



FOOD WASTE BASELINE SURVEY

REPORT

2021

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Abstract

An estimated 37% of the households in Uganda and 20% of people in the capital Kampala live with food insecurity.¹ According to the Kampala Capital City Authority (KCCA), solid waste generation increased from 407,890 tons in 2011 to 785,214 tons in 2017; three-quarters of the waste is organic and biodegradable. Moreover, 28% of city-wide emissions come from landfills, waste incineration and solid waste management collectively, making the waste sector the second

biggest contributor of greenhouse gas emissions in Kampala after energy generation.² Food waste currently represents the largest part of solid waste generation in Kampala. The KCCA estimates that average household food waste generation in the city is 89 kg per person per year. Based on data collected as part of this project, daily food waste in Kampala ranges from 0.241 to 0.447 kg per person. Low-income earners generally generate less food waste (average 0.26 kg/ person/day) as compared to middle-income (0.40 kg/ person/day) and high-income earners (0.50 kg/person/day). The project found that in Uganda the absence of food waste regulations, inappropriate handling of food products, lack of food storage facilities, poor infrastructure, limited access to and high cost of electricity, inadequate food management practices and skills, and lack of understanding and awareness are the major drivers of food waste. Addressing food waste requires lifecycle interventions instead of a singular action targeting a particular stage of the food chain. Interventions at the production and transportation stages can also help to reduce food waste in households. Data is key, especially data to illustrate the economic, environment and social costs and consequences of food waste. An enabling environment is needed, with more attention to the informal sector that works on food service and waste collection. It also needs to connect infrastructure, urban planning, economic incentives, capacity support and mandatory regulations into a holistic approach. Given the role of women in the informal sector and in food consumption, such interventions should take into full consideration and systematically integrate gender equality into its planning and implementation. More support is needed to empower women to access green technologies, services and information and to participate in decisionmaking related to food waste. Financiers also need to improve finance for new technological innovations and business models. Researchers could fill in the gaps in data, technical standards, impact assessment, cost valuation, R&D and productive capacity. Civil society groups could leverage the latest findings in behavioral science and support grassroots campaigns to advocate for change in perception and lifestyle that relate to food consumption and food waste.

1 Background

This study is funded under the project Building Back Better; using Green and Digital Technologies to Reduce Food Waste at Consumer level. The project aims at contributing to the following Sustainable Development Goals (SDGs): SDG target 12.3 (halving food waste), SDG 2 (Zero

Hunger), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Sustainable Consumption and Production), SDG 13 (Climate Action) and SDG 17 (Partnerships). It will also support countries in harnessing green and digital technologies to reduce food waste at consumer level; contribute to the attainment of the SDGs and climate goals; support countries in Building Back Better from the COVID-19 pandemic. This project brings together different knowledge groups of United Nations Environment Programme (UNEP) for an integrated approach cutting across Economic and Trade Policy, Food and Food Waste, Consumer Information, Sustainable Lifestyles, and the International Resource Panel (IRP). This is combined with case studies of 5 cities in 5 regions, including: Doha (Qatar), Bogotá (Colombia), Belgrade (Serbia), Kampala (Uganda) and Bangkok (Thailand).

1.1.1 The Objectives

The study involves;

- (i) Diagnosing the food waste problem in Kampala by working with local authorities to develop urban food waste baselines, accompanied by a survey to understand the causes and drivers of household food waste, including COVID 19-specific impacts,
- (ii) Supporting food waste measurement by applying and contributing to the UNEP-led “Food Waste Index”,

2 Introduction

Between 33-50% of all food produced globally is never eaten, and the value of this wasted food is worth over \$1 trillion. Estimates suggest that 8-10% of global greenhouse gas emissions are

associated with food that is not consumed¹. Food waste is the third biggest source of greenhouse gas emissions it's among the key reasons why Sustainable Development Goal 12.3 aims to halve food waste and reduce food loss by 2030. Food waste also burdens waste management systems, exacerbates food insecurity, making it a major contributor to the three planetary crises of climate change, nature and biodiversity loss, and pollution and waste. Food waste reduction offers multi-faceted wins for people and planet, improving food security, addressing climate change, saving money and reducing pressures on land, water, biodiversity and waste management systems. Yet this potential has until now been woefully under-exploited. This potential may have been overlooked because the true scale of food waste and its impacts have not been well understood. Global estimates of food waste have relied on extrapolation of data from a small number of countries, often using old data. Few governments have robust data on food waste to make the case to act and prioritize their efforts.

3 Food and Food waste situation in Kampala City

3.1 Food and households in Kampala

According to the National Household Survey 2016/2017, the Uganda population was 37 million out of which 1.58 million people lived in Kampala. In 2020, the population was reported at 41 million people with about 2 million people leaving in Kampala. The average size of households in Kampala is 3.7 people. Households in Kampala (88%) had the highest share of their food from purchases in markets and food service entities and the rest from others.

