A contextual investigation into the practices of tabletop food vendors and how they deal with urban food waste reduction in Viwandani, Nairobi

Prepared by: Euan Lindsay, Master of Science Student, of International Development Studies at Utrecht University, Netherlands, Affiliated with Alliance of Bioversity International and CIAT

Student Number: 8756120

Institution Name: Faculty of Geosciences, University of Utrecht

Department Name: Department of Human Geography and Planning.

Supervisor(s): Dr. Harrison Esam Awuh

Date of Submission: June 2024

Word Count: 15,064

(Photo Source: Omotayo Tajudeen)

2. Abstract

Increased urbanization rates pose critical challenges in terms of food systems' sustainability worldwide, including the issue of food loss and urban food waste management. The overall goal of this study is to generate evidence on the urban food environment that can contribute to reducing food loss and waste. In sub-Saharan Africa, particularly in Kenya, the burden of malnutrition and food insecurity is exacerbated by food loss along the food supply chain. Nairobi City Council's 2022 Food System Strategy cites the reduction of food losses as a specific objective in obtaining consistent food security for Nairobi city residents (Nairobi City Council, 2022). The current research conducts a qualitative investigation of the food waste management and food recovery practices of Tabletop food retailers, known locally as *Mama Mbogas*, in the Viwandani informal settlement area of Nairobi. Through policy & document analysis, site visits and observation and key informant interviews, this study seeks to answer the research question "How do vendors/retailers deal with unsold food and manage vegetable food waste in Viwandani, Nairobi?". This study will focus specifically on spoiled and unsold vegetables as an element of food waste management. This paper follows an exploratory qualitative analysis paradigm in order to examine food waste and the motivating factors behind its usage in urban settlements. This research demonstrates that tackling food waste in informal settlements is not only crucial for improving local food security but also for contributing to broader efforts to ensure sustainable food systems and alleviate food poverty in an urban area of high vulnerability among residents.

3. Acknowledgements

I would like to give acknowledgement firstly to my supervisor Dr. Harrison Esam Awuh. His guidance and feedback was extremely useful and helpful throughout the entire process of writing this thesis. Furthermore, thank you very much to the Alliance Bioversity International & CIAT in Nairobi. In particular, Dr. Irmgard Jordan, Mr. Nicanor Odongo, Mrs. Irene Induli, Dr. Celine Termote, Dr. Nadia Guettou Djurfeldt & Mr. Tosin Akingbemisilu were all extremely informative and helpful with their time and their knowledge. I am hugely thankful to all of you for your help in making this thesis possible. To the Community Health Officers in Viwandani, Nyambane and Alfred, thank you very much for allowing me to enter your home and feel so welcome. To Deo and Esther for their careful and effective facilitation of the interviews, thank you immensely. Finally, a huge thank you to my parents, Josephine and George for all of their continuous support and counsel. Go raibh míle maith agaibh/Asanté Sana.

4. Tables of content

Contents

5. List of figures and tables

6. List of abbreviations

CBD - Central Business District

CIAT - International Center for Tropical Agriculture

FAO - Food and Agriculture Organization

ICT - Information and Communication Technology

IPBES - Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

LMICs - Lower- and Middle-Income Countries

MUFPP - Milano Urban Food Policy Pact

NACOSTI - National Council for Science, Technology, and Innovation

PSV: Public Service Vehicle

SDGs - Sustainable Development Goals

WASH - Water, Sanitation, and Hygiene

7. Introduction

Development Scholars are expressing a growing interest in understanding how food waste can be reduced in order to reduce economic loss across the supply chain (Gustavsson et al., 2011), decrease environmental loss of emissions production across the value chain (FAO, 2013), and prevent a nutritional loss of nutrient-dense, edible vegetables to the local populations of communities globally (HLPE, 2014). So far, research on food loss and waste has typically focused on the value chain of food production (Parfitt, Barthel, & Macnaughton, 2010), international governmental policy development (Papargyropoulou et al., 2014), and individual attitudes towards storage and refrigeration (Evans, 2012). Scholars have suggested that in order to reduce food loss and waste that we should, implement innovative education programs with individuals, design programs and metrics for food waste monitoring, and link global procedures, across the international value chain to reduce the loss or waste of food from "farm to fork" (Sheahan & Barrett 2017, 78; Pedrotti & Fattibene, 2023; Von Braun, 2023).

While these suggestions have been insightful, they have been critiqued, most commonly as they are perceived as top down, higher level-imposed interventions and theories that do not consider the day-to-day desires or livelihoods of vulnerable individuals in society throughout countries such as those in the global South (Mariam, Valerie et al., 2019). To counterbalance this focus on top down, overarching policy implementation, this research explores how community-based, local processes have been influential in contributing to food security. This thesis explores the options for individuals when dealing with their spoiled and unsold vegetable waste. It is further clarified why individuals are influenced to deal with waste by choosing a certain option. Also, this research explores the extent of the influence of traditional ideals of solidarity among individuals and how this affects people's actions with food. By applying local knowledge systems and philosophies that are rooted in indigenous philosophy to understand these destinations, decisions, and drivers, we can develop more accurate theoretical frameworks and descriptions of existing processes for managing food waste, thereby potentially enhancing food security for the local population.

Problem Statement

A lack of food security has a number of contentious elements and externalities, including that of the problem of increased food wastage. On the one hand, the United Nations estimates that there are 828 million people going hungry in the world today (2022), while on the other hand, the Food and Agriculture Organization of the United Nations (FAO) estimates that a third of the total food produced for human consumption goes to waste, equaling nearly 1.3 billion tons of food per year (2019). The paradox of this issue lies in the fact that in many countries, which are considered lower- and middle-income countries (LMICs) or where citizens

experience a high level of food insecurity; more food is wasted at the consumer and retail level than is needed to feed those who still face hunger (FAO, 2019).

Institutional Background

Food loss and waste has been directly addressed by the Sustainable Development Goals (SDGs), with SDG 12.3 aiming to cut global food waste at the retail and consumer level in half by 2023 and reduce overall food losses including post-harvest losses (United Nations, n.d. 2015). The commitment to recognising the impact of food loss and waste has been strengthened by the Milano Urban Food Policy Pact (MUFPP), which is an international agreement between cities, launched in October 2015 to encourage cities to work together to address common challenges related to food security, nutrition, and sustainable development (FAO, 2015). Reducing food loss and waste in urban areas is one of the 6 Key Policy areas of the MUFPP and the governing bodies of the act have developed a number of intervention policies, measurement tools, and variable indicators to track cities' production and reduction of food waste (MUFPP, 2019).

Nairobi, Kenya's capital city, which is a proponent of the SDG pathway and a signee of the MUFPP, has been described as an example of the "critical situation related to urban food insecurity in Africa, with 47% of its total population being food insecure" (Pedrotti et al., 2023, 3). Added to this is the high prevalence of individuals living in informal settlements in Nairobi (UN-Habitat, 2020). It is estimated that, in 2023, 85% of those living in informal urban settlements were food insecure (FAO, 2023). Through a worksheet developed with the Nairobi team during the MUFPP monitoring framework pilot project training workshop 2019, Nairobi was ranked as high priority with regard to total annual volume of food losses and waste (MUFPP, 2019). This too has been recognised by the Nairobi City County Food System Strategy 2022 which explicitly cites the reduction of food waste and loss as one of the city's primary objectives over the next five years (Nairobi City County, 2022). It flows from this that reducing food waste is critical for improving economic, social, and environmental issues, but can also contribute to achieving healthy diets and the sustainability of food systems, specifically within countries like Kenya and cities like Nairobi (Searchinger et. al, 2019). Nairobi too has been the subject of recent investigations into the concept of "retail modernisation", as many new international supermarket chains and western styled retail outlets move to the city and change the landscape of food purchasing and consumption. Questions are being increasingly asked of how well these supermarket chains align with the needs of the urban poor (Berger & Van Helvoirt, 2018).

Using 20 key-informant interviews, policy analysis and site observation of the retail and food environment in Viwandani Informal Settlement, this research seeks to answer the following research question: *How do food vendors/retailers deal with unsold food and food waste management in Viwandani, Nairobi?* For residents of Viwandani, an informal settlement area located in Nairobi's South-East Makadara constituency, Tabletop food traders, known locally as *Mama Mbogas* form an important aspect of day-to-day life. They are one of the most prevalent vendor types in the locality, and they sell a variety of fruits, vegetables, legumes and readily cookable perishable foods (Kimani-Murage, 2013). Their propensity for selling perishable foods highlights their relevance to this study as this is food that spoils, wilts and goes unsold leaving it to become waste. Further to this, vegetables were chosen as the specific food group to be studied in this research, owing to the overall nutritional value they bring to the customer/consumer in the local area and their multiple uses and functions which are brought following spoilage/rotting (Bennett & Wallsgrove, 1994). This research will apply an exploratory design as it is intended to explore new topics, gaining a range of perspectives on an under researched issue (Hennink et. Al, 2011). For this investigation, retailers and traders are the specific actors of the food value chain to be focused on.

Definition of food waste for this study:

Although food loss and waste is a major global problem, there is no consistent definition of food loss and waste in the research literature (Martin Rios et. al, 2018). Most typically, Authors apply a definition that distinguishes lost or wasted food within some level of the food supply chain. Food losses occur along the food supply chain from harvest to production, packaging and transportation, but not including the retail and consumer level. Food waste, on the other hand, occurs at the retail and consumption level. (Totobesola, Mireille, et al., 2022).

For the purposes of this investigation, which focuses specifically on the retail sector, the definition of food waste incorporates food, specifically vegetables, that are deemed unfit for sale due to *spoilage* or are considered waste at the end of the working day, due to the fact that by the time the retail site opens the following morning, they will be spoiled. Section 1 of the Results section of this paper explains this definition further and is designed across these two-food waste types; spoiled and unsold. This definition is formed from the popular literature and from incorporating the targeted food waste policies of the Nairobi City Food Security Strategy (Alfiero et. al 2022; Nyambura Kariuki, E, 2017, Nairobi City County 2022).

Study Background

Viwandani informal settlement in Nairobi was selected for this research for a number of reasons. Firstly, detailed data has already been collected by a previous project within the area titled "Piloting an organic

food system in Kenya by connecting vulnerable consumers in Nairobi with small scale producers in Makueni county", and the results of this quantitative project were very useful in defining the sample size and scope of this investigation[1]. Further to this, Viwandani has been the site of previous studies investigating micronutrient deficiencies resulting from poor quality diets and high rates of infection (Wahome & Mbatia, 2017). Nonetheless, no existing study focusing on food waste and similar theoretical grounds within the Viwandani urban settlement area could be found. Informal settlements are a relevant sample area for this investigation. Over 60% of Nairobi's population live in these informal settlements and they represent the poorest and most food insecure section of society, vulnerable to flooding, malnutrition and increased levels of stunting among child growth and development (Kimani-Murage, 2013).

This study of food waste is framed through the local theoretical concept of Harambee Theory. Harambee, meaning "let us all pull together" originates from Swahili and is derived from the Bantu family of languages. It can be described as a societal ethos of community self-reliance, solidarity and mutual assistance that predates British colonial rule, and its impact on life in rural Kenyan villages has been well documented (Mbithi 1972, Mbithi and Rasmusson 1977, Ngau 1987, Ouko 2018). To help facilitate this analysis of solidarity using an academic analysis lens, three aspects of social capital theory were chosen to highlight solidarity and the spirit of solidarity and community self-reliance. In the data analysis phase, a number of emergent themes presented themselves as very important to the overall explanation and academic theorizing of this research, these two themes were Self-Organisation in a Poverty Context and The Food Environment. These will be fully explained in the theoretical section of this paper.

At all times, while interviewing, reading or writing this thesis and collecting the data to do so, the researcher has desired wholeheartedly to maintain the dignity and integrity of the participants involved in the process.

[1] As this research dataset and project has not been published yet, it cannot be referenced directly. Once the full report is published, an update will be made to this paper in order to adequately cite it.

8. Literature Review

Food Security

The global food system urgently needs transformation to optimize its outcomes and ensure security for all (Caron et al., 2018). This shift towards a more sustainable food system is crucial for ending hunger, achieving food security, and improving overall nutrition by 2030 (FAO, 2018). Both the global north and LMICs currently operate under unsustainable food systems, which negatively affect water, soil, and air quality, contribute significantly to climate change, and perpetuate socio-economic challenges (Stefanovic, 2020). Despite the global food system producing enough to meet dietary needs, 690 million people worldwide still face hunger, and 11% of the global population is undernourished (IPBES, 2019; FAO et al., 2020). Increasing food security is essential for achieving the Sustainable Development Goals (SDGs), with food and agriculture identified as critical "cross-cutting" objectives (Stefanovic, 2020, 124). Food security is defined as a situation where all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to maintain an active and healthy life (FAO, 1996).

Food Loss & Waste

A significant barrier to food security is the issue of food waste. In sub-Saharan Africa, post-harvest food losses are a significant issue, with an estimated 37% of food produced lost between production and consumption. This high level of food loss is attributed to inadequate infrastructure, lack of technology, and inefficient supply chains (FAO, 2019). Reducing food waste is critical for economic, social, and environmental reasons and can contribute to healthier diets and more sustainable food systems, especially in the Global South (FAO, 2013; HLPE, 2014; Springmann et al., 2018, Searchinger et al., 2019). Furthermore, wasted food contributes to greenhouse gas emissions, deforestation, and loss of biodiversity, thus exacerbating environmental degradation and climate change (Pedrotti, 2023). Addressing food waste is therefore essential for achieving multiple Sustainable Development Goals, including those related to poverty alleviation, hunger eradication, and environmental sustainability (FAO, 2013).

Food Waste in LMICs & Informal Settlements

Studies suggest that food loss predominantly occurs in the agricultural, packaging, and transportation phases of the food supply chain in LMICs, before reaching retail and consumers (Soe Thoudt et al., 2021). Conversely, in higher-income countries, more food is wasted at the retail and consumer levels due to factors such as overconsumption, market dynamics, and consumer behavior (Min et al., 2021). Regardless of the

stage at which food waste occurs, it results in significant environmental and economic damage. By the time food is wasted at the retail sector, it has already consumed substantial resources like water, land, manpower, and energy throughout the value chain (Sahoo, 2023). This highlights the need for comprehensive strategies to address food waste at all stages of the food supply chain in LMICs, from production to consumption.

Informal settlement areas present unique challenges in managing vegetable waste, which constitutes a substantial portion of their overall food waste and more general refuse (Science Africa, 2023). Food wastes generated in areas of deprivation are a major cause of litter in the streets. These wastes have been proven to pose risks to public health and easily end up clogging drainage systems and sewer infrastructure (Cabaltica, 2016). Not only this, but Studies by Smith and Wessels (2020) indicate that inadequate waste management systems in these areas lead to significant environmental degradation, including soil contamination and the proliferation of disease vectors. Further research by Kamau and Njenga (2018) supports these findings, highlighting how poor waste disposal practices contribute to water pollution and increased health risks in Nairobi's informal settlements. Additionally, Kumar et al. (2021) highlight the socio-economic implications of food waste, noting that households in areas such as Viwandani often experience food insecurity, exacerbating the paradox of concurrent food wastage alongside vulnerability and hunger.

Social Capital and Food Security in Informal Settlements

In informal settlements such as Viwandani, social capital plays a critical role in enhancing resilience and improving food security. Approximately 62% of the urban population in Sub-Saharan Africa lives in slum areas with limited access to basic services like water, sanitation, and waste management (Nzeadibe, 2009; Dlamini et al., 2016). High levels of social capital, characterized by trust and cooperation within the community, provide a safety net that helps residents to cope with livelihood shocks and anxieties (Mpanje, 2022). Research indicates that communities with higher social capital perform better in water and sanitation interventions and overall food security (Pedrotti, 2023; Salinger et al., 2024). For example, households with higher social capital in Nairobi's Kibera slum are significantly more food secure than those with lower social capital (Termeer et al., 2021). Integrating food waste management into the discussion on social capital and food security is of academic interest, especially in informal settlements where very few such studies currently exist.

Theoretical Basis

Solidarity & Harambee Theory

Within LMIC, solidarity and "the spirit of solidarity" between individuals, is an important developmental component that is distinct to that of countries, with more individualistic and a perceived higher socio-economic status (Gray & Gills, 2015, 565). When studying solidarity, it is important to place the concept within the wider cultural context where it is embedded.

