forms like social media and television (Banga, 2011). With five of 12 interviewees in the community unaware, it is critical that GLI increases its (positive) notoriety in the community to reach more potential collectors. Highly educated individuals specifically are not recycling, and to incentivize them to, whether they do so for economic, environmental, or totally unrelated reasons, their awareness needs to be raised. Not only do individuals in the community need to know the value of recycling, they also need to have clear and easy steps they can take to recycle (Conke, 2018).

It is worth noting that while several factors associate with recycling, they seemingly link back to income. In the literature, economic benefit perception is a salient factor in promoting recycling, which is reflected in this study's findings (Katusiimeh et al., 2013). The income available through recycling was the only motivator to recycle amongst collectors, and they all expressed economically based positive perceptions of recycling. Educational attainment within collectors was lower on average than amongst residents, which aligns with the literature that notes that often individuals that complete higher education acquire higher-paying jobs, eliminating the income motivation to recycle (Banga, 2011). Furthermore, the average income between groups shows that non-collector residents make significantly more than collectors, and while it is a small sample size, the range and median for incomes is also greater among residents. This indicates that the driving factor differentiating those who recycle and those who do not is income, for those with higher paying jobs or more generally anyone without an incentive to

collect plastic for a relatively low buyback rate are rarely recycling. Education may play an (uncertain from the data) role in influencing awareness of recycling, but economic need, measured through income, is what is driving people to recycle. This influence generally only affects those at the lowest income levels or those who have no other employment options, as those with other vocations often reported that the buyback amount did not justify the time and resources needed to recycle. This reinforces the idea that the economic benefit of the center is its primary marketable incentive in the community and that for some people not in lower-income situations, the market rate of Ushs 250/kg is not enough to incentivize collection.

Acknowledging that most recyclers do so out of economic motivation, the center should expand its potential base by raising its buyback rate in Kabale, as in Lira, to Ushs 500/kg. Though it increases day to day expenses, it would broaden the amount of the population that viewed collecting both full and part-time as a viable and worthy source of income. Revenue lost in this increased buyback would likely be offset by an increase in collection rate. GLI could certainly also willingness to pay studies to identify the popular consensus at different income levels as to what buyback rate might incentivize them to recycle. While many people feel favorably about recycling as an environmentally beneficial action, those who currently engage in recycling at the center are doing so for economic reasons, and GLI should emphasize that.

The perceived environmental benefits are referenced in the literature as an influential force in promoting recycling (Crociata et al., 2015; Khan et al., 2019). However, in this study, environmental benefit perceptions were far outnumbered by economic benefit perceptions in terms of driving recycling. This may be due to lower awareness among highly educated individuals about recycling, which again circles back to promoting awareness through radio and word of mouth.

In terms of disincentivizing factors in relation to recycling, access, monetary value, and safety seem to be the primary obstacles. The dangers both from hazards like sharp glass during the act of collecting as well as from the road conditions while transporting plastic were frequently mentioned and serve as disincentivizing factors in the quantity of plastic collected and the frequency with which it is brought to the center. The distance from the center, while not forcing collectors to stop their collection, did come up in equal numbers (one third of the interviewees) for collectors and residents as an inconvenience. Three collectors indicated the distance made it harder to recycle, and none of the three recyclers amidst the resident population were among those who called it inconvenient. Perceived distance, then, affects recycling outcomes in Kabale.

Acknowledging these findings, GLI should work to set up plastic drop off points in common areas around Kabale. More effective than clean zones, these drop off points would ameliorate access and travel safety issues often noted (Abdelnaser, 2008; Bolaane, 2006). Concerns about security, management, and payment to collectors who drop at all these locations are obviously of concern. However, using drop off points and thereby reducing the distance individuals travel to transport plastic to a collection center would empower individuals in Kabale who currently view recycling as too cost, time, or risk prohibitive to engage in healthy recycling behaviors. Drop off points are well established in the recycling literature. A pilot should be run at one location to help evaluate the best way to manage payment and storage from these drop off points.