Despite various efforts by government of Uganda, the extent of hunger in Uganda is still a serious problem. As of January 2017, about 10.9 million people in Uganda were experiencing acute food insecurity, out of which 1.6 million were in a food crisis. Only 4% of Ugandan households were food secure for the five years from 2009/10 to 2015/16, with 80% having suffered transient food insecurity. (NPA &WFP, 2017). Over 64% of Ugandans cannot afford the desired 3 meals per

1 UNEP Food Waste Index Report 2021

day². Hunger is high among primary school going children with 66% not accessing any meal while at school.

The average household monthly expenditure in Kampala is estimated at UGX 608,400/= and 33.5% goes on food and non-alcoholic beverages. The findings show that, more than a third (37%) of the households in Uganda had food poverty and in Kampala 20% of people had food poverty.³

Table 1: Average weekly consumption of food groups (No. of days) in Kampala

Average weekly consumption of food groups (No. of days)									
Food types	Staple (roots, cereals and tubers)	Pulses and Nuts	vegetables	Meat/ Fish & Eggs	Fruits	Milk	oil/fats	Sugar	Spices
Number of days	6.0	1.3	5.8	2.6	3.4	2.5	4.5	5.8	5.7

Source UBOS 2017

3.2 Solid Waste Profile in Kampala

According to KCCA, solid waste generation increased from 407,890 tons in 2011 to 785,214 tons in 2017 that represents 48% in seven years. The solid waste composition in Kampala is reported to be consisting of 88.5% organics, 3.8% soft plastics, 2.8% hard plastics, 2.2% paper, 0.9% glass, 0.7% textiles and leather, 0.2% metals, and 1.0% others in wet season. During the dry months, the waste consists of 94.8% organics, 2.4% soft plastics, 1.0% hard plastics, 0.7% papers, 0.3% glass, 0.3% textile and leather, 0.1% metals, and 0.3% others⁴. Further studies show that organic waste forms over 90% of total solid waste (73% vegetable matter (food waste edible and inedible part), 8% tree cuttings, and 1.7% saw dust)

3.3 Food waste Initiatives at KCCA

² National Planning Authority (NPA) and world Food Programme (WFP) strategic Review of sustainable development goal 2 in Uganda

³ UBOS 2017 National Household Survey 2016/17

⁴ Characterization of municipal waste in Kampala, Uganda Allan J. Komakech, Noble E. Banadda, Joel R. Kinobe, Levi Kasisira, Cecilia Sundberg, Girma Gebresenbet, and Björn Vinnerås

KCCA is undertaking a number of studies that range from food recovery from waste and safe disposal of food through energy recovery. The key activities of these projects include.

- (i) A joint study by KCCA in collaboration with Ministry of Energy and Mineral Development (MEMD) aimed at assessing the quality of organic (biodegradable matter) for possible use as input into a proposed biogas plant for electricity generation at the KCCA Landfill located in Kitezi.
- (ii) Joint study by KCCA in collaboration with Korea International Cooperation Agency to explore the possibility of treating and recycling food waste from markets for purposes of converting it to animal feeds.

KCCA has under taken the following two pilot projects aimed at recycling food waste from markets in Kampala.

- (i) Through a public private partnership, KCCA is working with PROTEEN (U) Ltd to collect food waste from markets and feed them to black soldier flies with a purpose of producing high quality protein from black soldier lavea for animal feeds. The reports from this pilot indicate that 5 to 10 tones/week of food waste is collected from the markets to feed the black soldier flies. The pilot projects are located at Wankoko and Kyanja (KCCA demonstration farms) both located in Nakawa division.
- (ii) KCCA through its Directorate of Gender, Community Services and Production is piloting segregation of food waste at Usafi Market located in Central Division where food waste (including peelings, vegetables) is collected in different bins and sold as animal feeds.

The Kampala Capital City Authority integrated urban farming into the city planning framework. The urban farming programmes are implemented and supervised by the Directorate of Gender and Community Services and Production. The directorate has implemented a number of interventions on urban farming which have direct impact on reduction of food waste.

- (i) Development and enacting of the Local Governments (Kampala City Council) (Urban Agriculture) Ordinance, 2006 to guide and regulate establishing and operating urban farming including use of composite manure e.g composted food waste.

- (ii) Establishment of a demonstration farm (Kyanja agricultural Resource Centre). The Center demonstrates Urban farming Technologies like improved seedlings of vegetables which yield products with extended shelf life.
- (iii) Piloting use of Farm to plate digital mobile application. Under the urban farming KCCA has developed and launched a mobile phone application (K-Smart Market) to support urban farmers while selling directly to consumers thus eliminating food waste associated with middle men

4 Baseline survey methodology

4.1 Definitions, Parameters and boundary Conditions

The National Food Waste Baseline survey has adopted the food waste definitions from UNEP as described in the food waste index report 2021 and is illustrated in figure 1.

Food waste: For the purposes of the Food Waste baseline “food waste” is defined as food (including drinks) and associated inedible parts removed from the human food supply chain in the following sectors: manufacturing of food products (under certain circumstances); food/grocery retail; food service; and households. “Removed from the human food supply chain” means one of the following end destinations: landfill, controlled combustion, sewer, litter/discards/ refuse, co/anaerobic digestion, compost / aerobic digestion or land application.