Harambee refers to a socio-economic philosophy that emerged in rural Kenya and is associated with the concept of collective effort and community. Believed to have originated from the Swahili speaking populations living in the coastal regions of Kwale and Mombassa, Harambee traditionally signified a collective act of coming together in order to complete a physical task or to pool the resources of multiple individuals to address significant challenges (Ng'ethe, 1986). Harambee emphasises that individuals and communities can come together to engage in collective responses and actions for mutual benefit. Harambee as a popular theory gained prominence in Kenya during the post-independence period under President Jomo Kenyatta in the 1960s. Kenyatta promoted the spirit of Harambee as a national ethos to foster unity, cooperation, and solidarity among a newly sovereign Kenyan population. It is worth noting the Harambee has been criticised by other scholars for what they see as its potential to reinforce top down, patriarchal governance structures (Mwiria, 1990).

Contemporary Harambee Theory can be viewed as a local philosophy, rooted in indigenous principles and values, and providing beneficial insights for explaining community action. Harambee Theory has been utilised in modern academic scholarship to contextualize a variety of issues. Nyong'o (1981) has previously explored how Harambee has been instrumental in fostering community mobilization and participatory governance in the 1980s and early 90s in Kenya. Mwangola (2007) has highlighted case studies where Harambee initiatives of collective action have successfully mobilised communities for environmental conservation and sustainable agriculture. Most recently, Weiss (2024) has given a detailed description of how auto-repair businesses located in Nairobi's Western Dagoretti Corner have incorporated elements of Harambee Theory in supporting each other through business operations and crisis. These authors all draw the common theme that Harambee Theory signifies how different individuals can come together to pool their capabilities and resources for a collective benefit.

Understanding how Harambee Theory promotes collective action and resource pooling lends important cultural and geographical context to our investigation. Viwandani, and most impoverished areas of Nairobi, lack formalised waste disposal systems (Nairobi City County, 2022). In the absence of a formalised system, endogenous, self-generated processes and mechanisms of survivalist organizing have been shown to become important for individuals to safeguard themselves against worse poverty outcomes (Weiss, 2024). Harambee Theory is incorporated in this study as it places emphasis on the enabling role of local institutions and community organisation in urban poverty contexts (Weiss, 2024, 7). Harambee Theory is used as an important theoretical tool to frame solidarity within the sample area, and to remove the bias of utilising a Western lens, in order to conduct research in an inherently different, cultural environment (Pedrotti, 2023). As was stated by Ndlovhu (2022), African traditional philosophies are constantly evolving, and are construed by authors in a variety of different ways. In order to provide focus and academic credibility to this investigation, a more modern academic theory emphasizing the importance of communal relations and shared norms and values is utilised as an analysis tool for Harambee Theory. This is explained forthrightly.

Academic Analysis Framework - Social Capital Theory

In order to analyse Harambee with an analytical framework, this research utilizes the Sustainable Livelihoods Approach to inform the overall investigation. The Sustainable Livelihoods Approach is a systematic concept and way of analysing and understanding the assets and strategies people use to make a living and improve their well-being in their individual context (Ashley, 1999). Within this framework, this research will employ Social Capital Theory as an element of the livelihoods framework that can reflect the relationships of communities and solidarity within the sample area. Bourdieu (1986) utilised social capital theory as a way of understanding the positional advantages which individuals can attain through their networks and social groups within larger social systems. At the level of community systems, social capital can bond, bridge and link individuals together in solidarity and inform mutual benefit processes and common purpose value systems (Glowacki-Dudka et al., 2013). Social Capital Theory emphasizes the importance of norms, networks and social trust in facilitating social cooperation for mutual benefit (Putnam, 1984). Other African philosophies, such as Ubuntu or Umundu have been utilized also in academia to emphasize social solidarity between people, loyalty and human trust among each other, and a sense of belonging that is ingrained in, what is known now as “social capital” (Ndlovhu, 2022, 9).

Social Capital has also been shown to play an important role in food system sustainability at the community level. Where actors within a community system have been shown to hold high levels of social capital with each other, those actors have been found to be more resistant to shocks and maintain a greater capacity to overcome problems through partnerships and support systems that enable participation and cohesion

(Glowacki-Dudka et. al, 2013). In furtherance of this analysis of collective action and Harambee theory, three elements of social capital have been chosen to investigate. These are (1) Shared Norms & Values, (2) Reciprocity and (3) Social Relations and Networks. These three elements have been chosen due to their important place in the social capital scholarship by a number of authors and due to their prevalence in studies investigating the level of social capital between actors (Lin, 2001; Fukuyama, 2002; Bourdieu, 1986; Putnam, 1995). Some authors choose to incorporate reciprocity as a category of shared norms and values but for the purposes of this investigation it has been chosen as a separate category. By evaluating the importance of these three elements of social capital theory within the community this research shall shed light on the prevalence of Harambee theory processes in the food waste sector, such as resource sharing and collective problem-solving within a community (Lin, 2001).

Self Organisation in a Poverty Context

Alongside Harambee Theory, there are other important theoretical bases, upon which this investigation is grounded. An increasing theoretical literature has built upon the organisation of individuals who are living within a poverty context, like the residents of Viwandani. This theory considers the social settings that individuals create and organise in order to avoid social isolation, develop their personal networks, and minimize the impact of livelihood shocks (Allard & Small, 2013). Self organisation in a poverty context is perhaps most helpful when applied as a method of understanding the systemic nature through which highly disadvantaged people live, incorporating a multi-dimensional interconnect between institutions, organizations, or systems within their society (Patel, 2010). Within this study, self organisation in a poverty context is utilised, and Allard & Small's (2013) framework is incorporated, as a lens to explain the response mechanisms to vegetable waste and how different institutions and individuals come together within the local food system of Viwandani to implement this system. Management and livelihood studies have begun to incorporate self-organization in a poverty context more and more into their research, however to the extent that this discipline is expanding, it has been criticized for seemingly imposing "western styled development" or interventions by external actors tasked with alleviating poverty and food security in the context of local institutions (Weiss, 2024, 4).

Food Environment

In recent years, there has been a notable increase in the significance of food environment research as an element of food security. Broadly defined, the food environment encompasses the combined physical, economic, policy, and socio-cultural factors that influence individuals' choices regarding food and beverages (Swinburn et al., 2013). Alternatively, it serves as the intermediary interface shaping people's

choices regarding food acquisition, consumption and decision making within the broader food system (Downs et al., 2020; Turner et al., 2018). Moreover, the concept includes considerations of the availability, affordability, convenience, and desirability of various food options (Herforth & Ahmed, 2015). These diverse definitions collectively address inquiries pertaining to what, when, why, where, and how food is obtained and consumed. Food Environment Theory aids this research in understanding the systemic and structural factors which form the context within which food waste is present in Viwandani

Conceptual framework

The main research objective of this study is to understand the decision-making processes of tabletop food traders (Mama Mbogas) in dealing with spoiled and unsold vegetables within informal settlements in Nairobi. The conceptual framework (Figure 1) flows from the main Research Question, which informs the incorporation of the three main theories of Self Organisation in a Poverty Context, Harambee Theory and Food Environment Studies. It is worth noting that these three theories do not exist in isolation and elements of each theory overlap. In order to plan the research sub questions from the theoretical concepts adopted, bridging factors became clear in the design stage. The research sub questions, which are highlighted in blue, were included with the intention of utilizing these bridging factors as analysis tools. From the incorporation of these theories, the bridging factors, highlighted in pink, are analytical framework tools to reach the research sub questions highlighted in blue. Research Sub-Question 3, which is not included in this framework, is explained separately, in the Discussion section of this paper.

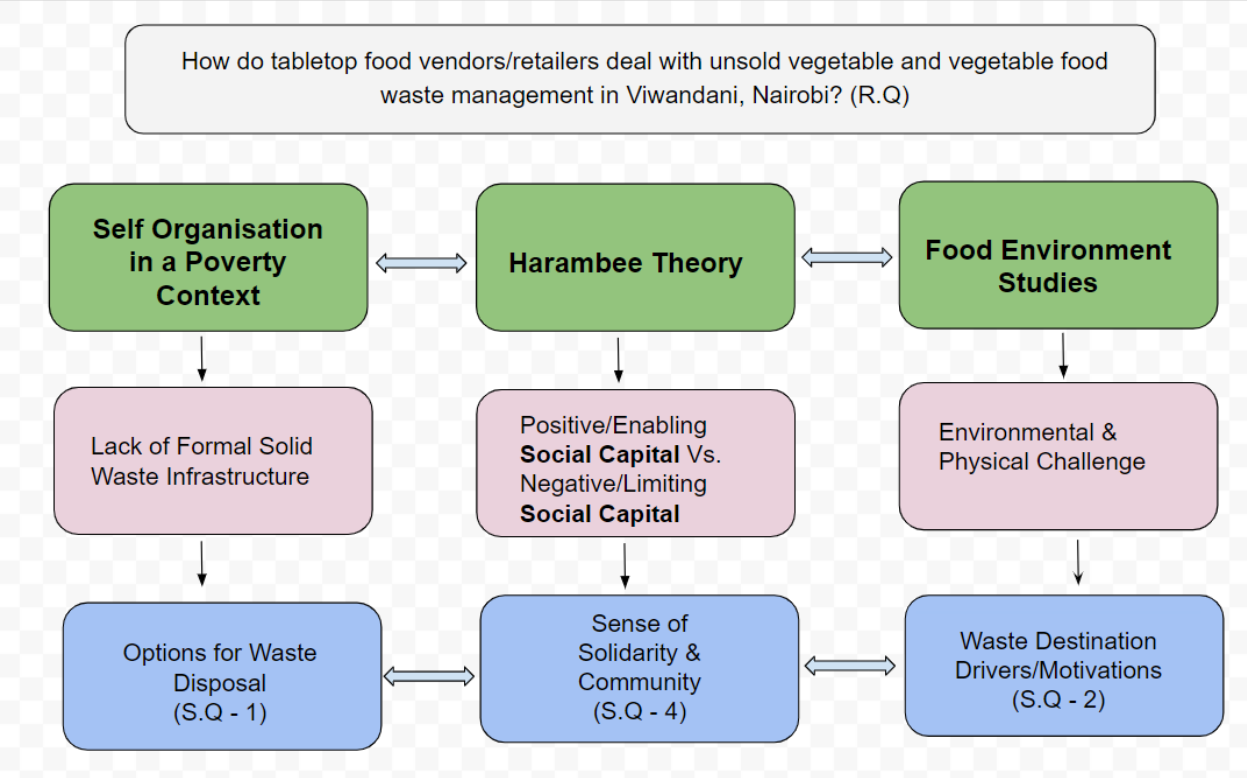
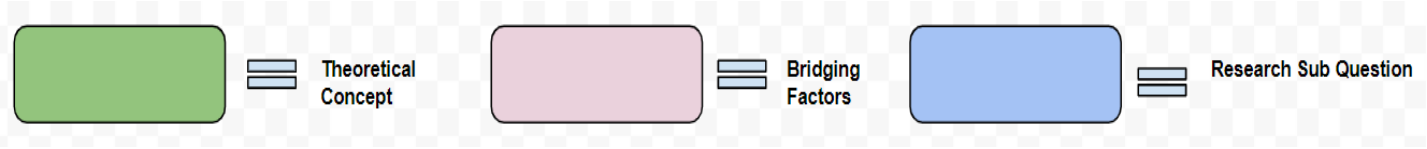


Figure 1 - Conceptual Model



10. Methodology

Research Question

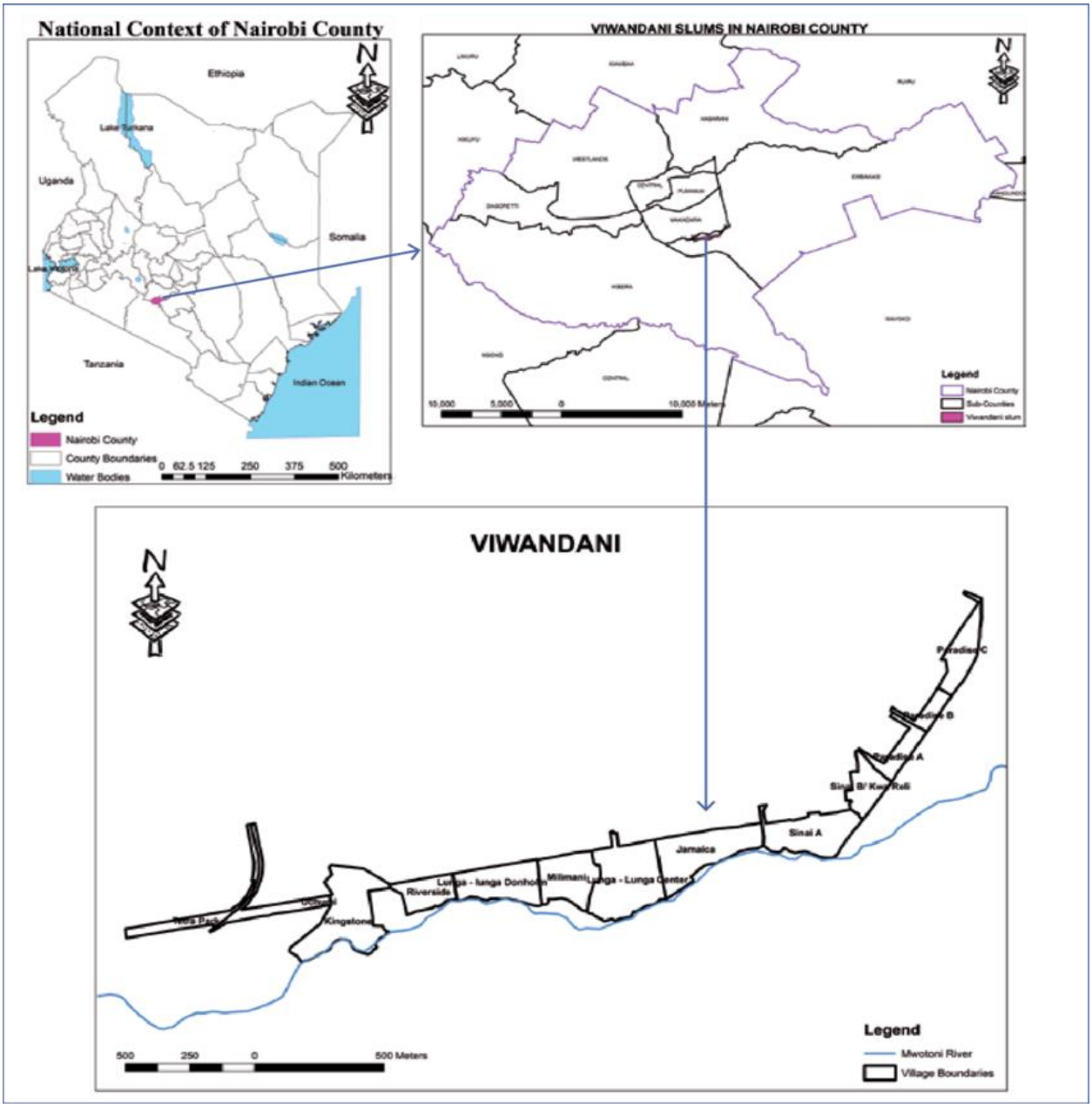
How do tabletop food vendors/retailers deal with unsold vegetable and vegetable food waste management in Viwandani, Nairobi?

Sub Questions

- What are the options for tabletop food traders (Mama Mbogas) in dealing with their spoiled and unsold vegetables?
- What is the main driver behind this decision?
- Who makes the final decision with regard to what happens to this spoiled and unsold vegetables? (Gendered perspective)
- How aspects of community/social capital affect how individuals deal with this spoiled and unsold food?

Geographical contextual framework

The research was carried out in Makadara sub county, specifically within the Viwandani informal settlement, located in Nairobi. Viwandani is located approximately 7.8 kilometers to the Southeast of Nairobi CBD. In Swahili, `Viwandani' means 'at the industrial zones', and the settlement accommodates a large population of people working in the surrounding industrial estates and factories, producing products like paint, cooking oil, maize flour and cement. Its history dates back to the 1960s when Lunga Lunga Centre was established as a dumping site. The Ngong River, which is heavily polluted by industrial waste, is located to the south of Viwandani, while the industries are situated to the north of the settlement. Most structures in Viwandani have tin walls with iron roofing sheets, but there are emerging dynamics with several permanent apartments being erected (especially in Kingston). The settlement has thirteen villages (Paradise A, B, and C, Sinali Reli, Sinai, Jamaica, Lunga Lunga Center, Donholm, Milimani, Riverside, Kingstone and Tetrapak). Viwandani is introduced on the map below, visible as Figure 2 "Map of Viwandani ".