One small but impactful recommendation would be to aid long-time collectors in the purchase of work gloves. Three of the twelve collectors interviewed mentioned cuts from glass

while sorting waste as a significant obstacle to their recycling and providing a layer of protection would alleviate concerns and allow the collectors to collect higher volumes more frequently.

The other factors, such as gender, household size, marital status, and age, do not appear to have an association with recycling outcomes. The differences between populations in these categories are largely negligible, and do not suggest an association with recycling. The one potential exception is that of marital status, in that the two widows in the collector population noted they had begun collecting as a result of being widowed. However, with a small sample size, it is difficult to ascertain the significance of these two instances more broadly.

Ultimately, these findings answer the question of what factors affect recycling outcomes by identifying a few key factors. Income, primarily, as a motivator, demonstrates a strong influence on behavior and is the primary reason collectors approve of recycling. Awareness of the center allows people to have the opportunity to form perceptions in the first place. Disincentives to recycling outcomes include the convenience of the center's location as a matter of time as well as safety transporting the plastic in addition to perceived low buyback rates and dangers while collecting.

There were a few limitations to this study. One of these limitations was the language barrier. The need for a translator in all but two interviews inevitably impeded communication and resulted in shorter responses. In an ideal scenario, there would have been more interviews conducted by numerous individuals to ensure different populations were represented equally. Minors may be overrepresented in the collector's population as one collection day occurred on a holiday. The qualitative nature of this study is also not ideally suited for finding correlational or causal relationships. Future studies would benefit from a native speaker of the local dialects fully conducting and taking notes on interviews. Future studies should also include widely

disseminated surveys to encompass a larger population percentage and enable quantitative analysis. Confirming the findings, particularly as they pertain to the motivations and incentives of individuals in Kabale to recycle, would be recommended as a part of further studies.

Conclusion

This study established what factors are associated with recycling outcomes in Kabale, Uganda as to enable the client, the Global Livingston Institute, to increase collection within the city. What the study uncovered was that access to nearby recycling centers, general awareness levels in the community, and most significantly economically based incentives (the buyback program), are the primary factors affecting recycling within Kabale, Uganda. Further studies should be undertaken to verify the results of this one and attain more specific quantitative data regarding incentives, incomes, and a reasonable buyback rate. Large population-size studies undertaken to find more specific correlations between factors and recycling, especially income, access, and awareness, would empower GLI to further focus its efforts in the community and increase recycling rates. In-depth interviews with current collectors about they experience and ways they can see them being ameliorated would also be highly beneficial for increasing the ease of which individuals can recycle while employing the Listen. Think. Act. approach that GLI favors. However, devoting resources to in-person and radio awareness campaigns, helping to provide gloves for collectors, exploring the installation of plastic drop off points around the city, and increasing the appeal of the economic incentive by raising the buyback rate, are all actionable steps GLI can take in light of these findings to increase collection in Kabale.

References

- Abdelnaser, O., Abdullah, M., & Hamidi, A. A. (2006). To recycle or not to recycle? A study of household attitude toward recycling of solid wastes in Malaysia: A case study of perlis state. *Environmental Engineering and Management Journal*, 5(4), 743–756.
<https://doi.org/10.30638/eemj.2006.060>
- Adogu, P. O., Uwakwe, K. A., Egenti, N. B., Okwuoha, A. P., & Nkwocha, I. B. (2015). Assessment of waste management practices among residents of Owerri Municipal Imo State Nigeria. *Journal of Environmental Protection*, 06(05), 446–456.
<https://doi.org/10.4236/jep.2015.65043>
- Babbie, E. R. (2001). *The practice of Social Research*. Cengage.
- Banga, Margaret (2011) Household Knowledge, Attitudes and Practices in Solid Waste Segregation and Recycling: The Case of Urban Kampala, *Zambia Social Science Journal*, 2(1), 26-39. Available at: <http://scholarship.law.cornell.edu/zssj/vol2/iss1/4>
- Bennett, E. M., & Alexandridis, P. (2021). Informing the public and educating students on plastic recycling. *Recycling*, 6(4), 69. <https://doi.org/10.3390/recycling6040069>
- Bolaane, B. (2006). Constraints to promoting people centred approaches in recycling. *Habitat International*, 30(4), 731–740. <https://doi.org/10.1016/j.habitatint.2005.10.002>
- Conke, L. S. (2018). Barriers to waste recycling development: Evidence from Brazil. *Resources, Conservation and Recycling*, 134, 129–135.
<https://doi.org/10.1016/j.resconrec.2018.03.007>