Food Any substance – whether processed, semi-processed or raw – that is intended for human consumption. “Food” includes drink, and any substance that has been used in the manufacture, preparation or treatment of food. “Food” also includes material that has spoiled and is therefore no longer fit for human consumption. It does not include cosmetics, tobacco or substances used only as drugs. It does not include processing agents used along the food supply chain, for example water to clean or cook raw materials in factories or at home

Inedible (or non-edible) parts: Components associated with food, in particular the food supply chain, are not intended to be consumed by humans. Examples of inedible parts associated with food could include bones, rinds and pits/stones. “Inedible parts” do not include packaging. What is considered inedible varies among users (e.g., chicken feet are consumed in some food supply chains but not others), changes over time, and is influenced by a range of variables including

culture, socio-economic factors, availability, price, technological advances, international trade and geography. See also “edible parts

Edible parts of food waste: “Food” (see definition, including drink) that is removed from the human food supply chain (i.e., to end up at the following destinations: landfill, controlled combustion, sewer, co/anaerobic digestion, compost / aerobic digestion or land application). See also “inedible parts”.

Table 1: Description of potential destinations for food, other than direct human consumption

Table 2: Description of potential destinations for food, other than direct human consumption

Destination	Definition	status
Bio-based materials / biochemical processing	Converting material into industrial inputs / products. Examples include creating fibres for packaging material; creating bioplastics (e.g., polylactic acid); making “traditional” materials such as leather or feathers (e.g. for pillows); and rendering fat, oil or grease into a raw material to make products such as soaps, biodiesel or cosmetics. Biochemical processing does not include energy generation through anaerobic digestion or production of bioethanol through fermentation.	Food Waste Co
Co Waste digestion / anaerobic digestion	- Breaking down material via bacteria in the absence of oxygen to generate energy (typically in the form of biogas) and nutrient-rich matter. Co-digestion refers to the simultaneous anaerobic digestion of food waste and other organic material in one digester. This destination includes fermentation, converting carbohydrates – such as glucose, fructose and sucrose – via microbes into alcohols in the absence of oxygen to create products such as biofuels.	
Composting / aerobic processes	Breaking down material via bacteria in oxygen-rich environments to produce organic material (via aerobic processes) that can be used as a beneficial soil additive	

Land application	Spreading, spraying, injecting or incorporating organic material onto or below the surface of the land to enhance soil quality.	
Not harvested / ploughed in	Leaving crops that were ready for harvest in the field or tilling them into the soil. It applies only to the food portion of the crop, with exception of the bagasse portion of harvestable sugarcane left in field.	
Other Recovery –	Sending material to a destination that is different from the specific destinations listed above (the FLW Standard destinations), for recovery. This may include recovery of hazardous food waste.	
Other Disposa –	Sending material to a destination that is different from the specific destinations listed above (the FLW Standard destinations), for disposal. This may include treatment and disposal of hazardous food waste at a hazardous waste treatment facility	
Sewer wastewater treatment /	Sending material to the sewer (with or without prior treatment), including that which may go to a facility designed to treat wastewater.	
Landfill	Sending material to an area of land or an excavated site that is specifically designed and built to receive wastes.	
Food rescue	The process of diverting food from landfill to charities and other organizations who redistribute food in the form of groceries or meals to Australians in need. Rescued food is considered part of the food supply chain, although the distribution pathway is different from that originally intended.	Not a Food Waste
Animal feed	Diverting material grown for human consumption from the food supply chain (directly or after processing) to animals. Material sent to animal feed is not considered food waste	

4.2 Food waste data collection methodology

4.1.1 Methodology for Households

Direct weighing and measurement of food waste at household level was carried-out. This included separating and subsequent weighing of edible and inedible parts of the food waste. The households were randomly selected in divisions of Kampala based on commitment and willingness to share data. The target for the study was 700 waste-day, which equates to 100 households sampled for a week. Data and information from reputable organizations or governmental publication, was used in comparison with findings from household surveys, direct weighing and measurement to increase the confidence of data collected. This methodology is limited by the fact that in some cases it was impossible to completely separate edible from inedible food waste (for example sauce mixed with peelings, dust or silt mixed edible food waste etc).

4.1.2 Methodology for Retailers (markets)

Data collection was done in 5 five food markets in Kampala. This involved; Quantifying food waste by establishing the number of waste trucks collected and the tonnage of waste carried by each truck per day from each of the sampled markets. A sample of waste from the markets was assessed to establish the average percentage of food waste in the total solid waste collected. The formula below was used to establish Daily food waste from markets.

Daily food waste quantities = (daily number of trucks collected * tonnage collection capacity* percentage of food waste)

This methodology has limitations because data collected was based on the capacity of the waste collection trucks yet some times the truck could be filled with high volume low density organic waste.