(**Source:** https://pubmed.ncbi.nlm.nih.gov/36963082/)

Figure 2 - Map of Viwandani

The disposal and regulation of wastes within Viwandani, Makadara County, Nairobi is governed by the Nairobi City County Solid Waste Management Act 2015 (The Act). The Act provides the overarching legal framework for which the 2022 Nairobi City Council Food Systems Strategy is implemented within. The Act does refer to "market waste" which it defines as organic waste generated from public market facilities. Section 5, Part (2) of the act provides that "every person within the county is entitled to a clean and healthy environment and has a duty to safeguard and enhance the quality of the environment". Section 16 Part (3)

cites that “the county government may directly or indirectly undertake collection of solid wastes from the streets and other places” placing no regulatory requirement on the county government to clean or collect waste of any kind. The act follows to criminalise any “person who dumps, causes, or allows waste disposal in any premises, land or any other place not approved for such disposal [to be] guilty of an offense” of which the potential punishment is liability to incur a fine not exceeding two hundred thousand shillings or in default to imprisonment not exceeding two years, or to both” (Section 36, Part IV). These regulations are complex and place the burden of waste disposal on the retailer while simultaneously penalizing individuals for not utilising government regulated waste disposal locations. Utilizing governmental waste disposal is not easy in an informal urban area such as Viwandani and it creates an additional financial cost for local residents in an area facing high levels of low-income employment and food insecurity (Kimani-Murage, 2013).

Food insecurity has a number of important implications for Nairobi and the Viwandani area. There is a high prevalence of stunting among children under five years of age. Mutisya et al. (2015, 324) found that the proportion of stunted children was higher in Viwandani (52%) compared with other informal settlements in Nairobi such as Korogocho. Poor access to water, sanitation and hygiene (WASH) services is a great challenge in Viwandani and has an effect on health and nutrition outcomes (Kimani-Murage et al., 2020). Lack of safe drinking water in informal settlements has been linked with under nutrition and illnesses such as diarrhea or cholera (Goudet et al., 2017; de Vita et al., 2019). Despite differences between informal settlement areas in the context of sanitation and basic services there are also immediate differences within the different villages of specific settlements themselves. This was made clear to the Author during data collection that the sanitation and toilet facilities present in Riverside village of Viwandani were more plentiful and superior to villages such as Dunholme and Jamaica, despite all being within the same settlement.

More generally, Kenya’s urban population has increased from 285,000 in 1948 to 14.8 million in 2019 (Republic of Kenya, 2023). Its urban population is disproportionately concentrated in Nairobi and urban poverty is disproportionately concentrated in Nairobi’s informal settlements (Pape and Mejia-Mantilla, 2019). Current patterns of urban population growth, food insecurity, and poor health and nutrition are becoming increasingly urban challenges, with those living in informal settlements being the most affected (Battersby and Watson, 2018). Furthermore, most low-income residents living in urban informal settlements depend more on unregulated informal food sources and healthcare services, which can significantly compromise the quality of food and healthcare available to them (Kimani-Murage et al. 2020).

Research Design

Using document and policy analysis, site visits and observations and 20 key informant interviews, this research seeks to answer the following research question: *How do food vendors/retailers deal with unsold food and food waste management in Viwandani, Nairobi?* An exploratory design was applied to the research design as it explored new topics, gaining a range of perspectives on an under researched issue (Hennink et. Al, 2011). The selection of methods for this study flows from a quantitative data set compiled by the Alliance of Bioversity International and International Center for Tropical Agriculture (CIAT)[2]. This project is titled "Piloting an organic food system in Kenya by connecting vulnerable consumers in Nairobi with small scale producers in Makueni county" ("Piloting Food Systems"). This unpublished research compiled a list of all vendor types as well as information on the procurement, storage, and marketing of 10 food types in Viwandani informal settlement. The original data collection was purely quantitative and so the qualitative methods present in this proposal have been chosen to add more insight to the information already collected.

Sample Selection

The selection of participants and of methods for this study flows from the "Piloting Food Systems" project. Tabletop vendors, known locally as *Mama Mbogas* (Chege, 2021, 4), were chosen to investigate further in this specific research. Tabletop food vendors have been previously shown to proportionally sell the highest amount of vegetables in informal areas in Nairobi (Chege, 2021). Of the overall "Piloting Food Systems" vendor survey (n=1192), tabletop vendors formed a large selection of this original survey (n=293), more than other retailers such as Hawkers, Kiosk stands and Cereal and Grain sellers. Of these Mama Mbogas, the vast majority (n=227) are female owned with a small percentage being operated by men (n=21). After filtering for those tabletop vendors who sell vegetables (n=251) our sample selection is drawn from these individuals.

Methods Selection

After reviewing the quantitative data, this research followed a three-step methodology sequence. Firstly, policy analysis of relevant governmental and international documentation was conducted to understand the present situation surrounding waste, food and food waste policy in Nairobi. Key to this was analysis of the

[2] The Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) is a global organization headquartered in Nairobi, Kenya. This Alliance focuses on agricultural research to improve food security, nutrition, and sustainable agriculture in the tropics. By combining Bioversity International's expertise in biodiversity with CIAT's strength in tropical agriculture, the organization aims to address critical challenges such as climate change, biodiversity loss, and the need for sustainable food systems. Their work involves collaborative research, partnerships, and capacity building to benefit smallholder farmers and promote resilient agricultural practices. The author was hosted by this organization over a 3-month period in their Kasarani Headquarters, Nairobi, Kenya.

Nairobi City County Solid Waste Management Act 2015 and Nairobi City Council's 2022 Food Strategy and how it addresses food waste as one of its five key cross cutting objectives (Nairobi City Council, 2022). Following this, site visits were conducted at the research site in Viwandani, Nairobi. As this was the Author's first experience of conducting research within an informal settlement area, site visits were essential firstly to familiarize with the living situation and day-to-day ongoings of people living in Viwandani. This provided an important embedding of the research within the sample area. Following the completion of this 20 key informant interviews took place. These interviews took place with Tabletop Food retailers and were situated at the retail site of the participant. Each interview was between 15 and 40 minutes in length and all were done through Kiswahili language and a mixture of English and Sheng. These methods are visualised in Figure 3 below.

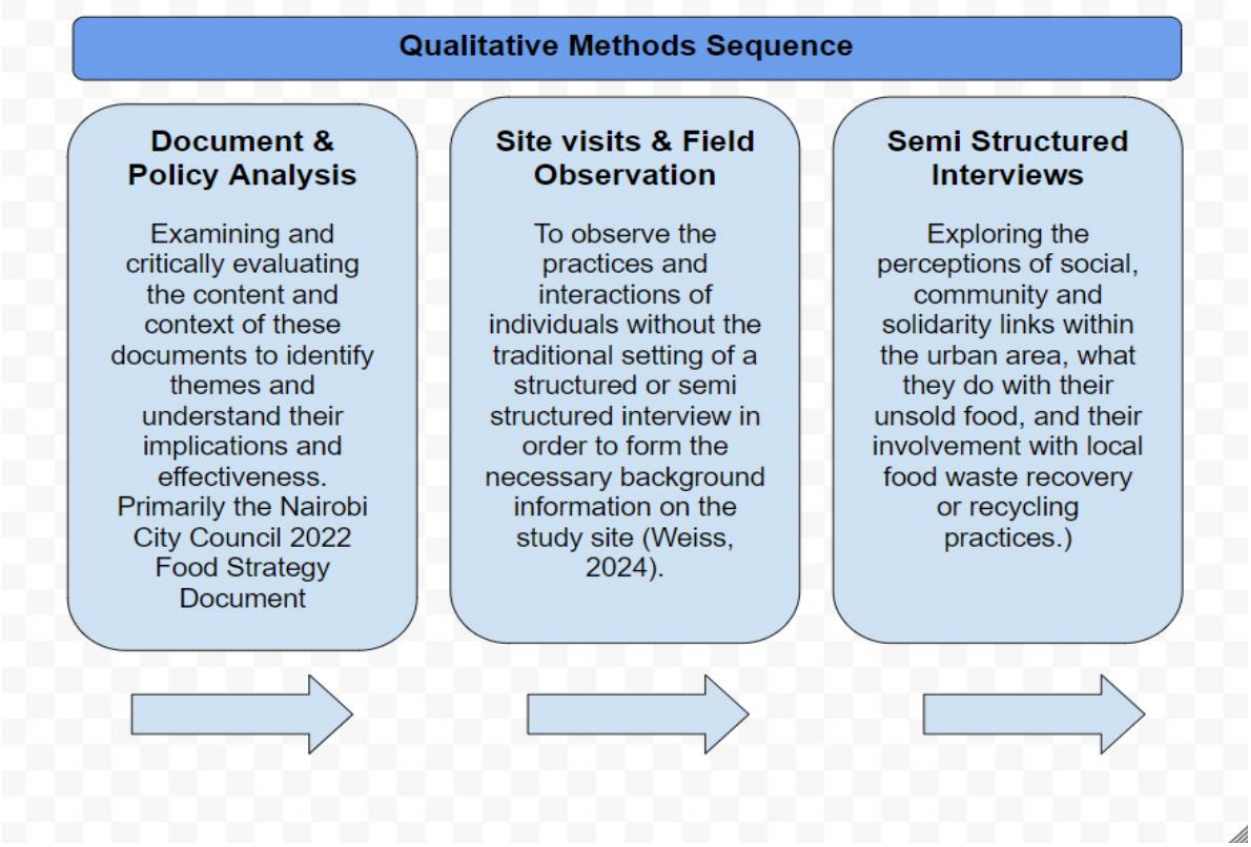


Figure 3 - Qualitative Methods Sequence

Data Collection

In order to adequately obtain the desired data, the interviews were conducted by trained Facilitators who spoke fluent Swahili. As the first Author does not speak Swahili fluently this was imperative to make sure the correct information was being collected in the most efficient and equitable way. In hiring Facilitators,

one female and one male were selected. Having gender diversity across interviewers was important so as to allow female interview participants, which were the majority of those interviewed, feel comfortable in the course of the research. Two days of training took place with the facilitators. On these days, the English interview questions were translated contextually into Swahili, key interview points from the Facilitator handbook were described and mock interviews took place to ensure timing and usage of the recording equipment was effective (See below Figures 4 and 5 of both training days).[3]

Figure 4 & 5 - Research Training with Facilitators

The interviews were split across 6 different villages of Viwandani, namely Ochumi, Lunga Lunga, Jamaica, Riverside, Dunholme and Kingston. The participants come from a range of ethnic backgrounds with representation from ethnic Kikuyu, Luo, Luhya, Kalenjin, and Kambaa participants who all live within the study site. These areas are visible on Figure 1 Map of Viwandani. Key Informant Interviews were conducted in easily accessible locations within the respective study site or close to the retail site of the Vendor. Prior to any interviews with participants, written consent was sought, and they were provided with an informed

[3] Facilitator training handbook can be found within the Appendices section of this document.

consent information sheet that they could keep in the event they wanted to further contact the Author[4]. Attempts were made to minimize the impact of this research on their day-to-day livelihood.

The interviews were recorded as they were taking place and then transcribed in Swahili verbatim. These transcripts were then given to a reputable English/Swahili translator who translated the Kiswahili transcripts into English for data analysis. The analysis of the qualitative data, once it was collected and transcribed, was done with pseudonymisation of participants' names. The transcripts were imported to Nvivo software, which was used to help the data analysis process. The analysis stage consisted of three steps i) exploration and generation of initial codes; ii) searching for themes by gathering coded data that addressed specific themes; and iii) defining and naming identified themes. A spreadsheet was also designed which held a list of all code names, both inductive and deductive, with a supporting codebook for further explanation.

Ethical Considerations

Encouraging integrity and equity of every individual involved in this research process was an extremely high priority. In order to conduct this research, ethical clearance and permission was sought and received from the National Council for Science, Technology and Innovation (NACOSTI) in Kenya; Nairobi County Commissioner's Office; Nairobi Regional Education Office; Makadara County Commissioner's Office; and the Office of the Chief of Viwandani[5]. The interview transcripts and all other data relating to the interview participants was stored in the cloud service YODA data system and behind a password protected and encrypted google drive on the University of Utrecht's server to minimize the potential for breach or loss. At all times participants were given the opportunity to revoke or remove their participation in the study.

Positionality as a Researcher

Further to this, the Author's positionality as a European, male researcher cannot be avoided and this may have had an unintended influence on the study participants and the information they provide in the course of learning about their experiences (Elder & Odoyo, 2018). The results of this research are to be distributed to all local and interested stakeholders. Alongside this an information brochure containing key points has been designed in order to be provided to those within Viwandani. The research results will be given to local community leaders and to those that have participated in the collecting of information after data analysis

[4] Both Informed Consent Sheet and Permission Sheet can also be found under the annexes section of this paper.
[5] These permission documents are visible in the Appendices section of this thesis.

by presenting and publishing in the Alliance open data repository. The data, personal details such as names and specific locations will be excluded. With these research methods this research aims to be as inclusive as possible. Elder & Odoyo (2018, 48) describe this well; as a Researcher, there is no desire to speak for the local people. However, it is believed that collaboration is important so that individuals have allies committed to investigating and improving practices outside of their communities.

11. Results

Research Question 1 was answered through the variable list of options for individual tabletop traders contained in Table 1. The motivations for what makes an individual vendor choose a certain option with their food waste was then explored in the findings, in order to answer Research Sub Question 2. The position of gender was explored through Research Sub Question 3 by analysing who made the final decision over what an individual trader does with their spoiled and unsold vegetables. Finally, Research Sub Question 4 analyzed what the influence of traditional Harambee theory was, through social capital theory, in explaining how individuals dealt with their spoiled and unsold food. In the course of analysing and answering these four research questions, relevant emergent themes such as the influence of weather and transport emerged.

The results of the research question 1 + 2 are split across the two categories of Food Waste that were defined in the Food Waste definition section of this research, namely spoiled food and unsold food. Spoiled food is food that is inedible due to it spoiling or wilting, unsold food is considered waste at the end of the working day, due to the fact that by the time the retail site opens the following morning it will be spoiled (Alfiero, 2022). It is worth noting that many participants mentioned multiple ways of dealing with both types of food waste and that a retailer's choice of which specific food waste destination is influenced by a variety of changing factors such as weather, proximity and availability.

Research Questions 1 + 2 - Spoiled/Unsold Food Destination + Drivers:

Research Question 1. Response Results

Participant Category	Gender		Total
	Female	Male	
Spoiled Food			
Local Livestock Farming	17	3	20
Bagged & Thrown Away	3	0	3
Formal Waste Collection	0	1	1
Unsold Food			
Price Dropping & Veg. Mixing	4	1	5
Giving Away for Free	8	1	9
Cooking/Eating Themself	3	0	3
Bagged & Thrown Away	2	1	3
Local Livestock Farming	5	0	5
Balancing Stock	7	1	8

Table 1 - Spoiled & Unsold Food Waste Options

Spoiled Food:

Finding A1: Contribution to Local Livestock Farming

With regards to their spoiled vegetable waste, all participants interviewed spoke of giving these inedible vegetables, as food, for local agricultural practices, namely that of feeding livestock. The most common type of local livestock that are fed with these spoiled vegetables are goats, cows, chickens and to a lesser extent pigs. Local livestock farming is popular in Viwandani and other informal settlements in Nairobi. This waste is typically collected by local farmers from the Tabletop vendor's site, meaning retailers do not have to travel to dumping sites or to agricultural areas for this waste to be disposed of. Some retailers form links with local farmers who regularly attend and collect their specific waste, whereas others give their spoiled vegetable waste to the first farmer that approaches them each day. This is highlighted in the following quotes:

Defay, Riverside: ***"****There are men who keep cows here; they do farming around. So, there's one who had booked with me, so I supply it to him."*

Jennifer, Kingston: ***"****There's a young man from around here who comes every evening, even this one you've just taken out, the wilted ones, you arrange them nicely, and he carries them. And there are others who have cattle, even goats."*

Other retailers have less connected links with those farmers who come to take their vegetable waste, and participants explained how there are many people involved in agriculture in Viwandani so this type of waste is in high demand as agricultural feed. Only one participant mentioned that farmers would provide a fee for this waste. The rest gave the waste to these farmers at no cost.