Crociata, A., Agovino, M., & Sacco, P. L. (2015). Recycling waste: Does culture matter?

Journal of Behavioral and Experimental Economics, 55, 40–47.

<https://doi.org/10.1016/j.socec.2015.01.005>

Global Livingston Institute. (2021). *Recycling center*. GLI. Retrieved July 16, 2022, from

<https://www.globallivingston.org/programs/recycle>

Godfrey, L. (2021). Quantifying economic activity in the informal recycling sector in South

Africa. *South African Journal of Science*, 117(9/10), 138–144.

<https://doi.org/10.17159/sajs.2021/8921>

González-Torre, P. L., & Adenso-Díaz, B. (2005). Influence of distance on the motivation and frequency of Household Recycling. *Waste Management*, 25(1), 15–23.

<https://doi.org/10.1016/j.wasman.2004.08.007>

Kabera, T., Wilson, D. C., & Nishimwe, H. (2019). Benchmarking performance of Solid Waste Management and recycling systems in East Africa: Comparing Kigali Rwanda with other major cities. *Waste Management & Research: The Journal for a Sustainable Circular Economy*, 37(1_suppl), 58–72. <https://doi.org/10.1177/0734242x18819752>

Katusiimeh, M. W., Burger, K., & Mol, A. P. J. (2013). Informal waste collection and its co-existence with the formal waste sector: The case of Kampala, Uganda. *Habitat*

International, 38, 1–9. <https://doi.org/10.1016/j.habitatint.2012.09.002>

Khan, F., Ahmed, W., Najmi, A., & Younus, M. (2019). Managing plastic waste disposal by assessing consumers' recycling behavior: The case of a densely populated developing

country. *Environmental Science and Pollution Research*, 26(32), 33054–33066.

<https://doi.org/10.1007/s11356-019-06411-4>

Khan, O., Daddi, T., Slabbinck, H., Kleinhans, K., Vazquez-Brust, D., & De Meester, S. (2020).

Assessing the determinants of intentions and behaviors of organizations towards a circular economy for plastics. *Resources, Conservation and Recycling*, 163.

<https://doi.org/10.1016/j.resconrec.2020.105069>

Lange, F., Brückner, C., Kröger, B., Beller, J., & Eggert, F. (2014). Wasting ways: Perceived

distance to the recycling facilities predicts pro-environmental behavior. *Resources,*

Conservation and Recycling, 92, 246–254. <https://doi.org/10.1016/j.resconrec.2014.07.008>

Madinah, N. (2016). Solid Waste Management System: Public-Private Partnership, the Best

System for Developing Countries. *International Journal of Engineering Research and Applications*, 6(4), 57–67.

<https://doi.org/https://kyuspace.kyu.ac.ug/bitstream/handle/20.500.12504/497/Nabukeera%20Madinah.pdf?sequence=1&isAllowed=y>

Mekonnen, G. B., dos Muchangos, L. S., Ito, L., & Tokai, A. (2022). Analyzing key drivers for a

sustainable waste management system in Ethiopia: An interpretive structural modeling approach. *Environmental Challenges*, 8, 100556.

<https://doi.org/10.1016/j.envc.2022.100556>

Muisa Zikali, N., Chingoto, R. M., Utete, B., & Kunedzimwe, F. (2022). Household solid waste

handling practices and recycling value for integrated solid waste management in a

developing city in Zimbabwe. *Scientific African*, 16.