4.2.3 Methodology for Stakeholder engagement

Developed and used a survey questionnaire to collect data on overall food waste, including food waste generation by type, causes, destinations, waste handling cost, technologies, and practices for food handling.

Stakeholders that were engaged in the discussion gave insight on their perception on food waste, drivers of waste generation and possible measures on how to address food waste. The targeted stakeholders included local authorities including Kampala Capital City Authority (KCCA), Local councils, and management of food markets. Consultation will be extended to include the five divisions of Kampala, super markets, hotels and restaurants.

5 Finding From household and retail markets food waste survey

5.1 Findings from food waste direct measurements at Household level.

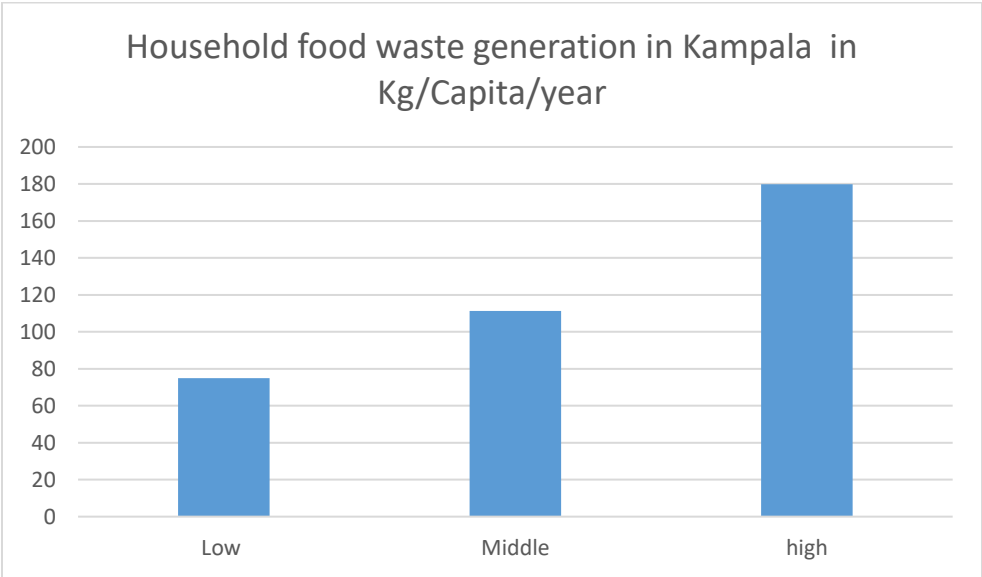


Figure 1: Variation of waste generated across different household incomes

The low-income earners generally generate less food waste (average 74.95 kg/person/ year) as compared to middle and high-income earners majorly because of the types of foods that dominate their diets. Low-income earners mainly eat foods prepared from grains and cereals such as millet flour, maize flour, rice, beans, and g-nuts, which are not always associated with inedible food waste. The middle and high-income earners have higher values of food waste of about 111.35 and 179.82 kg/person/year respectively. This is because their diets contain a variety of fresh foods like matooke, bananas, fruits (water melons, mangoes, oranges etc), cassava, irish potatoes, sweet potatoes etc which have huge quantities of inedible waste and easily go bad. Households in a similar income status may generate food waste above or below the average of the category

depending on their ethnicity. The bantu group (bakiga, banyankole, baganda), for example, their food waste tends to be slightly above average of the category because composition of their food is dominated by bananas while other ethnic groups like Lango and Acholi whose food is dominated by cereals. The average household food waste generation in Kampala City is 89 kg/person/ year which equates to about 178,367,203 kg per capita per year of food waste.



Figure 2: Separation edible food from inedible parts Food waste measurement at households



Figure 3 Food waste measurement at household level

5.2 Causes of food waste at household level

At household level food waste occurs at different levels that's in the store, in the kitchen and at dining or on the plate. Each stage generates food waste because of different causes.