There are a number of reasons which individuals mentioned as influencing their choice to give their spoilt waste to local livestock farmers. Motivations discussed were those of wanting to contribute to urban agriculture but perhaps most interestingly was the driver of this method saving time and effort for the retailer. As the farmers generally come directly to the retail site, vendors do not have to travel to any dump site or waste destination, thus increasing the amount of time they can spend at their stall generating sales or attending the whole sale market to purchase stock. The following quote serve to emphasize this point:

Jennifer, Dunholme: *"Back then, there weren't people who kept livestock, so it was a hassle. Back then, you'd just throw them away, taking trash to the dump every day because there was a lot of waste. Now, it's easier because he comes and takes them away."*

Finding A2: Spoiled Food is Bagged and Thrown

The second most commonly mentioned method of waste disposal was that of placing spoiled vegetables into a bag that could be thrown away in the local area. Public waste and drainage are problems of particular importance in Viwandani, specifically around times of heavy rain and extreme weather patterns. Due to the lack of adequate drainage infrastructure, which some locals described as the most pressing concern in the slum, vegetable waste that is dumped can spill and merge with other waste types causing flooding of rotting perishables and the exaltation of fumes. Josephine explained this waste disposal method below:

Josephine, Kingston: "*I just throw them away as waste. These are what I've put here. You see, I've taken out this waste so I dump it here, and all the spoiled ones I throw here"*

The most common driver that people gave for using this method of waste disposal was that they were not aware of other methods of waste disposal within the area. It is also worth noting the high desire for cleanliness which vendors detail, specifically around their retail sites. It was frequently mentioned that in order to attract customers and generate sales, retailers were required to maintain a high level of cleanliness around their retail sites and not allow waste and rotting vegetables to stagnate close by. Therefore, this desire for cleanliness supports the decision to remove spoiled vegetables from the retail site. Anne describes this below:

Anne, Runga Runga: *"Cleanliness is important; you can't just leave rotten vegetables here. You have to know how to maintain cleanliness because those vegetables are smelly; who will stand here? No one"*

Finding A3: Despite the associated costs, there was one example of Formalised Waste Collection as a means of disposing of spoiled food

Only one participant mentioned using any sort of formalised waste collection service when dealing with spoiled vegetables. It is worth noting that this waste collection service is privately organised and not a state service. The participant who mentioned using this service described that it is organized by young people from the local area who are looking to generate income by providing a waste collection service. The participant was not aware of what these waste collectors did with the waste after they took it away from the retail site. It was clarified that these collectors did not make any distinction between vegetable waste or any other types of waste, they charge a fee of 20 shillings for this waste service, and they come once a week on Sundays, making it a less attractive option as waste is not collected by these individuals on any other day.

When discussing the drivers of why this participant chose to engage in this service, he cited that he wanted to encourage these local youths who were trying to make some extra income by offering a waste collection service. This is encapsulated in the following quote:

George, Kingston: "*Well, those guys need jobs, they're just working and earning a living on that side of waste collection."*

Unsold Food

Finding B1: Price Dropping & Vegetable Mixing

One of the most commonly used options for individuals dealing with unsold vegetables is to offer reduced prices for these products or mix the produce with other fresher vegetables in order to encourage their sale and prevent them from being disposed of as waste. Individuals who mentioned engaging in price dropping specifically emphasized the importance of communication to the customer about what type of vegetables they were being sold and why they were being retailed at a lower price. This is visible in the following quotation:

Evans, Riverside: "*You see, if you know it won't last till tomorrow, sometimes... especially the traditional ones, you have to talk to customers, tell them this will spoil by tomorrow, please let's agree and you take it. let's say it's 50, you add 20 so it becomes 70, so that you avoid that loss."*

Vegetable mixing is another commonly utilised unsold food practice. This involves taking wilting or older vegetables, cutting them up finely and mixing them with newer purchased vegetables in order to make a tradeable product without having to waste a lot of old stock. Some traders engage in this behaviour whereas others choose not to. From the interview participants, it became clear that this was a process dictated by the customer. This aspect is illuminated by the following quote:

Margaret, Ochumi: "*Some will come and ask you to chop for them, then in the process they take wilted vegetables and mix them up for you."*

The motivations retailers gave for choosing this action with spoiling food were largely based around maximising potential income and protecting themselves against lost costs of wholesale purchase. One vendor explained this by saying:

Evans, Riverside: ***"****Maybe you talk to another customer, tell them these vegetables will spoil by morning, so let's agree, you take them, let's say it's 100 or 50 and they pay later, but the main thing we try to avoid is loss"*

Finding B2: Giving Away for Free

A total of nine participants mentioned that if they were in possession of food that was going to spoil by the next day, they would give this food away for free. This is an important behavioral pattern that has wide reaching impact for community relations, retail trade and the local economy of Viwandani.

A level of contention exists within this practice. For some participants, giving away unsold food is done through an informal communication network, whereby they can identify who is in most need of more food. Evelyn describes this in the quote below that she will ask individuals whom she suspects may be undernourished in a way that does not harm their personal pride if they want to take her leftover/unsold vegetables. The following quote sheds light on this aspect:

Evelyn, Kingston: *"You ask from a distance, "Did you cook today? Why haven't you cooked?" Another might say, "I don't have vegetables," you tell them, "Come and get vegetables here and go cook." Like that. You can't directly tell them I know you haven't cooked."*

Not only is personal pride an issue within Viwandani in motivating traders in how they deal with their food waste but so too is the local economy. Some traders said that they would rather throw away food than to give it out for free, in order to not upset the economic system of the local markets they operate in. Some traders shared a fear that if they gained a reputation for giving out their unsold food for free, customers would be encouraged not to purchase any vegetables at all and just wait for them to be unsold in order to obtain them cheaper.

Participants interviewed described two main drivers of why they chose this method of dealing with unsold food. Firstly, participants showed an awareness and willingness that food is better placed with someone who can eat it and who needs a meal, rather than going to waste. This description of the "moral benefit" of giving away edible food was commonly cited, in 7 of the 9 participants who mentioned giving away food for free as a method of dealing with unsold food. The second most commonly cited driver of choosing this method of dealing with unsold food can be characterized as a desire for cleanliness, typically around the retail site of the Trader. This desire for cleanliness is borne largely out of a belief that the cleaner your stall or retail site is, the more customers you will attract and income you will generate. It is worth noting that this is a similar motivation mentioned by participants who engaged in bagging and throwing away their vegetables in the spoiled food decision-making. Cleanliness was repeatedly mentioned like in the following quotation:

Jennifer, *Runga Runga:* *"You have to know how to maintain cleanliness because those vegetables are smelly; who will stand here? No one"*

Finding B3: Cooking & Eating Themselves

Multiple participants mentioned that a common practice traders did with their unsold but still edible food was to take it home and cook it themselves. Participants spoke of how feeding their own family and themselves was a viable option with their unsold food but only on certain occasions where they had the additional food. Generally, this is not a reliable form of self-nutrition as it is dependent on how much trade a retailer carries out in a day and so is not as common with traders. This is quoted below:

Jennifer, Dunholme: *"Even if they're still edible, you just check. If they're edible, you set them aside, sometimes even I eat them. I sort out the good ones, cook them for myself, but I don't sell them."*

The clearest motivation for dealing with food in this way was that participants were not aware of other ways of dealing with unsold food in the local area, and thus ate themselves to minimize loss of income/earnings by having unsold product.

Research Question 3: - Gender & Food Waste Decision Making

As was described within the literature review of this paper, a question of Gender and Food Decision Making was incorporated into the study interview guide. From an analysis of all 20 participants' interview scripts all participants spoke of how they made their own decisions with regards to decision making and what to do in relation to spoiled and unsold food. This is visible on Figure 3B. Analysis of this figure and what it means for the primarily female Tabletop Food Vendors is included in the Discussion section of this research.

Research Question 3. Response Results

Participant Category	Gender		Total
Final Decision on what happens with Spoiled/Unsold Food			
Gender	Female	Male	
Participants Own Decision	17	3	20
Other individual's Decision	0	0	0

Table 2 - Who makes the final decision with Food Waste?

Research Question 4: Harambee, Social Capital & Food Waste Decision Making

This research aimed to analyse what effect the local knowledge system of Harambee, which is rooted in Kenyan indigenous principles and values, had on retailers in dealing with their spoiled and unsold vegetables. In order to analyse Harambee in this context, the academic analysis lens of Social Capital Theory was used. Not only is Social Capital Theory useful in reflecting Harambee beliefs in this research but it has also previously been associated with positively contributing to levels of food security for those living in urban areas (Termeer, et.al, 2022). In order to adequately investigate the social aspect of this question, three elements of Social Capital Theory within the Sustainable Livelihoods framework have been chosen to explore these aspects in more detail. These three topics are (1) shared norms & values, (2) reciprocity and (3) social relations and networks. The response rates of participants who mentioned experiencing positive elements of these three key elements are included on Fig. 3C below.

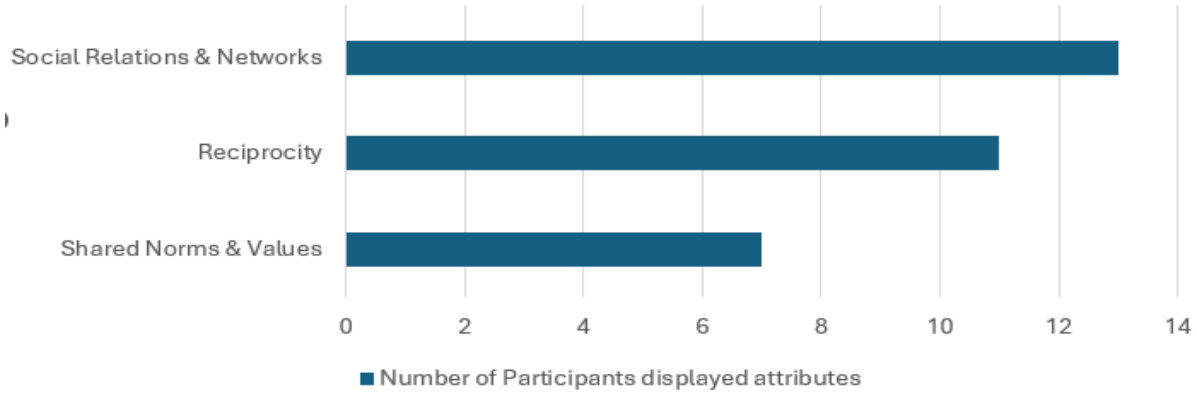


Figure 5 - Representation of Social Capital Theory

Finding C1: Shared Norms & Values

Of the 20 participants interviewed in this study, 7 participants spoke of possessing shared norms and values in relation to other traders with regards to how they deal with spoiled and unsold vegetable waste. It is the case that there were other participants who mentioned similar values in relation to other aspects of their business and livelihoods, for example, cleanliness and clearing stock. However, for the context of this investigation, the focus is specifically on those interviewees who spoke of social capital indicators in the sense of how it informs their spoiled and unsold food practices and how this can point towards elements of Harambee theory. These norms, particularly the practice of sharing without seeking payment, reflect Harambee principles of collective effort and mutual benefit.

Some participants spoke of the norm of sharing which informs why individuals do not seek payment from those farmers who come to collect their spoiled vegetables. This was highlighted in the following quotation:

Jennifer, Kingston: *"It's just about sharing. We share, even she shares with those who feed livestock. That's the method we all use here."*

Finding C2: Reciprocity

Of the participants interviewed in this study, 11 described reciprocal relationships which they held with other local actors in relation to spoiled and unsold waste. Participants who spoke of reciprocal relationships generally discussed these in the context of their fellow traders, customers and local neighbours. For one particular participant in Jamaica Village, the reciprocal relationship of chopping her spoiling vegetables to give to her neighbor's chickens was a necessity since injuring her leg last year. The participant's neighbour helps her to carry water and heavy objects to and from her retail site as the retailer is incapable since injuring her leg. In return for this help in carrying and helping her with heavy objects, the retailer gives her waste vegetables to the neighbour to feed her chickens, thus engaging in a reciprocal relationship in the context of how she deals with spoiled food and vegetable waste. Positive reciprocity links to the Harambee theory principles of collective pooling and shared resources. This reciprocity is exemplified in the following quotation:

Linda, Jamaica: "*this lady helped me has chickens. I don't have chickens, so I ask her to chop them for her chickens. She has helped me, so I helped her too."*

A similar example of reciprocal acts was brought up by another participant in the context of the other retailers who operate in the same area. She mentioned that often, if she is lacking certain vegetables and she is looking to make a mixed batch of vegetables for sale, she is able to go and grab from her neighbour and utilise their stock. The same is also the case for another trader who is welcome to take from her stock as well. Reciprocal acts appeared as most common between retailers themselves rather than with customers or others with one participant even claiming that *"we support each other like sisters"* reflecting the spirit of mutual support and solidarity emphasized in Harambee theory. This is different with customers, as many retailers mentioned high levels of distrust due to reneged credit agreements they have experienced, thus making them less likely to trust and build up trust with customers.

It is also the case that the physical environment affects the building up of trust and reciprocal acts between retailers and individuals. Caroline, a retailer based in Kingston spoke of how she was happy to watch her neighbors stall and sell for him, however now that he has moved further away it is impossible for her to constantly be present at his retail site. She explained this in the following quote:

Caroline, Kingston: "*Yes, but you see, now we are far apart. So, if this one asks me to watch his tomatoes, I can do it while he's nearby, but if he's far, I can't because I can't leave my stall and go watch hers."*

Finding C3: Social Relations & Networks

Of all the elements of Social Capital analyzed in this investigation, the most participants described the element of Social Relations & Networks playing a role in how they dealt with unsold and spoiled vegetable foods.

Multi-Member Networks

A common feature of businesses operating in urban areas of Nairobi are informal savings groups, or *chammas*. The term "Chamma" originates from Swahili, meaning "group" or "association" (Kimani-Murage, 2013). These groups are pivotal in the financial lives of many Kenyans, especially those in low-income areas where access to formal banking services is limited. Membership of a *chamma* provides business owners with access to informal rotating savings and credit groups akin to merry-go- round savings groups that operate in closed networks, such as food retailers, to informally pool resources from members (Kinyanjui, 2012). Due to the informal nature of many urban areas of Nairobi, these retailers would otherwise not be able to receive assistance from a bank or registered institution due to their lack of address or other formal conditions. *Chammas* reflect key principles of Harambee theory by promoting collective action, mutual support, economic empowerment, social cohesion, and community development (Weiss, 2024).

These *chammas* do have an effect on spoiled food and waste. Members of *chammas* pool their resources together in order to purchase vegetables wholesale and thus achieve cheaper overall bulk purchasing prices. This produces a higher overall number of vegetables being bought and brought to Viwandani from the wholesale market, through the pooling of financial resources. Also, the collective savings pool of a *chamma* can facilitate investments in more adequate storage facilities. One participant described how within the *chamma* she was a member of, they have been investigating ways that they could improve their food storage capabilities and thus avoid producing as much waste. She spoke of how they had been seeking funding and

applying for donations in order to fund the purchase of a cold storage unit which could be collectively used by those who pay a fee for the *chamma*:

Mariam, Riverside - "*In our group, we were thinking of a way that we as traders can get good storage. So, we're in that process, we've registered and applied for many donors"*

One-to-One Relationships

Chammas are one example of multi-member group networks that inform how individuals deal with food waste in the slum. On a more micro scale, individual relationships between retailers and customers influence spoiled and unsold food behaviour too. Catherine, a retailer operating in Kingston, described in her interview that for certain vegetables that may be oddly shaped or wilting but that are still edible, she will keep these in a separate basket throughout her workday. When a customer, known to her, comes to purchase vegetables, Catherine will supplement their purchase with extra vegetables from the separate bucket. She made a point of clarifying that this is only possible with certain customers and not with those unknown to her. This prior existing relationship is important in building trust between the retailer and customer in which both parties benefit from the removal of waste and the addition of food. Jennifer from Dunholme highlighted a similar sentiment of one-to-one relationships and how that can affect what she does with unsold food. This is visible in the following quotation:

Jennifer, Dunholme: *"Maybe someone with a very close relationship might come, and if you see this won't last till tomorrow, you add it instead of throwing it away, and if they accept, you tell them to take it for free because it'll spoil, so instead of throwing it away, you give it to them."*

Finding C4: Negative/Limiting Social Capital

The extracts written above contain findings of how elements of social capital, supporting indigenous beliefs of community and solidarity, positively affect livelihoods and food waste decision making in Viwandani. It is the case that in the course of this research, negative relationships limit the development of social capital as well.