<https://doi.org/10.1016/j.sciaf.2022.e011150>

Orcher, L. T. (2014). Chapters Ten and Twenty. In *Conducting research: Social and behavioral science methods* (pp. 83–188). essay, Routledge.

Projects. Planet Buyback. (2021). Retrieved July 10, 2022, from

<https://www.planetbuyback.com/projects/>

Temple, A. J. (2021, May 13). *Plastic bottle recycling in Uganda*. GLI. Retrieved July 16, 2022, from <https://www.globallivingston.org/dir/research/plastic-bottle-recycling-in-uganda>

Troschinetz, A. M., & Mihelcic, J. R. (2009). Sustainable recycling of municipal solid waste in developing countries. *Waste Management*, 29(2), 915–923.

<https://doi.org/10.1016/j.wasman.2008.04.016>

Uganda Bureau of Statistics. (2017, April). *National Housing and Population Census 2014*.

UBOS. Retrieved September 18, 2022, from <https://www.ubos.org/wp-content/uploads/publications/2014CensusProfiles/KABALE.pdf>

Uganda Revenue Authority. (2022). *Taxation handbook - ura*. Uganda Revenue Authority.

Retrieved September 1, 2022, from

https://www.ura.go.ug/resources/webuploads/INLB/Taxation%20Handbook%204th%20Edition%202022_10.02.2022.pdf

United Nations Environment. (2018). *The challenge Africa is currently recycling*. unep.org.

Retrieved July 12, 2022, from

https://wedocs.unep.org/bitstream/handle/20.500.11822/30975/Africa_WMO_Poster.pdf

Van Leeuwen, J. (2021). *Listen. Think. Act*. Gli. Retrieved August 28, 2022, from

<https://www.globallivingston.org/mission/#mission-header-story-section>

Viljoen, J., Blaauw, D., & Schenck, C. (2019). The opportunities and value-adding activities of

buy-back centres in South Africa's recycling industry: A value chain analysis. *Local*

Economy: The Journal of the Local Economy Policy Unit, 34(3), 294–315.

<https://doi.org/10.1177/0269094219851491>

Wansi, B.-I. (2022, July 1). *Uganda: Coca-Cola and 3 start-ups join forces against plastic waste*

in Kampala. Afrik 21. Retrieved July 15, 2022, from

<https://www.afrik21.africa/en/uganda-coca-cola-and-3-start-ups-join-forces-against-plastic-waste-in-kampala/>

World Bank. (2021). *Urban population (% of total population) - Uganda*. data.worldbank.

Retrieved August 14, 2022, from

<https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=UG>

Appendix A: Interview Protocols

Interview with Collectors at the Recycling Center

Number:

Interviewer: Nathan Fletcher

Interview Date & Time:

Letter of Consent (Read to interviewees and verbal confirmation was received before every interview)

In an effort to address improper disposal of plastic bottle waste, this interview aims to study the ways in the recycling center in Kabale, Uganda can increase recycling outcomes. Information gathered in this study will be used only for research purposes, and your identity will be protected by assigning a number to your interview that will be used to identify your answers in the analysis generated from these interviews. Your participation is voluntary and may be terminated at any time. This interview will take between five and ten minutes. May I continue?

1. How old are you?
2. What is your current marital status? <ul style="list-style-type: none"> • Single • Married • Other
3. How many people do you live with?
4. Gender (M/F)
5. If over 18 , Do you have other ways you make money? (Y/N)
6. If over 18 and if N to 10 , What share of your income comes from recycling (as a %)?
7. If over 18 , How much do you estimate is your monthly individual income?
8. Tell me about your recycling habits; how often do you recycle? How much do you normally bring to the center?
9. What is your highest level of education attended? <ul style="list-style-type: none"> • None • Primary School • Lower Secondary • Upper Secondary/Ordinary • Diploma • Bachelor’s Degree • Postgraduate/Master’s Degree