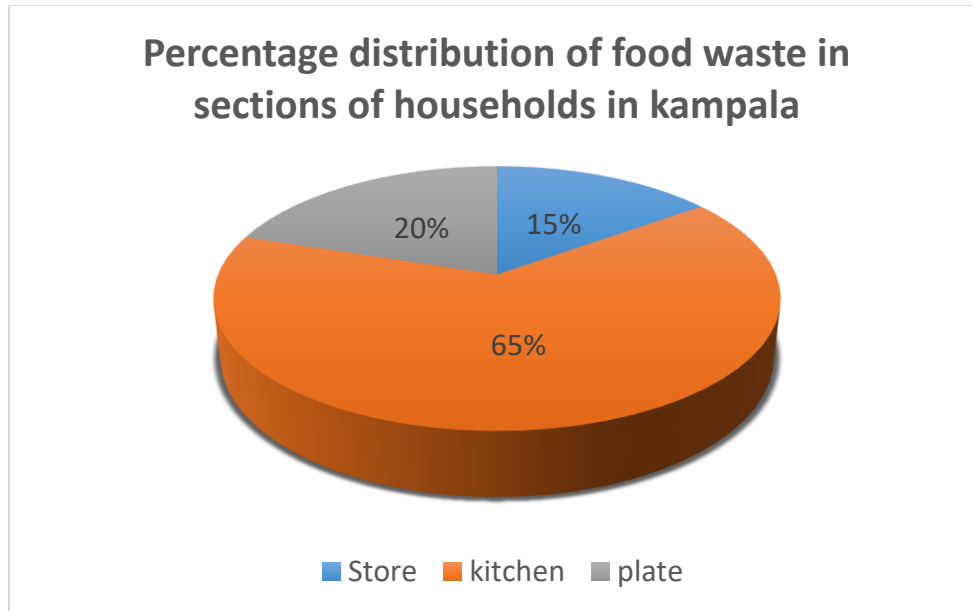


Figure 4: Percentage distribution of food waste in different section of the households

- a. In the store: On assessment the following causes of food waste were identified
 - i. Load shedding; this is dominant in middle and high-income earners whose diet features sausages, frozen meat, fruits and vegetables.
 - ii. Unplanned shopping; there is always a mismatch in stocked food and food that is preferred or often cooked. For example, people will stock more vegetables or bananas because one is offered a price below the average market price, such foods are very close to end of shelf life.
 - iii. Absence of storage technologies like conditioned storage in household's especially low-income earners lack appropriate food storage facilities.

- b. In the kitchen:
 - i. The technology applied for cooking; Charcoal stoves are widely used by households in Kampala for preparing meals. The technology does not allow controlled burning often resulting into burnt food.
 - ii. The preference of eating staple food. The national Household survey indicates that on average households in Uganda eat their staple foods 6 days per week. The staple foods are mainly bananas (matooke), cassava, sweat potatoes that are associated with large volumes of inedible food waste.

c. In the dining or on the plate.

- i. Failure to estimate the right quantity of food that is enough for the household. The household prefers to overestimate food instead of preparing food that is not enough for the family members.
- ii. Failure of some family members to turn up for dinner due to alcohol or family conflicts or any other business.
- iii. Dislike of left overs, in most families in Uganda it is a sign of disrespect to save left overs for a family head and most Ugandans prefer freshly prepared food.
- iv. Failure to prepare preferred meals due to cost of such meals, in such cases household members often leave food on the plate.

5.3 Food waste findings in food markets in Kampala



Figure 5: Food stalls in informal food retail markets

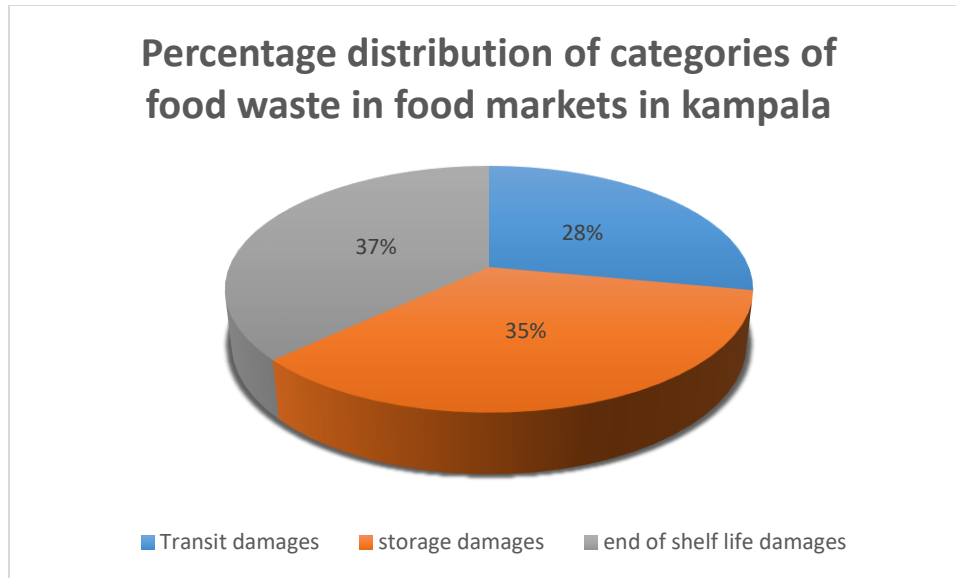


Figure 6: Percentage distribution of categories of food waste in food markets in Kampala

End of shelf-life accounts for the largest food waste generation in markets due to a number of reasons including;

- i. Harvest or bulk seasons; during harvesting season (June to July and October to November,) food floods the market and eventually the supply greatly exceeds the demand. This results in food staying on market stalls beyond their shelf life thus generating food waste.
- ii. Failure to predict market demand, the demand of food varies with time. The demand for fruits, for example, is higher in the dry season or festive seasons. The traders in informal markets do not have data and the capacity to consider such variations. This often results into food waste generation in the markets.
- iii. Middle men speculation and hoarding; the middle men tend to hoard food products in order to inflate prices for food leading to delayed purchase and therefore deterioration of food quality and shortening the shelf life.