One such example is from Mama Grey. This participant has been selling vegetables in the Viwandani area for over 30 years and as self-proclaimed, has survived, raised a family and educated her children with the money she generates selling vegetables from her stall. One year ago, she was involved in a motorcycle crash while bringing vegetables back from the wholesale market. This injury, which she required surgery for, has hampered her mobility hugely, and while there were some friends and individuals willing to help while she was heavily injured, others were not as helpful. She describes some of the farmers who came to collect her spoiled vegetables while she has been injured as treating her like trash. In her own description, they don't even say thank you to her for her spoiled and unsold vegetables. Further to this, Mama Grey described the nonlinear nature of relationships and support in Viwandani in quotes such as:

Mama Grey, Dunholme - "*let me tell you, some may hate you while others may be happy for you. Some will be happy when you're unwell because your customer will go to them. Some will have pity on you to ensure you get something to eat."*

Another example of factors limiting social capital was discussed by Mbithe in Riverside Village. She described that often her relationship with her fellow traders is limited by envy that they may feel for each other. She explains that some neighbours may dislike you for the business you are making or the perceived customers you are taking from each other. This promotes a sense of envy among individuals and demands that you have to choose who your friends are carefully. This aspect of competition over customers was mentioned by a number of participants in the interviews collected:

Mbithe, Riverside Village - "*Some don't have a good relationship; they might dislike you for the work you're doing, and they won't be happy for you to get anything; they'll envy you. So, if someone envies you, will you have a relationship with them? You can't have a relationship with them"*

Inductive Pressing Vendor Issues: Cleanliness, Weather, Transport, & Balancing Stock

It became clear throughout the interviews that there were some key themes that were repeatedly raised by Vendors in the course of discussing their spoiled and unsold food practices. These key themes influence decision making and are explored below.

Finding D1: Desire for Cleanliness

When asked about the importance of dealing with these types of wastes, the most commonly returned answer was that of the desire for cleanliness at the retail site. Cleanliness is important for attracting customers and also for gaining referrals from customers for the quality of the vegetables being sold at a single retail site. One participant described how customers are weary of diseases and illnesses that can be passed on food items in informal areas. She explained that the cleaner your vegetables and retail site is, the more customers you will attract as customers will be less fearful of contacting diseased or dirty vegetables from a vendor. Overall, the fear of losing income due to appearing unclean by not dealing with spoiled and unsold vegetables in a sanitary and timely manner was one of the most popular reasons given by individuals for providing a high ranking to the importance of this issue in their day-to-day life. The significance of this point is underscored in the following quote:

Jessica, Jamaica - "*There's importance because customers also look at whether a place is clean or dirty. If it is dirty, no customer will come*."

Finding D2: Impact of Weather

The theme of the impact of the weather was repeatedly mentioned by participants. These interviews were conducted during the rainy season in Nairobi which stretches from February to April. Without a doubt the pressing and contextually relevant timing of the interviews being conducted during the rainy season had an effect on the participants' reference to the topic. However, it remains a very challenging concern for retailers in Viwandani. Changes in weather patterns and increased rainfall affect a number of aspects of a retailer's day-to-day life. Firstly, it was mentioned that during the rainy season the quality of wholesale vegetables available for sale reduces, thus producing vegetables that spoil quicker at the wholesale market. One of the main reasons for this was that the roads to and from the farms that supply the wholesale market became flooded and harder to pass, therefore taking longer to deliver the vegetables to the market. This means that by the time the retailers can purchase vegetables to sell, they have been sitting and wilting for longer,

meaning they have less of a time window to be sold as edible produce. William described this in his interview:

William, Riverside - *Also, when they're taken from the farm; by the time they get to Muthurwa, it's been a day or two. During the rainy season, the roads get muddy, so by the time they arrive, they're not fresh anymore. By the time we buy, they're already bad. So, when you soak them in water by evening, they'll already be wilted."*

The combination of extreme rain with sunny and hot temperatures was an issue also. During the rainy season, participants spoke of purchasing vegetables from the market, which are already soaked in tepid water, then they are placed in sacks and transported in vehicles which are hot, dark and humid. Upon arriving at the retail site, these vegetables will be placed for view in areas that may be directly under sunlight, thus exposing them to heat and drying them out. This combination of weather and environmental factors causes the vegetables to spoil quicker than usual and this becomes more of an issue during the seasons with more extreme weather patterns.

In field notes and in conversations with locals in the area, it was discussed that the weather also had an effect on the agricultural livelihoods of the farmers who generally collect spoiled vegetable food waste in Viwandani. With increased flooding and heavy rains in the settlement, many of the livestock had been affected, injured or in some cases completely washed away. This has reduced demand for spoiled and unsold food from vendors. This in turn has meant that more and more rotting and spoiled vegetable waste is piling up close to retail sites due to the lack of livestock to feed on this.

Figure 6 - Aftermath of excessive flooding and extreme weather

Finding D3: Influence of Transport

Transport to and from the whole-sale market, which for the majority of the participants of this study was Muthurwa market, was an important repeated topic of conversation in the interviews with participants. Muthurwa market is a distance of approximately 7.7 kilometers from the Viwandani area. All participants interviewed described that they traveled back and forth between Muthurwa and Viwandani by public service vehicle (PSV; locally known as Matatu). The journey itself and quality of roads was described as a problem by some participants who indicated that when vegetables are being transported in the vehicle they crush and can break. Also, once off incidents in travel were also cited as affecting the amount of waste. For example, Lisa in Kingston gave the example of cabbage specifically and described how one day, as the cabbage was being delivered something happened to the vehicle, there was an accident and she found her cabbage was crushed and lost. With increased rain and extreme weather patterns, the issue of transport becomes increasingly important as travel becomes more difficult due to flooded roads and poor infrastructure. The increased cost of this travel was discussed in the following quotations:

Caroline, Ochemi - "*The transportation from there to here sometimes presents a challenge, when we're taken by a vehicle, it's far, we get dropped off, then you have to wait here at the stage, sometimes they arrange for people, we call them Makuaa, to carry for you and they charge 50 here. It can be very challenging sometimes, like now with the flooding, we had to go all the way to Lunga to get here and the bus fare was more expensive."*

Lisa, Kingston: *"The one I've encountered is cabbage. One day as they were being delivered, I don't know what happened to the vehicle; it was an accident. I found the cabbage crushed, that was a big loss."*

Finding D4: Proactively Balancing Stock

Multiple participants mentioned that they aim to reduce waste as much as possible by tailoring their wholesale purchases to match the demand for stock at any given time. Participants spoke of only buying enough stock to last them exactly one day's worth of trading from the wholesale market and also discussed how they utilize the wage and work schedules of their customers to decide when to buy more produce. This is done on a daily basis, by taking stock at the end of each working day in order to decide what to purchase for the next day. This also takes place on a monthly basis where retailers have learned the payment schedules of their customers. See below quote for further explanation:

Mama Mewsti, Jamaica: "*Yes, it's usually towards the end of the month or around the 15th. We business people calculate, when it reaches that time you bring fewer vegetables. It's better it finishes than leaving it and lacking customers, that becomes a waste."*

This more proactive approach towards limiting waste before the point of wholesale purchase differs from those food waste management responses that have been mentioned earlier in this research. Those responses mentioned earlier, like giving the waste to local livestock farming, or bagging and dumping the waste, take place following the point of purchase of vegetables from the wholesale market and retail display. This more proactive approach is placed before the retailer has even bought vegetables from the wholesale market. This strategy will be further explored in the conclusion section of this paper, as it forms an interesting example of pre-purchase waste reduction, a form of waste reduction not mentioned in the Nairobi City Council Strategy Document.

12. A discussion of findings

It is now important to interpret these findings in relation to the theoretical and contextual framing of the overall research analysis. This will be done systematically through the three key theories of this paper: Self-Organisation in a Poverty Context, Food Environment studies and Harambee Theory. Following this, other key findings flowing from the research will be discussed.

Self Organisation in a Poverty Context

In the absence of government implementation or institutional assistance, individuals are placed within a context where they must self-organize (Walsh, 2015). The results given to the first research question can be viewed as examples of self organised processes situated within the poverty context of Viwandani. Utilising Allard & Small's (2013) framework, the three clear elements of self organisation; Systems, Institutions and Organisations, can be viewed interacting and connecting in the context of Viwandani.

- The **System** can be observed as the overall food system of the local Viwandani area. As Allard & Small (2013, 44) describe, systems are macro level entities that are governed by rules and norms. Within our local Viwandani food System, we can observe rules and norms as being things such as the prices set and paid for food, or the giving of spoiled and unsold food to farmers.

- The **Organisations**, which the authors describe as "formally recognized sets of people and practices whose activities are oriented toward an overarching purpose" (Allard & Small, 2013, 48) are also recognisable. Within this specific example, our organizations can be the Tabletop Traders and the Farmers.

- The **Institutions**, which are described as formal rules or informal norms governing the behavior of individuals and organizations, can be observed in the collection of the food waste from the retail site by the farmer or the keeping of spoiled and unsold vegetable waste by the retailers in wait for the farmers to arrive and collect.

This is one example of how we can place the destination of waste, in the context of self-organization in a poverty context and in the absence of governmental assistance, these processes are self organised. In their analysis. Allard & Small (2013) contend a novel point about how social capital can be shaped by the organizations that individuals take part in, including those self organised groups in poverty situations. This point of Social Capital will be reintroduced later in the thesis as well.

Food Environment Theory

Broadly defined, the food environment encompasses the combined physical, economic, policy, and socio-cultural factors that influence individuals' choices regarding food and beverages (Swinburn et al., 2013; Glanz et al., 2005; Story et al., 2008). Within the food environment, unsold and spoiled vegetables can be viewed as negative externalities as they represent the removal of edible food from the food environment of Viwandani. The removal of food from the food environment represents an economic loss to the trader, an environmental loss of emissions and a nutritional loss of nutrient-dense, edible vegetables to the food-insecure local population (FAO, 2013; HLPE, 2014).

One of the most important inductive codes mentioned in this research was that of the impact of transport. Participants mentioned poor road and transport infrastructure facilities as contributing to increased vegetable spoilage. The participants highlighted that transport facilities are a vulnerability of the local food environment that cause increased wastage, which is a negative externality with environmental, economic, and nutritional loss to the local population of Viwandani. Poor road and transport infrastructure can be described as a vulnerability to the food environment that, if improved or resolved, would reduce the amount of food waste and thus edible food being extracted from the local food environment.

Another important inductive code extracted from the research data is that of the weather and its impact on the spoilage and sale of vegetables. When the weather is more extreme, vegetables arrive at the wholesale market in a worse condition from the production farms due to damaged road infrastructure and delays in transportation. Also, the exposure to extreme weather patterns such as rain, heat, humidity, and dampness can cause the vegetables to spoil faster than usual. Similar to the transport point made above, the weather highlights a vulnerability to the local food environment of Viwandani, where an increase in spoilage is a negative externality. The vulnerability that it exposes to this study is the lack of adequate storage facilities for individuals to store their vegetables to keep them from spoiling. Poor storage facilities can be described as a vulnerability to the food environment that, if introduced or improved, would reduce the amount of food waste and thus edible food being extracted from the food environment (Kitinoja et al., 2011).

Harambee & Social Capital Theory

From the data collected, it can be analyzed that elements of Harambee theory and indigenous communitarian systems are indeed present in the practices of these vendors. This is evident in the formation of mentioned examples like *chamas*, small informal savings and loan groups that exemplify communal support systems (Bouman, 1995). These *chamas* facilitate financial cooperation among members, allowing them to pool resources for mutual benefit, which is critical in managing business operations and personal needs in resource-constrained environments (Gugerty, 2007). The resource pooling element of *chamas* has previously been directly linked to rural Harambee traditions in resource poor areas of Nairobi (Weiss, 2024). Additionally, vendors often collaborate in cleaning and disposing of each other's waste, demonstrating a collective approach to managing shared environmental challenges (Mitullah, 2003). Such practices reflect a continuation of traditional communal values and mutual aid, resonant with the principles of Harambee, which emphasize solidarity and collective responsibility (Weiss, 2024).

However, the modern, capitalistic retail environment in which these traders operate introduces countervailing forces that undermine these traditional communal practices. The competitive pressures and entrepreneurial rivalry inherent in a market-driven economy influences behaviors and feelings of solidarity and community, which conflict with the cooperative ethos of Harambee (Porter & Lyon, 2006). This tension between communal solidarity and competitive capitalism highlights the interplay between traditional values and contemporary economic practices. The references made towards "envy" and "distrust" of others in the interviews signifies this.

Moreover, the influence of globalization and the impact of multinational corporations exacerbate this dichotomy by imposing Western consumerist values that prioritize profit-making and modernised retail technology (Berger & Van Helvoirt, 2018). The presence of large international retailers and the increasing popularity of Western-influenced packaged foods contribute to this shift, promoting a consumer culture that often conflicts with local and indigenous philosophies (Pieterse, 2004).

Further to this, Viwandani has a very diverse population across religion and ethnic background. Typically, the settlement is organised across areas of individuals who come from different ethnic backgrounds such as Kikuyu, Luo and Kalenjin. It has been shown in other informal settlement areas that these ethnic backgrounds can create a distrust of individuals from different groups, fragment communities and disturb collective action (Yenkey, 2018). Alongside this ethnic diversity, security and robbery were commonly mentioned fears and experiences of those vendors interviewed in this study. The lack of governmental

support and increased fear of robbery and security issues could also be a compelling discussion formed in order to explain these aspects of limiting social capital and solidarity present in Viwandani.

While elements of Harambee Theory as a native belief persist among Viwandani vendors, the pervasive influence of modern capitalist dynamics introduces significant changes to the traditional elements of the philosophy.

Women's Empowerment and Decision-Making Autonomy

In the results it is visible that all (n20) of the participants interviewed made the final decision over what to do with their spoiled and unsold vegetable waste. Placing this finding within the wider context of women's entrepreneurship and empowerment, it can be observed that female retailers are exercising autonomy in their food waste decision-making processes. This autonomy can have broader implications for women's empowerment. Research suggests that when women have control over their business decisions, it not only enhances their economic status but also contributes to their overall empowerment in society (Kabeer, 1999). Empowering women to make independent decisions in their businesses can lead to improved social status, and greater influence within their communities (Carter & Shaw, 2006). The ability to independently manage food waste decisions may thus reflect and reinforce their empowerment in Viwandani.

Limitations of Women's Empowerment and Broader Context

However, it is also important to consider literature that discusses the limitations of this autonomy. Some studies suggest that while women may exhibit decision-making power in specific domains, such as their businesses, this does not always translate to broader empowerment across all aspects of their lives (Cornwall, 2007). Structural barriers, socio-cultural norms, and economic constraints can still limit the overall impact of their autonomy.

In conclusion, the autonomy observed in food waste decision-making among female retailers in Viwandani is a positive indicator of their economic empowerment and entrepreneurial capabilities. Nonetheless, further research is necessary to explore the extent to which this autonomy influences other domains of their lives and to identify strategies to enhance the overall empowerment of women in informal settlements.

Other Discussion Points: Governmental Communication or Governance Gap

One of the most prevalent responses, visible in Table 1, from individual retailers regarding their spoiled and unsold food was to place the vegetables in a bag and dispose of them at a local dumpsite (Finding A2). Vendors are compelled to discard their food waste in communal dumpsites due to Nairobi City Council's inadequacy in providing sufficient waste management facilities or solid waste collection centres in the area. As was earlier defined, in the 2015 Nairobi City County Solid Waste Management Act, there is no regulatory requirement on the county government to clean or collect waste of any kind in Viwandani. This absence of a formalized waste management system underscores a significant infrastructural and administrative shortcoming.

The Nairobi City Council's 2022 Food System Strategy Document ("The Strategy") emphasizes the reduction of food waste and losses as a key objective in achieving a sustainable food system. The Strategy explicitly advocates for the promotion of food recovery and recycling procedures, instructing traders on how to repurpose spoiled and unsold food. However, the participants in this study had never heard of any educational or informational training from the County Government regarding these initiatives. This indicates a substantial capacity gap between governmental policy and the local population of Viwandani, exacerbating a sense of disconnection between the traders and the governing authorities. The failure to bridge this gap not only undermines the effectiveness of policy implementation but also perpetuates the challenges associated with food waste management in informal settlements.