<ul style="list-style-type: none"> • Doctoral Degree
<p>10. How did you first discover the opportunity to recycle plastic and collect for the recycling center?</p> <ul style="list-style-type: none"> • Oral Communication (conversationally) • Witnessed Physical Location • Television • Radio • Social Media (Facebook, WhatsApp, Instagram, Other) • Other
<p>11. What did you learn about recycling and the benefits of recycling in school?</p>
<p>12. What is good and/or bad about recycling?</p>
<p>13. If under 18, What days and times are you most likely to recycle?</p>
<p>14. What are your main reasons for recycling at the center?</p> <ul style="list-style-type: none"> • Aesthetic (visible appearance of Kabale) • Environmental (reduction in toxic fume production, land reclamation, etc.) • Economic (the buyback program) • Other
<p>15. What makes it hard to recycle at the center?</p> <ul style="list-style-type: none"> •
<p>16. How convenient is the recycling center to bring plastic to?</p> <ul style="list-style-type: none"> •

Interview with Residents in Kabale’s Town Center

Number:

Interviewer: Nathan Fletcher

Interview Date & Time:

Letter of Consent (Read to interviewees and verbal confirmation was received before every interview)

In an effort to address improper disposal of plastic bottle waste, this interview aims to study the ways in the recycling center in Kabale, Uganda can increase recycling outcomes. Information gathered in this study will be used only for research purposes, and your identity will be protected by assigning a number to your interview that will be used to identify your answers in the analysis generated from these interviews. Your participation is voluntary and may be terminated at any time. This interview will take between five and ten minutes. May I continue?

<p>1. How old are you?</p> <ul style="list-style-type: none"> •
<p>2. What is your marital status?</p> <ul style="list-style-type: none"> • Single • Married • Other
<p>3. How many people do you live with?</p> <ul style="list-style-type: none"> •
<p>4. Gender (M/F)</p> <ul style="list-style-type: none"> •
<p>5. What is your highest level of education attended?</p> <ul style="list-style-type: none"> • None • Primary School • Lower Secondary • Upper Secondary/Ordinary • High School • Advanced • Diploma • Bachelor’s Degree • Postgraduate/Master’s Degree • Doctoral Degree
<p>6. If over 18, How much do you estimate you make monthly?</p>
<p>7. If over 18, What is your occupation?</p>
<p>8. What did you learn about recycling and the benefits of recycling in school?</p> <ul style="list-style-type: none"> •
<p>9. What is good and/or bad about recycling?</p>

<ul style="list-style-type: none"> •
<p>10. Are you aware of the recycling center in Kabale that takes plastic bottles? (Y/N)</p> <ul style="list-style-type: none"> •
<p>11. If Y to 6, How were you made aware of the recycling center?</p> <ul style="list-style-type: none"> • Oral Communication (conversationally) • Witnessed Physical Location • Television • Radio • Social-Media (Facebook, WhatsApp, Instagram, Other) • Other
<p>12. If Y to 6, Do you recycle your plastic bottles at the center? (Y/N)</p> <ul style="list-style-type: none"> •
<p>13. If Y to 8, Tell me about your recycling habits; how often do you recycle? How much plastic do you normally bring?</p> <ul style="list-style-type: none"> •
<p>14. If under 18 and if Y to 8, What days and times are you most likely to recycle?</p> <ul style="list-style-type: none"> •
<p>15. If Y to 8, what are your main reasons for recycling at the center?</p> <ul style="list-style-type: none"> • Aesthetic (visible appearance of Kabale) • Environmental (reduction in toxic fume production, land reclamation, etc.) • Economic (the buyback program)
<p>16. If N to 8, what are reasons you choose to not recycle at the center?</p> <ul style="list-style-type: none"> •
<p>17. If N to 8, are you aware of the buyback program where the center buys your bottles from you for Ushs250/kg? (Y/N)</p> <ul style="list-style-type: none"> •
<p>18. If N to 13, does knowing about the buyback program make you more likely to recycle? (Y/N)</p> <ul style="list-style-type: none"> •
<p>19. How convenient is the recycling center to bring to?</p>