Storage damages;

- i. Some of the markets that were assessed were constructed in the 90s and early 2000. The current population of traders far exceeds the initial design capacity of the markets. For example, one of the markets was designed to accommodate 1000 traders but currently it's occupied by about 5500 traders hence significantly compromising its storage facilities.

- ii. Absence of appropriate storage technologies; in all of the five markets assessed none of them had conditioned storage like cold rooms for highly perishable foods.

Transit damage;

- i. The produces from farm to the market are overload on trucks exerting more pressure on food produces. This often results in food reaching the market when they are already waste or of deteriorate quality.
- ii. In some cases vehicles delay in transit due to mechanic failure which reduces the shelf life of produces or generates immediate food waste.



Figure 7: Breakdown of food distribution truck in Kampala

Table 3: The Case of food waste originating from transit in Nateete Market kampala

Produce	Quantities of food delivered	Food Waste originating from transit	Lost money due to food waste	Percentage of waste generated
Jack fruits	20 pcs	16 pcs	UGX 80,000/=	80%
Yellow banana (Ndizi)	18 pcs	15 pcs	UGX 300,000/=	83%
Ovacado	350 pcs	165 pcs	UGX 33800/=	53%

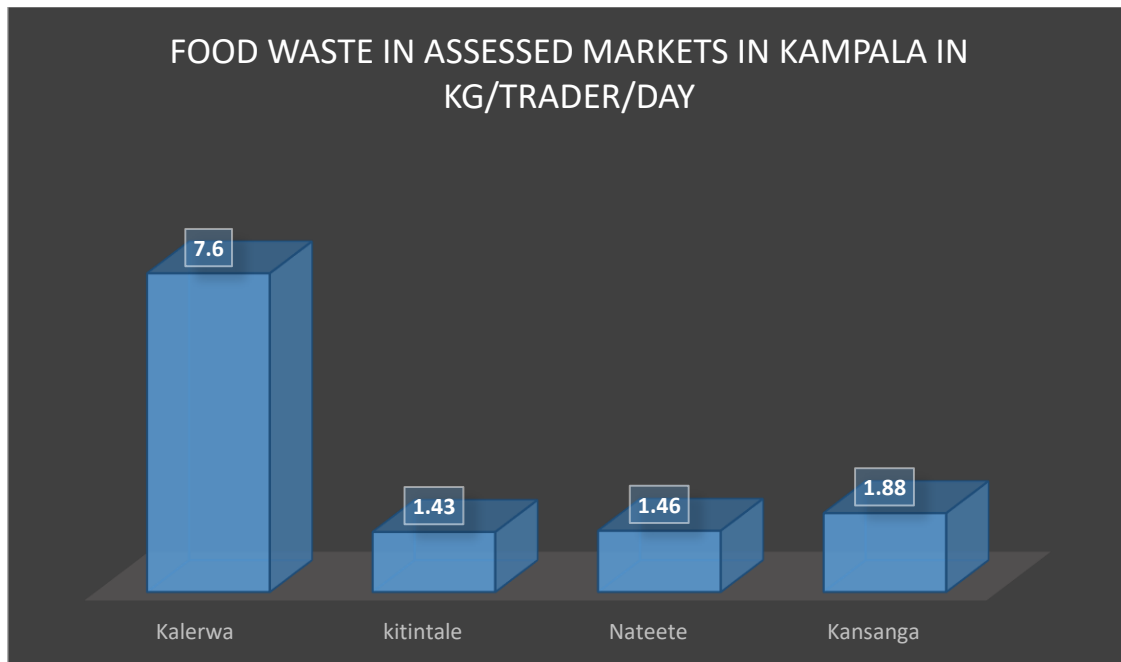


Figure 8: Quantities of food waste generated in Kampala markets

The food waste in assessed markets was ranging from 1.43 to 7.6 kg/trader/day. The Kalerwe market waste value was very high (7.6 kg/trader/day) compared to other markets because the market receives food products directly from the farmers (primary recipient market) where traders from other markets usually purchase their food products. This means other markets get reduced damaged food products associated with transit since they purchase sorted food products at Kalerwe market.

5.4 Opportunities For food waste Prevention, and recovery and recycling

With use of green technologies and techniques food waste can be prevented and diverted to create the most benefits for the environment, society and the economy as described below. Through use of digital technologies excess food can be redistributed to feed poor people. Over 64% of Ugandans cannot afford the desired 3 meals per day. The findings show that, more than a third (37%) of the households in Uganda had food poverty and in Kampala 20% of people have food poverty. In many cases, the food tossed into our nation's landfills is wholesome, edible food. We can be leaders in our communities by collecting unspoiled, healthy food and donating it to our neighbors in need. By donating food, we're feeding people, not landfills, supporting local