Proactivity of Food Waste reduction - "Balancing Stock"

Finally, it is worthwhile to conclude on an interesting new development to the study of food waste in LMICs. Many candidates interviewed mentioned "balancing stock" (Finding D4) and proactively altering their whole sale purchases in order to minimize waste and loss of income. Candidates spoke of how at certain times of the month, or even of the week, they would buy less stock as they were aware of the salary patterns of their customer base. By buying more wholesale stock when their customer base has been recently paid, and less stock when they are towards the end of the month, these retailers spoke of avoiding their vegetables going unsold, by taking a proactive approach to waste reduction. Proactive food waste minimisation strategies, as opposed to reactive cost-driven strategy, have been researched, in the context of European supermarket and bakery retailers (Martin-Rios, 2018). A potentially interesting point of further study could be to investigate this by examining the vegetable wholesaler markets, in order to find out if they possess superior refrigeration systems that could keep vegetables for longer than retailers, or whether they too alter their stock orders during these times of the month.

The literature surrounding these proactive approaches has described technological advances including increased digitisation and the use of artificial intelligence as revolutionizing the capacity of large-scale retail operators to proactively reduce their unsold and wasted stock (Martin-Rios, 2018). The Author could not find any existing literature discussing proactivity in food waste reduction in LMICs and informal settlement areas. The discussion of this topic within this paper can be considered a novel introduction to the field of food waste research in LMICs.

Research Limitations

While working in an informal settlement there are a number of limitations and concerns in relation to personal access and safety of the facilitators, participants and researchers. These issues of access were mitigated by conducting interviews at the participants' retail site; therefore, they did not have to move anywhere unusual or distant. The duration of three months allocated for conducting this research is relatively brief. The author contends that extending the duration and intensifying observation and data collection efforts in Viwandani could significantly enhance the quality and depth of the research findings. This extended engagement could foster deeper insights into the dynamics of the issues under study, potentially uncovering further critical aspects that may not be immediately apparent within a shorter timeframe.

Further to this, it is important to acknowledge that the communication style and manner of posing questions in Western Academia contrasts with the day-to-day communication style of those living in Viwandani, Nairobi. An example of this is the use of a "Likert Scale", which was attempted in the interview phase. Likert scales are a commonly used research tool that consist of asking interview or study participants to rank something on a numerical scale with the lower end signifying a lack of importance and the higher the number signifying greater priority (Allen & Seaman, C. A, 2007). Despite this analysis being purely qualitative, a Likert scale was initially planned to introduce methodological consistency in the interview analysis, aiding in the identification of trends and correlations within the qualitative data set (Sullivan & Artino, 2013). Ranking something on a scale of one to ten is not a concept participant were familiar with and therefore it had to be explained to them on the spot, bringing into question the academic validity of such tools if it is the participants' first time hearing of them. This question was taken out of the overall results, discussion and conclusion section.

Despite these limitations, this research does still hold numerous positive academic advancement points. This research serves to further develop qualitative material arising from the "Piloting Food Systems" dataset. This study forms a worthwhile exploratory analysis of the livelihoods of food vendors in Viwandani previously analyzed in a quantitative survey and gives more detailed clarification and explanation to the numbers of the large data set.

13. Conclusion

It is worthwhile to conclude by analyzing the research question and sub questions in order to ascertain the key results and identify any potential benefit of these results to the wider research of international development.

What are the options for tabletop food traders (Mama Mbogas) in dealing with their spoiled and unsold vegetables?

Table 1 provides a full list of all options which tabletop food traders engage in when dealing with spoiled and unsold food waste. Perhaps the most novel point examined in this section, is the prevalence of participants who practice "balancing stock" and tailor their wholesale purchases of vegetables, in order to avoid financial loss and waste at specific times of the month. As was mentioned in the discussion section of this paper, the Author could not identify any existing literature or research discussing proactivity in food waste reduction in LMICs and informal settlement areas and therefore this inductive research point is innovative. For future research this "balancing stock" theme could be incorporated into food value chain investigations in order to determine whether this has any effect on other elements of the food supply chain such as packaging or whole-sale retailing.

What is the main driver behind this decision?

As is discussed in the findings section, there are numerous reasons why individuals choose certain options in dealing with their food waste. The most commonly cited two drivers for choosing a certain option were that individuals (1) would rather give away food for free than to see it go to waste and (2) that the traders were not aware of any other way of dealing with this waste. It is visible that more educational work could be provided in future in order to educate traders of the various uses for waste and how these could benefit their livelihoods while also reducing solid waste in urban areas. This way traders could learn of alternate ways of dealing with waste, such as food waste recycling or food waste recovery. Both waste recycling and recovery are methods included in Nairobi City County's 2022 Food System Strategy as positive methods to be encouraged.

Who makes the final decision with regard to what happens to these spoiled and unsold vegetables? (Gendered perspective)

Every participant remarked that they made the decisions on what option is selected with their spoiled and unsold vegetables. There was no patriarchal influence in the decisions of the female traders who were interviewed in this study. Further research could pursue this questioning further, in order to find

out whether other decisions made by female traders are influenced by males, and if so, what factors determine the choices women have in the course of their retail trade of food.

How aspects of community/social capital affect how individuals deal with this spoiled and unsold food?

Some participants spoke of the positive influence of Harambee Theory beliefs and values affecting how they dealt with spoiled and unsold food in Viwandani. However, it was discovered that retail modernisation and elements of distrust and envy were also prevalent in preventing individuals from displaying this thinking wholeheartedly. For future policy development, it is recommended to strengthen those positive and traditional institutions of Harambee Theory such as *chamas*, and their effects on the local community, that were highlighted in the interviews. By promoting these bottom-up dynamics, this research supports the idea that traditional value and knowledge systems can strengthen the collective welfare that individuals living in informal settlements and poverty can achieve (Weiss, 2024, 28).

As with exploratory research more generally, the goal of this investigation was to shed light on an under researched topic. The central figures within this study are those tabletop food vendors who operate in Viwandani, and similar small-scale retailers and business people in areas of urban poverty.

In the course of the data collection of this thesis numerous fears and everyday struggles were highlighted, separate or tangentially related to food waste reduction. Despite the challenge and uncertainty that these retailers face, they are resilient and work every day to provide for their families and sustain their personal livelihoods. This research is intended to honour and respect these participants who made this study possible. As a key takeaway of this research, it is clear that individuals in the community, and how they operate in their day-to-day practices, can be effective at taking steps towards reducing food waste and increasing food security, as compared to governmental or international policy interventions which come from a top-down perspective.

14. References

Alfiero, S., Christofi, M., & Bonadonna, A. (2020). Street food traders, farmers and sustainable practice to reduce food waste in the Italian context. *British Food Journal*, 122(5). https://doi.org/10.1108/BFJ-04-2019-0265

Allard, S. W., & Small, M. L. (2013). Reconsidering the Urban Disadvantaged: The Role of Systems, Institutions, and Organizations. *Annals of the American Academy of Political and Social Science*, 647(1). https://doi.org/10.1177/0002716213479317

Allen, I.E. and Seaman, C.A. (2007) Likert Scales and Data Analyses. *Quality Progress*, 40(7), 64-65.

Ashley, C., & Carney, D. (1999). Sustainable livelihoods: Lessons from early experience. Development.

Battersby, J., & Watson, V. (2018). Urban food systems governance and poverty in African cities. *Urban Food Systems Governance and Poverty in African Cities*. https://doi.org/10.4324/9781315191195

Bennett & Wallsgrove (1994). Secondary metabolites in plant defence mechanisms. *New Phytologist*, 127(4). https://doi.org/10.1111/j.1469-8137.1994.tb02968.x

Bouman, F.J. (1995). Rotating Savings and Credit Organizations: A Development Perspective. *World Development*; 23(3) 371-384.

Bourdieu, P. (1986). Pierre Bourdieu 1986 - The forms of capital. *Handbook of Theory and Research for the Sociology of Education.*

Cabaltica, A. D., Nguyen, H. D., & Pham, H. N. (2016). Solid waste management practices in the street food sector in Thu Duc District, Ho Chi Minh City. *Civil and Environmental Research*, 8(10), 105-120.

Caron, P., Ferrero y de Loma-Osorio, G., Nabarro, D., Hainzelin, E., Guillou, M., Andersen, I., Arnold, T., Astralaga, M., Beukeboom, M., Bickersteth, S., Bwalya, M., Caballero, P., Campbell, B. M., Divine, N., Fan, S., Frick, M., Friis, A., Gallagher, M., Halkin, J. P., … Verburg, G. (2018). Food systems for sustainable development: proposals for a profound four-part transformation. *Agronomy for Sustainable Development* (Vol. 38, Issue 4). https://doi.org/10.1007/s13593-018-0519-1

Chege, C.G.K.; Wanyama, R.; Onyango, K.; Kabach, J.; Lundy, M. (2021) Understanding market preference for fresh fruits and vegetables: A choice experiment approach. 20 p. https://hdl.handle.net/10568/116792

Cornwall, A. (2007). Revisiting the "gender agenda." *IDS Bulletin*, 38(2). https://doi.org/10.1111/j.1759-5436.2007.tb00353.x

De Vita, M., Scolfaro, C., Santini, B. et al. Malnutrition, morbidity and infection in the informal settlements of Nairobi, Kenya: an epidemiological study. Ital J Pediatr 45, 12 (2019). https://doi.org/10.1186/s13052-019-0607-0

Dlamini, S., Simatele, M. D., & Kubanza, N. S. (2016). Urbanization, environment and sustainable development in Sub-Saharan Africa: A review of the current status and trends. *Journal of African Studies*, 22(3), 215-230. https://doi.org/10.1080/13648470.2016.1170001

Downs, S., & Demmler, K. M. (2020). Food environment interventions targeting children and adolescents: a scoping review. *Global Food Security*, 27, 100403.

Elder, B. C., & Odoyo, K. O. (2018). Multiple methodologies: using community-based participatory research and decolonizing methodologies in Kenya. *International Journal of Qualitative Studies in Education*, 31(4). https://doi.org/10.1080/09518398.2017.1422290

Evans, D. (2012). Beyond the throwaway society: Ordinary domestic practice and a sociological approach to household food waste. *Sociology*, 46(1), 41-56. https://doi.org/10.1177/0038038511416150

FAO (1996) Food and Agriculture Organization of the United Nations; Rome, Italy: 1996. Report of the World Food Summit, 13-17 November 1996.

FAO. (2020). The State of Food and Agriculture 2020: Overcoming water challenges in agriculture. The State of Food and Agriculture 2020.

Food and Agriculture Organization of the United Nations, International Fund for Agricultural Development, United Nations Children's Fund, World Food Programme, & World Health Organization. (2022). The state of food security and nutrition in the world 2022: Repurposing food and agricultural policies to make healthy diets more affordable. Rome, Italy: FAO. https://doi.org/10.4060/cc0639en

Food and Agriculture Organization of the United Nations. (2013). Food wastage footprint: Impacts on natural resources. Rome: FAO.

Fukuyama, F. (2002). Social capital and development. *SAIS Review* (1989-2003), 22(1), 23-37.

Glanz, K., Sallis, J. F., Saelens, B. E., & Frank, L. D. (2005). Healthy nutrition environments: Concepts and measures. *American Journal of Health Promotion* (Vol. 19, Issue 5). https://doi.org/10.4278/0890-1171-19.5.330

Glowacki-dudka, M., Murray, J., & Isaacs, K. P. (2013). Examining social capital within a local food system. *Community Development Journal*, 48(1). https://doi.org/10.1093/cdj/bss007

Gray, K., & Gills, B. K. (2016). South–South cooperation and the rise of the global South. *Third World Quarterly*, 37(4). https://doi.org/10.1080/01436597.2015.1128817

Gugerty, M. K. (2007). You can't save alone: Commitment in rotating savings and credit associations in Kenya. *Economic Development and Cultural Change*, 55(2). https://doi.org/10.1086/508716

Gustavsson, J., Cederberg, C., Sonesson, U., van Otterdijk, R., & Meybeck, A. (2011). Global food losses and food waste: Extent, causes and prevention. Rome: Food and Agriculture Organization of the United Nations (FAO).

Hennink, M., Hutter, I., & Bailey, A. (2011). Data Preparation and Developing Codes. In Qualitative research methods.

Herforth, A., & Ahmed, S. (2015). The food environment, its effects on dietary consumption, and potential for measurement within agriculture-nutrition interventions. *Food Security*, 7(3). https://doi.org/10.1007/s12571-015-0455-8

High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. (2014). Food losses and waste in the context of sustainable food systems. Rome, Italy.

IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. https://doi.org/10.5281/zenodo.3831673

Kabeer, N., & Nations, P. (1999). The Conditions and Consequences of Choice : Reflections on the Measurement of Women ' s Empowerment for Social Development. Context, 30(108).

Kamau, P. N., & Njenga, M. (2018). Impact of poor waste disposal on water pollution and health risks in Nairobi's informal settlements. *International Journal of Environmental Health Research*, 28(6), 667-679. https://doi.org/10.1080/09603123.2018.1424303

Kimani-Murage, E. W. (2013). Exploring the paradox: Double burden of malnutrition in rural South Africa. *Global Health Action*, 6(1), 19249. https://doi.org/10.3402/gha.v6i0.19249

Kitinoja L., Saran S., Roy K., Kader A.A. (2011) Postharvest technology for developing countries: challenges and opportunities in research, outreach and advocacy. *J. Sci. Food Agric*. 2011;91:597–603

Kumar, S., Nyongesa, V., Wangari, M., & Otieno, M. (2021). Socio-economic implications of food waste: A case study of Viwandani, Nairobi. *Journal of Food Security*, 9(2), 56-64. https://doi.org/10.12691/jfs-9-2-3

Lin, N., Fu, Y. C., & Hsung, R. M. (2001). Measurement techniques for investigations of social capital. Social capital: Theory and research, 4, 57-81.

Mariam, N., Valerie, K., Karin, D., Angelika, W. R., & Nina, L. (2019). Limiting food waste via grassroots initiatives as a potential for climate change mitigation: A systematic review. *Environmental Research Letters* (Vol. 15, Issue 12). https://doi.org/10.1088/1748-9326/ab

Martin-Rios, C., Demen-Meier, C., Gössling, S., & Cornuz, C. (2018). Food waste management innovations in the foodservice industry. *Waste Management*, 79. https://doi.org/10.1016/j.wasman.2018.07.033

Mbithi, P. M. (1972). "Harambee" Self-Help: The Kenyan Approach. *African Review*, 2(1).

Mbithi, P. M., & Rasmusson, R. (1978). Self-Reliance in Kenya: The Case of Harambee. *African Economic History*, 6. https://doi.org/10.2307/3601188

Milan Urban Food Policy Pact (MUFPP) (2015) Milan urban food policy pact. Available at: https://www.milanurbanfoodpolicypact.org/wp-content/uploads /2020/12/Milan-Urban-Food-Policy-Pact-EN.pdf (accessed 22 May 2024).

Min, S., Wang, X., & Yu, X. (2021). Does dietary knowledge affect household food waste in the developing economy of China?. *Food Policy*, 98, 101896.

Mitullah, W. (2003). Urban slums reports: The case of Nairobi, Kenya.

Mohamed, S. F., Macharia, T., Asiki, G., & Gill, P. (2023). A socio-ecological framework examination of drivers of blood pressure control among patients with comorbidities and on treatment in two Nairobi slums; a qualitative study. PLOS Global Public Health, 3(3). https://doi.org/10.1371/journal.pgph.0001625.

Mpanje, D., Gibbons, P., McDermott, R., Omia, D. O., & Olungah, C. O. (2022). Social capital undergirds coping strategies: evidence from two informal settlements in Nairobi. *Journal of International Humanitarian Action*, 7(1). https://doi.org/10.1186/s41018-022-00115-0

Mutisya, M., Kandala, N. B., Ngware, M. W., & Kabiru, C. W. (2015). Household food (in)security and nutritional status of urban poor children aged 6 to 23 months in Kenya Global health. *BMC Public Health*, 15(1). https://doi.org/10.1186/s12889-015-2403-0

Mwangola, M. S. (2007). "Justice be our shield and defender": An intellectual property rights regime for Africa. *Africa Development*, 32(3). https://doi.org/10.4314/ad.v32i3.57211

Mwiria, K. (1990). Kenya's Harambee Secondary School Movement: The Contradictions of Public Policy. *Comparative Education Review*, 34(3). https://doi.org/10.1086/446951

Nairobi City Council Food Systems Strategy (2020) Nairobi City Council.