Appendix B: Interview Question Structure

Structure of Questions	
Questions are categorized into: Demographic; Knowledge, Attitude, and Awareness (KAA); Incentives; and Outcomes.	
Residents:	
Question Focus	
1. Age: Demographic	By year
2. Marital Status (over 18): Demographic	Single, Married, Other
3. Household Size: Demographic	By Number, including spouse and children
4. Gender: Demographic	Due to traditional cultural associations with gender in the population sampled, it was decided best that the interviewer note gender as either M or F by the interviewer based on their perception of the outward expression of their gender identity, acknowledging that this will not accurately represent how some interviewees may self-identify.
5. Education level: Demographic	None, Primary School, Lower Secondary, Upper Secondary/Ordinary, High School, Advanced, Diploma, Bachelor's Degree, Postgraduate/Master's Degree, Doctoral Degree
6. Estimated individual monthly income (over 18): Demographic	<Ushs. 335,000; Ushs. 335,000- Ushs. 410,000; >Ushs. 120,000,000
7. Occupation (over 18): Demographic	Open ended
8. Recycling and recycling benefits taught: KAA	Open ended
9. Views on recycling: KAA	Open ended
10. Awareness of Recycling Center that takes plastic bottles: KAA	Yes or No
11. How were you made aware of the recycling center?: KAA	Verbally Communicated, Witnessed physical location, Television, Radio, social media (subcategories of Facebook, Instagram, and WhatsApp), other
12. Do you recycle your plastic bottles at the center?: Outcomes	Yes or No
13. Recycling habits: Outcomes	Open ended
14. Days and times of recycling (under 18): Outcomes	Open ended
15. Reasons for recycling plastic at the center: Incentives	Aesthetic, economic, environmental, other (Almasi et al., 2019)

16. Reasons for not recycling plastic at the center: Incentives	Open ended
17. Buyback program awareness: Incentives	Yes or No
18. Effectiveness of Buyback: Incentives	Yes or No
19. Convenience of location: Incentives	1, 2, 3, 4, 5 (1 most convenient, 5 least convenient)
Collectors:	Collectors
1. Age: Demographic	By year
2. Marital Status (over 18): Demographic	Single, Married, Other
3. Household Size: Demographic	By Number, including spouse and children
4. Gender: Demographic	Due to traditional cultural associations with gender in the population sampled, it was decided best that the interviewer note gender as either M or F by the interviewer based on their perception of the outward expression of their gender identity, acknowledging that this will not accurately represent how some interviewees may self-identify.
5. Other source of income (over 18): Demographic	Yes or No
6. Share of income from recycling (over 18): Demographic	As a percent (%)
7. Estimated individual monthly income (over 18): Demographic	<Ushs. 335,000; Ushs. 335,000- Ushs. 410,000; >Ushs. 410,000- <Ushs. 120,000,000; >Ushs. 120,000,000
8. Recycling Habits: Outcomes	Open ended
9. Education level: Demographic	None, Primary School, Lower Secondary, Upper Secondary/Ordinary, Advanced, Diploma, Bachelor's Degree, Postgraduate/Master's Degree, Doctoral Degree
10. How did they discover and begin collecting for the center?: KAA	Verbally Communicated, Witnessed physical location, Television, Radio, Social Media (subcategories of Facebook, Instagram, and WhatsApp), other
11. Recycling and recycling benefits taught: KAA	Open ended
12. Perception of Recycling: KAA	Open ended
13. Days and times of recycling (under 18): Outcomes	Open ended

14. Reasons for recycling plastic at the center: Incentives	Aesthetic, economic, environmental, other
15. Barriers to recycling plastic at the center: Incentives	Open ended
16. Convenience of location: Incentives	1, 2, 3, 4, 5 (1 most convenient, 5 least convenient)