communities, and saving all the resources that went into producing that food from going to waste. Feeding Animals is the third tier of Food Recovery Hierarchy. Farmers have been doing this for centuries. With proper and safe handling, anyone can donate food scraps to animals. Food scraps for animals can save farmers and companies money. It is often cheaper to feed animals food scraps rather than having them hauled to a landfill. Companies can also donate extra food to zoos or producers that make animal or pet food. There are many opportunities to feed animals, help the environment and reduce costs. Anaerobic digestion is a process where microorganisms break down organic materials, such as food scraps, manure, and sewage sludge. This is done in the absence of oxygen. Recycling wasted food through anaerobic digestion produces biogas and a soil amendment, two valuable products. Wasted food can be processed at facilities specifically designed to digest the organic portion of municipal solid waste. It can also be co-digested at wastewater treatment plants and manure digesters. Create industrial synergies for purposes of using food waste as an input for industrial processes. For example, Liquid fats and solid meat products are materials that should not be sent to landfills or disposed of in the sanitary sewer system. Fats, oils, and grease can clog pipes and pumps both in the public sewer lines as well as in wastewater treatment facilities. This prevents combined sewer overflows, which protects water quality and lowers bills. Fats, oil and grease should be sent to the rendering industry to be made into another product, converted to biofuels, or sent to an anaerobic digester. Liquid fats and solid meat products can be used as raw materials in the rendering industry, which converts them into animal food, cosmetics, soap, and other products. Many companies will provide storage barrels and free pick-up service. Fats, oils and grease are collected and converted by local manufacturers into environmentally friendly biodiesel fuel. Biodiesel is an alternative fuel produced from renewable resources such as virgin oils (soybean, canola, palm), waste cooking oil, or other biowaste feedstock. Biodiesel significantly reduces greenhouse gases, sulfur dioxide in air emissions, and asthma-causing soot. Along with creating less pollution, biodiesel is simple to use, biodegradable and nontoxic. Even when all actions have been taken to use your wasted food, certain inedible parts will still remain and can be turned into compost to feed and nourish the soil. Like yard waste, food waste scraps can also be composted. Composting these wastes creates a product that can be used to help improve soils, grow the next generation of crops, and improve water quality. Inevitable or inedible food waste can also be compressed to provide alternative clean cooking energy sources.

5.5 Food waste Destination

The main food waste destinations in Kampala include landfill, water drainage channels, local dumping sites. During the study 100 households were contacted to understand food waste destination and management. The finding shows that about 8.5% of the contacted households recycled or repurposed food waste into animal feeds. The 91.5% of the household food waste ends up in land fill, local dumping or openly burnt in local sites. As detailed in the pie chart below.