Nairobi City County Solid Waste Management Act (2015). Nairobi, Kenya. https://nairobiassembly.go.ke/ncca/wp-content/uploads/act/2023/Nairobi-City-County-Solid-Waste-Management-Act-2015-2.pdf

Ndhlovu, T. P. (2022). Food (in)security, the moral economy, and Ubuntu in South Africa: a Southern perspective. *Review of International Political Economy*. https://doi.org/10.1080/09692290.2022.2161110

Ng'ethe, H. (1986). "Decentralization for Development: The Case of District Focus for Rural Development," A Paper Presented at the congress of the Organization of Social Science Research in Eastern Africa, Eldoret, July.

Ngau, P. M. (1987). Tensions in empowerment: the experience of the Harambee (self- help) movement in Kenya. *Economic Development & Cultural Change*, 35(3). https://doi.org/10.1086/451602

Nyambura Kariuki, E., Waithera Ng'ang'a, Z., & Wanzala, P. (2017). Food-Handling Practices and Environmental Factors Associated with Food Contamination Among Street Food Vendors in Nairobi County, Kenya: A Cross-Sectional Study. *East African Health Research Journal*, 1(1). https://doi.org/10.24248/eahrj.v1i1.389

Nyong'o, A. (1981), 'The Sociological Transformation of Harambee or is Accumulation the Source of Political Demobilization? in Ng'ethe (ed.), *Popular Participation and Rural Development*, Occasional Paper No. 38, IDS, University of Nairobi

Nzeadibe, T. C. (2009). Solid waste reforms and informal recycling in Enugu urban area, Nigeria. *Habitat International*, 33(1), 93-99. https://doi.org/10.1016/j.habitatint.2008.05.004

Ouko, E. M. (2018). Contextualising integrated conservation and development projects: Restoring the lost 'harambee' link in Kenya. *Geoforum*, 92. https://doi.org/10.1016/j.geoforum.2018.04.002

Papargyropoulou, E., Lozano, R., Steinberger, J. K., Wright, N., & Ujang, Z. B. (2014). The food waste hierarchy as a framework for the management of food surplus and food waste. *Journal of Cleaner Production*, 76, 106-115. https://doi.org/10.1016/j.jclepro.2014.04.020

Pape, U., & Mejia-Mantilla, C. (2019). More than just growth: accelerating poverty reduction in Kenya. Blog. World Bank, 12.

Parfitt, J., Barthel, M., & Macnaughton, S. (2010). Food waste within food supply chains: Quantification and potential for change to 2050. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1554), 3065-3081. https://doi.org/10.1098/rstb.2010.0126

Patel, R. (2010). The long green revolution. *Journal of Peasant Studies*, 37(4), 631-640

Pedrotti, M., Fattibene, D., Antonelli, M., & Castelein, B. (2023). Approaching Urban Food Waste in Low- and Middle-Income Countries: A Framework and Evidence from Case Studies in Kibera (Nairobi) and Dhaka. *Sustainability* (Switzerland), 15(4). https://doi.org/10.3390/su15043293

Pieterse, J. N. (2004). Ethnicities and multiculturalisms: Politics of boundaries. Ethnicity, nationalism, and minority rights, 27-49.

Porter, G., & Lyon, F. (2006). Groups as a means or an end? Social capital and the promotion of cooperation in Ghana. Environment and Planning D: *Society and Space*, 24(2), 249-262. https://doi.org/10.1068/d0303

Putnam, R. D. (1995). Bowling Alone: America's Declining Social Capital. Journal of Democracy, 6(1). https://doi.org/10.1353/jod.1995.0002

Republic of Kenya (2023). "The annual state of Kenya and state of world populations reports 2023 launch". Blog post, 28 October. Nairobi: State Department for Economic Planning. Available online (accessed 31 January 2024).

Sahoo, A., Dwivedi, A., Madheshiya, P., Kumar, U., Sharma, R. K., & Tiwari, S. (2024). Insights into the management of food waste in developing countries: with special reference to India. *Environmental Science and Pollution Research*, 31(12). https://doi.org/10.1007/s11356-023-27901-6

Salinger, A. P., Charles, I., Francis, N., Batagol, B., Meo-Sewabu, L., Nasir, S., Bass, A., Habsji, H., Malumu, L., Marzaman, L., Prescott, M. F., Jane Sawailau, M., Syamsu, S., Taruc, R. R., Tela, A., Vakarewa, I., Wilson, A., & Sinharoy, S. S. (2024). "People are now working together for a common good": The effect on social capital of participatory design for community-level sanitation infrastructure in urban informal settlements. *World Development*, 174. https://doi.org/10.1016/j.worlddev.2023.106449

Science Africa. (2023, August 18). Kenya: Mathare Youths Cleaning Environment by Turning Waste to Energy. Retrieved from Science Africa

Searchinger, T., Waite, R., Beringer, T., Forslund, A., Guyomard, H., le Mouël, C., Manceron, S., & Marajo-Petitzon, E. (2018). World resources report - creating a sustainable food future. In *Agency for International Development*.

Sheahan, M., & Barrett, C. B. (2017). Food loss and waste in Sub-Saharan Africa: A critical review. *Food Policy* (Vol. 70). https://doi.org/10.1016/j.foodpol.2017.03.012

Smith, J., & Wessels, A. (2020). Environmental impacts of inadequate waste management in urban areas. *Journal of Environmental Science and Policy*, 12(4), 234-250. https://doi.org/10.1016/j.envsci.2020.05.003

Soethoudt, J. M., Pedrotti, M., Bos-Brouwer, H. E. J., & Castelein, R. B. (2021). Adoption of food loss and waste-reducing interventions in Low- and Middle-Income Countries. Wageningen Food & Biobased Research, Subsidised by the Dutch Ministry of Agriculture, Nature and Food Quality and Funded by the Rockefeller Foundation, and the Foundation for Food and Agriculture Research., Report 219(WFBR Project number: 6239177200).

Springmann, M., Clark, M., Mason-D'Croz, D., Wiebe, K., Bodirsky, B. L., Lassaletta, L., de Vries, W., Vermeulen, S. J., Herrero, M., Carlson, K. M., Jonell, M., Troell, M., DeClerck, F., Gordon, L. J., Zurayk,

R., Scarborough, P., Rayner, M., Loken, B., Fanzo, J., Willett, W. (2018). Options for keeping the food system within environmental limits. Nature, 562(7728). https://doi.org/10.1038/s41586-018-0594-0

Stefanovic, L., Freytag-Leyer, B., & Kahl, J. (2020). Food System Outcomes: An Overview and the Contribution to Food Systems Transformation. In Frontiers in Sustainable Food Systems (Vol. 4). https://doi.org/10.3389/fsufs.2020.546167

Story, M., Kaphingst, K. M., Robinson-O'Brien, R., & Glanz, K. (2008). Creating healthy food and eating environments: policy and environmental approaches. *Annu. Rev. Public Health*, 29, 253-272.

Sullivan, G. M., & Artino, A. R. (2013). Analyzing and Interpreting Data From Likert-Type Scales. *Journal of Graduate Medical Education*, 5(4). https://doi.org/10.4300/jgme-5-4-18

Swinburn, B., Sacks, G., Vandevijvere, S., Kumanyika, S., Lobstein, T., Neal, B., Barquera, S., Friel, S., Hawkes, C., Kelly, B., L'Abbé, M., Lee, A., Ma, J., Macmullan, J., Mohan, S., Monteiro, C., Rayner, M., Sanders, D., Snowdon, W., & Walker, C. (2013). INFORMAS (International Network for Food and Obesity/non-communicable diseases Research, Monitoring and Action Support): Overview and key principles. *Obesity Reviews* (Vol. 14, Issue S1). https://doi.org/10.1111/obr.12087

Termeer, E. E. W., Soma, K., Motovska, N., Ayuya, O. I., Kunz, M., & Koster, T. (2022). Sustainable Development Ensued by Social Capital Impacts on Food Insecurity: The Case of Kibera, Nairobi. *Sustainability* (Switzerland), 14(9). https://doi.org/10.3390/su14095504

The State of Food and Agriculture 2015. (2015). In The State of Food and Agriculture 2015. https://doi.org/10.4060/ca6030en

The State of Food and Agriculture 2019. (2019). In The State of Food and Agriculture 2019. https://doi.org/10.4060/ca6030en

Totobesola, M., Delve, R., Nkundimana, J. d'Amour, Cini, L., Gianfelici, F., Mvumi, B., Gaiani, S., Pani, A., Barraza, A. S., & Rolle, R. S. (2022). A holistic approach to food loss reduction in Africa: food loss analysis, integrated capacity development and policy implications. *Food Security*, 14(6). https://doi.org/10.1007/s12571-021-01243-y

Turner, C., Aggarwal, A., Walls, H., Herforth, A., Drewnowski, A., Coates, J., ... & Kadiyala, S. (2018). Concepts and critical perspectives for food environment research: a global framework with implications for action in low-and middle-income countries. *Global food security*, 18, 93-101.

United Nations Human Settlements Programme. (2021). UN Habitat annual report 2020. Nairobi, Kenya: UN-Habitat. Retrieved from https://unhabitat.org/sites/default/files/2021/06/annual_report_2020.pdf

United Nations. (2015). The 2030 Agenda for Sustainable Development. Retrieved from https://sdgs.un.org/2030agenda

von Braun, J., Sorondo, M. S., & Steiner, R. (2023). Reduction of Food Loss and Waste: The Challenges and Conclusions for Actions. In Science and Innovations for Food Systems Transformation. https://doi.org/10.1007/978-3-031-15703-5_31

Wahome, M., & Mbatia, Prof. P. (2021). Causes of Under-Nutrition in Mukuru and Viwandani Urban Informal Settlements Mercy Wahome and Prof. Paul Mbatia. *American Journal of Food Sciences and Nutrition*, 1(1).

Walsh JP (2015) Organization and management scholarship in and for Africa… and the world. Acad. Management Perspect. 29(1):1–6

Weiss, T., Lounsbury, M., & Bruton, G. (2024). Survivalist Organizing in Urban Poverty Contexts. *Organization Science*. https://doi.org/10.1287/orsc.2023.17644

Yenkey, C. B. (2018). The outsider's advantage: Distrust as a deterrent to exploitation. *American Journal of Sociology*, 124(3). https://doi.org/10.1086/700694

15. Appendices

Consent and Permission Forms: *National Commission for Science Technology & Innovation of Kenya*

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 623705

Date of Issue: 05/April/2024

RESEARCH LICENSE

This is to Certify that Mr.. Ewan Blackwood Lindsay of Utrecht University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: A contextual investigation into the practices of tabletop food vendors and how they deal with urban food waste reduction in Viwandani, Nairobi for the period ending : 05/April/2025.

License No: NACOSTI/P/24/34181

623705

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)
Legal Notice No. 108: The Science, Technology and Innovation (Research Licensing) Regulations, 2014

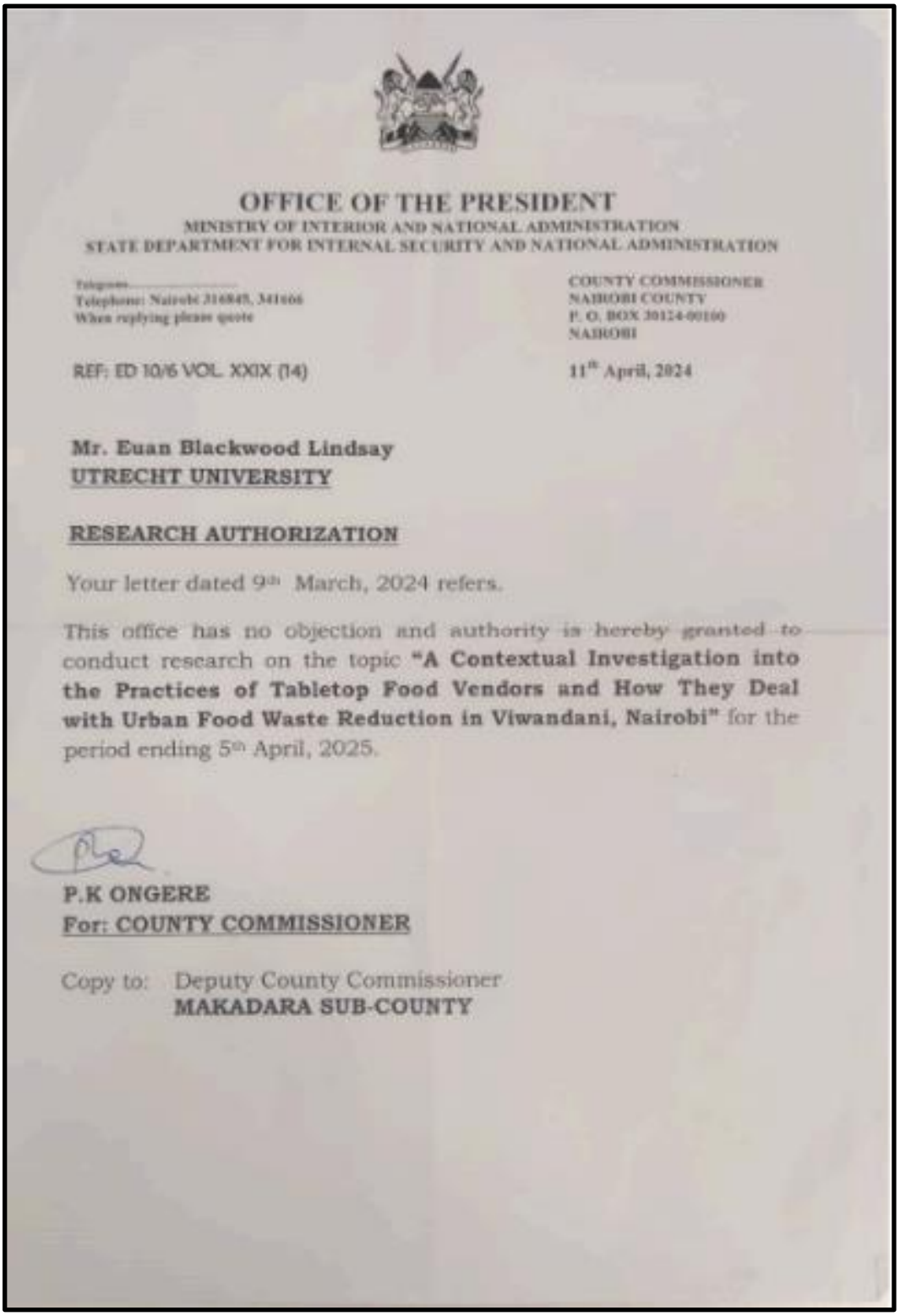
The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was the established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way;
    i. Endanger national security
    ii. Adversely affect the lives of Kenyans
    iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
    iv. Result in exploitation of intellectual property rights of communities in Kenya
    v. Adversely affect the environment
    vi. Adversely affect the rights of communities
    vii. Endanger public safety and national cohesion
    viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

National Commission for Science, Technology and
Innovation(NACOSTI),
Off Waiyaki Way, Upper Kabete,
P. O. Box 30623 - 00100 Nairobi, KENYA
Telephone: 020 4007000, 0713788787, 0735404245
E-mail: dg@nacosti.go.ke
Website: www.nacosti.go.ke

Nairobi County Commissioner Clearance:



OFFICE OF THE PRESIDENT
MINISTRY OF INTERIOR AND NATIONAL ADMINISTRATION
STATE DEPARTMENT FOR INTERNAL SECURITY AND NATIONAL ADMINISTRATION

Telegrams
Telephone: Nairobi 314845, 341666
When replying please quote

COUNTY COMMISSIONER
NAIROBI COUNTY
P. O. BOX 30124-00100
NAIROBI

REF: ED 10/6 VOL. XXIX (14)