Food waste destination in kampala in 2021

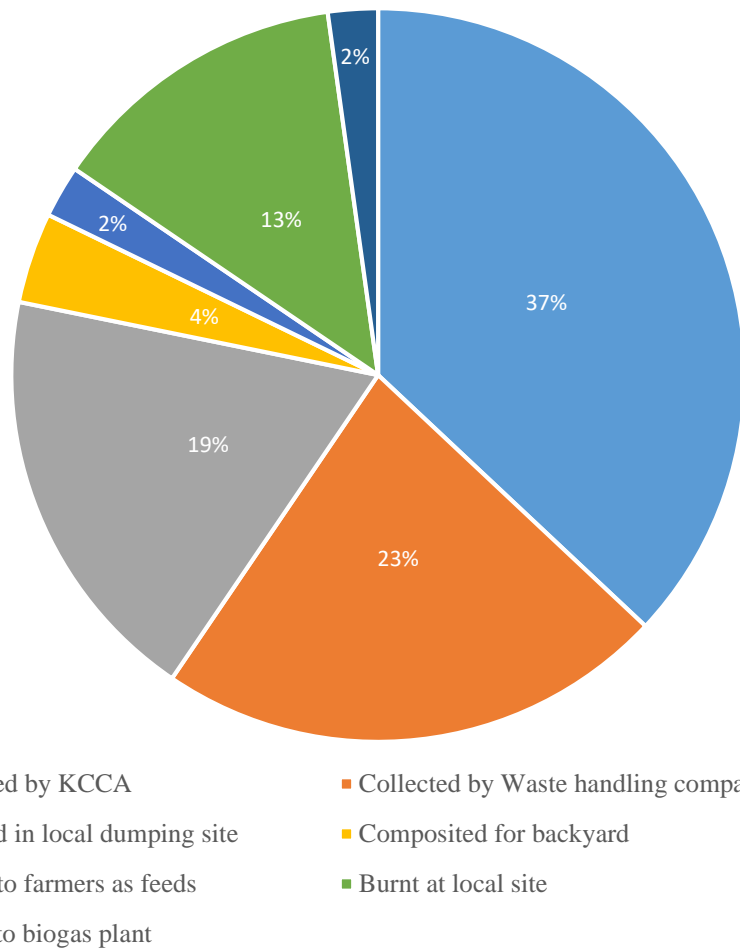


Figure 9: Household Food waste destinations in Kampala

5.6 Drivers of Food waste in Kampala

- (i) **Culture and norms;** Uganda has a diversity of cultures and practices compared to other countries. Culture and norms influence consumption behavior and often generates food waste for example in Uganda leaving food on a plate signifies satisfaction especially on custom visits, Furthermore, during the cultural and social events, food is prepared in large quantities, showing off “abundance” or to indicate wealth or hospitality. In other culture especially among the bantu ethnic group dislike of leftovers and it’s inappropriate to save a husband leftover (obuhoro). Often the large quantities of food end up not being wholly consumed and resulting in an increase in food waste that gets disposed.
- (ii) **The unfavorable or absence of food waste regulations and standards;** There are instances where some polices are barrier to reducing food waste for example in the labelling standards, food safety and quality require food to be discarded if it doesn’t meet the requirement. Such polices lack provision of recycling or reposing or converting such food products into animal feeds. In other case the regulation and standard are absent for in Uganda there are no regulations or standard that provide guidelines for sharing of unsold food or left over with communities that are food insecure. This leaves food services industries in Uganda with no choice but to dispose left over and unsold food into landfills.
- (iii) **Poor infrastructure,** the cases where the infrastructure is available it’s not of good quality or sufficient enough. The infrastructure includes reliable power supplies, reliable communication, usable roads, and access to markets storage facilities, cold chains, processing facilities, and distribution- or market-related logistics (e.g., handling facilities). Household and food retailers can’t affordable to store perishable under conditioned storage majorly because of limited access to and high cost of electricity. The informal retailers (market) have limited convention storage capacity and lack modern storage facilities
- (iv) **Inadequate food management practices and skills;** Lack of or inadequate management practices or use of equipment due to a lack of knowledge, skills, or incentives. Among food retailers, service providers and household, this could include poor use of mechanical and electrical appliances, lack of knowledge about planning and preparing meals, as well as how

to assess product freshness and interpret date labels. Lack of awareness also include a limited understanding of how reducing food waste can provide direct (personal or business) benefits (e.g., enhanced product freshness, reduced costs)

(v) **lack of understanding and awareness** are the major causes of food waste Lack of awareness that food waste happens and has an impact, and how one contributes to the problem. Business owners, and consumers often do not think they waste food, but measurement suggests otherwise.

(vi) **limited access to finance:** Inability to access sufficient financing (e.g., investment, loans, grants) to purchase, implement, or scale technologies that would reduce food loss and waste. The food sector is dominated by informal sector who can meet the prerequisites required by banks in order access loans

6 Lessons learnt and recommendations

6.1 Lessons learned

- The food service sector is largely dominated by the informal sector. The government interventions that can address food waste tend to target the formal sector for example only licensed hotels can benefit from tax exemption on green technologies, yet the food service sector is dominated by informal enterprises.
- Interventions at the production stage of food can help to reduce food waste at service and household levels. Addressing food waste requires life cycle interventions instead of singular interventions targeting a particular stage of the food chain. The assessment in the market shows that about 35% of food waste experience in markets are attributed to inefficiency in transit systems.
- Data is key to inform country strategic plans. Lack of data to illustrate the economic, environment and social impact of food waste has led to shift of government attention to addressing food loss.

- Given the role of women in the informal sector and in food consumption, such interventions should take into full consideration and systematically integrate gender equality into its planning and implementation. More support is needed to empower women to access green technologies, services and information and to participate in decisionmaking related to food waste

6.2 Recommendations

Addressing food waste requires lifecycle interventions instead of a singular action targeting a particular stage of the food chain. Interventions at the production and transportation stages can also help to reduce food waste in households. Data is key, especially data to illustrate the economic, environment and social costs and consequences of food waste. An enabling environment is needed, with more attention to the informal sector that works on food service and waste collection. It also needs to connect infrastructure, urban planning, economic incentives, capacity support and mandatory regulations into a holistic approach. The following intervention and measures recommended to address food waste challenge in Uganda

- i. Conduct consumer education campaigns about food loss and waste to shift social attitudes (e.g., to general public, to schools).
- ii. Implement techniques that reduce waste (e.g., reducing size of plates for buffets) in lunchrooms, cafeterias, and other foodservice settings.
- iii. Promote the value of food so that the cultural mindset is less likely to accept wasted food.
- iv. Conduct food waste inventories (or “audits”) to identify the quantity and hotspots of waste, and communicate the results.
- v. Pass laws that increase the cost of discarding food.
- vi. Amend laws to develop standards and regulations to allow unsold food to be used in animal feed
- vii. Adopt policies that encourage improved trade linkages (e.g., organized group membership for smaller producers, improved availability of, and access to, markets).
- viii. Develop policies that help small businesses improve their operations (e.g., by incentivizing and providing support for food handling practices that reduce contamination).
- ix. Create funds (and associated project preparation facilities) dedicated to reducing food loss and waste.

- x. Introduce financial product lines in commercial and development banks focused on food loss and waste reduction technologies and programs.
- xi. Introduce “pay-as-you-go” programs to make technologies marketed to large scale commercial operations a
- xii. Introduce technologies and business-to-business partnerships to improve supply demand forecasting and information flow among all actors in the supply chain