11th April, 2024

Mr. Euan Blackwood Lindsay
UTRECHT UNIVERSITY

RESEARCH AUTHORIZATION

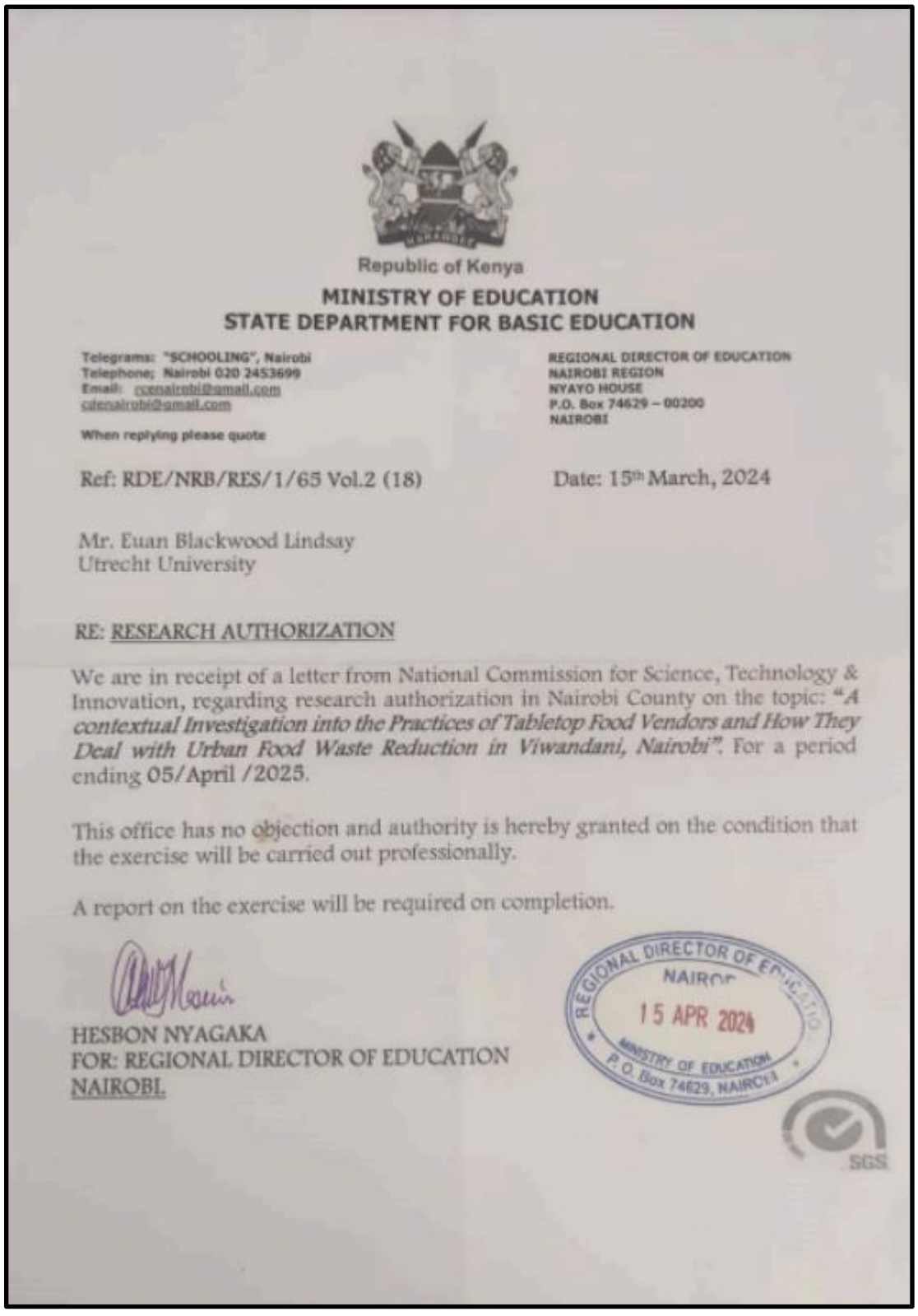
Your letter dated 9th March, 2024 refers.

This office has no objection and authority is hereby granted to conduct research on the topic **"A Contextual Investigation into the Practices of Tabletop Food Vendors and How They Deal with Urban Food Waste Reduction in Viwandani, Nairobi"** for the period ending 5th April, 2025.

P.K ONGERE
For: COUNTY COMMISSIONER

Copy to: Deputy County Commissioner
MAKADARA SUB-COUNTY

State Department of Education: Kenya



Republic of Kenya

MINISTRY OF EDUCATION
STATE DEPARTMENT FOR BASIC EDUCATION

Telegrams: "SCHOOLING", Nairobi
Telephone; Nairobi 020 2453699
Email: rcenairobi@gmail.com
cdenairobi@gmail.com

When replying please quote

REGIONAL DIRECTOR OF EDUCATION
NAIROBI REGION
NYAYO HOUSE
P.O. Box 74629 – 00200
NAIROBI

Ref: RDE/NRB/RES/1/65 Vol.2 (18)

Date: 15th March, 2024

Mr. Euan Blackwood Lindsay
Utrecht University

RE: RESEARCH AUTHORIZATION

We are in receipt of a letter from National Commission for Science, Technology & Innovation, regarding research authorization in Nairobi County on the topic: *"A contextual Investigation into the Practices of Tabletop Food Vendors and How They Deal with Urban Food Waste Reduction in Viwandani, Nairobi"*. For a period ending 05/April /2025.

This office has no objection and authority is hereby granted on the condition that the exercise will be carried out professionally.

A report on the exercise will be required on completion.

HESBON NYAGAKA
FOR: REGIONAL DIRECTOR OF EDUCATION
NAIROBI.

REGIONAL DIRECTOR OF EDUCATION
NAIROBI
15 APR 2024
MINISTRY OF EDUCATION
P. O. Box 74629, NAIROBI

SGS

Interview Scripts - English + Kiswahili:

Breaking Questions:

Can you talk me through the average day for you from the moment you get up to the moment you go to sleep?

Unaeza nielezea wewe kama mwana biashara mdogo siku yako hukua aje tangu uamke mpaka jioni ukienda kulala

On the average week, do you find the same customers come back again and again to buy vegetables from you?

Unakuanga na regular customers tu wako wenye hununua tu kwako anytime wanataka kitu ama ukona customers wenye hukuja tu mara moja moja.

- Why do you think this is?

Unathani ni kwa nini? (depending on their answer above)

What do you think customers find important in coming to buy vegetables from you?
Kwa wale regular customers wako,unadhani ni nini ndo hufanya wakuje tu kununua tu kwako? Na kwa wale wageni unaona nini kuhusu biashara yako huwavutia kununua kwako na si duka ingine maybe?

Waste destination questions:

When you receive your vegetables for sale from your supplier, is there a portion of these vegetables that are spoiled or that you deem not fit for sale?

Ukitoka soko kununua stock ya biashara yako kuna zenye zinakuanga zimeharibika already na huwezi uza.

- If so, what percentage of the overall supply is normally spoiled?

Kwa ujumla zile zinakunga zimeharibika ni kiasi gani? Labda wakati gani ndo huwa zinaharibika ?Ni zikitoka kwa soko,ama ukiweka kwa duka yako ,ama ni jioni ukifunga biashara,ama ukifungua kesho yake biashara?

What do you do with these spoiled vegetables that arrive from the supplier and that you can't sell?
Ukishafungua stock yako kutoka kwa suppplier upate zimeharibika na huwezi uza huwa unafanya nini nazo?

- What would you say are the main reasons why you deal with spoiled food in this specific way? *(kulingana na jibu lako nini ndo hufanya udeal na supply imeharibika hivo?)*

And through the course of the day as you are selling, are there a certain portion of the vegetables that you can't sell because they spoil or rot during the day?

Ukifungua biashara yako na udisplay products zako,kuna zile wewe hupata zimeharibika katika hiyo harakati ya kuuza ama kufikia jioni?

- If so, how often does this happen and what do you do with these vegetables?

Incase ziharibike,tuseme kwa wiki huwa inafanyika mara ngapi,na ikifanyika unafanyanga nini nazo?

- Like earlier, what would you say are the things that influence you to deal with this spoiling food in this way?
  (kulingana na jibu lako nini ndo hufanya udeal na supply imeharibika hivo?)

And at the end of the day when you are closing up, how often are you left with vegetables that are unsold and that can't be sold the following day?
Mwisho wa siku ukifunga biashara yako , ni mara ngapi wewe hujipata umebaki na mboga zenye huwezi uza kesho yake ,juu maybe zianeza kuwa zishaharibika?

- What do you do with these vegetables that are unsold at the end of the day?

Huwa unafanya nini nazo?

- Like earlier again, what is the driver behind this?

Nini hufanya udeal nazo hivo? (kulingana na jibu lililopita)

Some of these unsold foods may still be edible and not spoiled yet? Do you deal with these vegetables differently?
Mwisho wa siku unaeza pata kuna mboga hazijaharibika na zinaeza kulika,wewe hudeal nazo kitofauti na zenye zimeharibika?

- What would be the primary reason for dealing with this unsold food in this way?

Nini haswa ndo hufanya udeal nazo hivo?

When you look at the spoiled vegetables that arrive at the start of the day, the food that spoils during the course of the day, and the unsold food at the end of the day - Can you explain any differences in how you deal with these foods?
Kwa kila kitu tumeongea kuna kitu ungependa kuongezea unaona kikama umesahau kuniambia kulingana na vile wewe hudeal na mboga zimeharibika?

Waste drivers

Do you think there are multiple options that people have in how they deal with their spoiled and unsold food in the local area? If so, what are they?
Unadhani kuna njia zingine zenye watu hapa viwandani hutumia kushughulikia mboga zimeharibika ama zile hazijauzwa ? Kama ziko ni gani?
What do you think influences people in choosing what option to take with their spoiled and unsold food?
Unadhani ni nini hufanya watu watumie hizi njia umeniambia?

Are there common ways in which you and other trader
s in the area deal with spoiled or unsold food? Could you detail these to me?
Kwa hizi njia umeniambia mbeleni ,unadhani ni njia gani wanabiashara wengi hapa viwandani hutumia sana sana?

Gendered Experience

Who has the final decision over what happens with spoiled and unsold food at your stall? Is it you or someone else?
Ni nani ndio mwenye uamuzi wa mwisho kuhusu kitakocho fanyiwa kwa mboga zimeharibika ama zile ambazo hazijauzwa?

- If someone else - would you deal with this spoiled/unsold food in a different way?
  Je,kama uamuzi huu ni wa mtu mwingine ,kivyako unaona ungeshughulikia kwa utafoauti upi mboga hizi zilizo haribika ama kutouzwa?.

Community Initiatives

Are you involved in any schemes to recycle spoiled or unsold food from your stall - i.e to turn these foods into other material such as fertilizer or other products?
Je unajihusisha na miradi yoyote, inayotumia chakula kilichoharibika ama kile ambacho hakikuuzwa katika duka lako kukitumia kutengeneza kitu kipya kwa mfano mbolea,makaa ama vitu vingine vya manufaa kwa jamii?

- If yes, can you tell me about these processes?

(Kama ndio,nielezee kwa upana kuhusu hii miradi?)

Social Capital

Do you feel like your relationships with others in the community affects how you deal with unsold food and spoiled food?
Je unadhani uhusiano wako na watu wengine katika jamii unaadhiri jinsi unavyo shughulikia mboga amabazo hujauza kwa duka lako mwisho wa siku ama zilizo haribika?

- Could you explain a bit of why it does or does not?

Je unaweza elezea kwa undani mbona uhusiano huo unaadhiri ama hauadhiri?

Do you feel like you have strong relationships in the local area with your customers and fellow traders?
Je unahisi kwamba ukona uhusiano mzuri katika eneo lako na wateja wako na wanabiasha wenzako?

- Does this have any effect on how you deal with your spoiled or unsold food?
  Je uhusiano huu unaadhiri jinsi unavyo shughulikia mboga zilizoharibika ama zile hukuuzwa?
- If yes, could you give an example please.

(Kama jibu ni ndio ,waweza kunipa mfano tafadhali?)

Do you and your customers or other traders ever complete reciprocal acts for each other in dealing with food waste or unsold food?
Je kuna wakati wowote ambapo wewe,wateja wako ama wanabiashara wenzako huwa mnasaidiana kushughulikia mboga ambazo ni sawa na hazijauzwa hiyo siku ama zilizoharibika bila kutarajia faida yoyote kibinafsi?

- Prompt - i.e one takes food to the dump, maybe one trader gives their leftover food to another trader to give to their family?

Mfano mtu mmoja anaeza peleka mboga zilizoharibika kwa pipa la takataka,ama kupea mwenzako alishe familia yake, ama kuongezea mteja akinunua badala ya kuwacha ziharibike.

We spoke earlier about common practices that you and other traders do with spoiled or unsold food? Are there other norms or values which you have with other traders and even local customers in dealing with spoiled or unsold food?
Kwa yale yote tumezungumzia mpaka sasa ,jee kuna njia zingine zozote zile zinazochukuliwa kuwa sawa ambazo wewe, wateja wako ama wauzaji wengine hutumia kushughulikia mboga hizi ambazo huwa hazijauzwa mwisho wa siku ama zile ambazo huwa zimeharibika?

Final Questions

On a scale of 1 to 10, how important would you say spoiled or unsold food management practices are in your day-to-day?
Kwa kipimo cha 1 hadi 10, unaweza kusema ni umuhimu upi wa kushughulikia mboga zilizoharibika au kutouzwa katika maisha yako ya kila siku?
(1 ikiwa chini zaidi na 10 ikiwa juu zaidi)

Unaweza elezea kwa upana kwa nini umechagua jibu ?
Are there any suggestions which you have that could help you in dealing with spoiled or unsold food?
Ukona kitu kingine chochote ama mawazo yoyote unaweza ongeze yenye yanaweza kusaidia kushughulikia swala hili tulililozungumzia?

Facilitator Training Manual:

Background to the study:

This is a study being completed for two purposes. 1. It is a part of a wider research project seeking to increase food security of individuals in lower income urban areas in Nairobi, specifically Viwandani. 2. It is being conducted as part of completing an MSc in International Development at Utrecht University.

The objective of the study is to answer the research question - "*How do table top food vendors deal with unsold food and manage food loss and waste in Viwandani, Nairobi, and what are the drivers of this behavior?*"

Fruit and vegetable Waste is the main study sample of this investigation.

Study Objectives:

- Document current FL&W practices among table-top food vendors in Viwandani, Nairobi.
- Identify the drivers of why people deal with FL&W in specific ways in Viwandani?
- Identify who the key decision makers are, making the "final decision" on how to deal with food waste in the urban area.
- Investigate how various capitals within the livelihoods framework influence traders/vendors' attitudes and behaviors towards food waste management.
- Highlight the potential socio-economic and environmental benefits of investing in community-based approaches to food waste reduction and management.

Roles & Responsibilities of Facilitator:

Establishing rapport and trust: Build relationships with community members to gain their trust and cooperation. Create a safe and welcoming environment for open discussion.

Facilitating data collection: Conduct interviews, focus groups, and participant observations with sensitivity and respect for cultural norms. Encourage participation from diverse community members, including marginalized voices.

Active listening and probing: Listen attentively to participants' experiences, perspectives, and concerns. Ask open-ended questions and probe for deeper insights to uncover nuances in food waste behaviors.

Cultural sensitivity and humility: Respect cultural customs, traditions, and social hierarchies within the community. Approach the study with humility, recognizing that community members are experts in their own experiences.

Proper Handling of Data Collection Instruments: Making sure recording devices are switched on during interviews and successfully kept and given to Lead Researcher at the end of each day.

Research Methods:

The research methods to conduct this study are 20 to 25 in person interviews with tabletop food vendors or Mama Mbogas. Depending on the availability of the participants they will be selected from a mixture of genders.

These interviews are designed to be semi-structured and while there is a list of questions and structure laid out for the interviews - there is to be a level of flexibility involved that allows for a looser flow to the interviews.

The research is designed to be exploratory as this is an area that lots of information is not known about. So we want to encourage the participants to tell their stories. The interview guide is there to be exactly that, a guide and while it is good to keep a structure, as long as the key points are hit in terms of the questions, then the information of the participants is more important than all of the questions being answered.

Here is a link to a useful video on qualitative interviews to display some of the characteristics: (https://www.youtube.com/watch?v=cGQz8hZQ8fU)

Once 20 interviews are collected the overall amount of interviews will be reassessed and evaluated so as to find out whether further interviews are required.

Key Terms:

- FL&W - Food Loss & Waste

Instructions on Equipment:

You will be provided with audio recording equipment to record the interviews. A demonstration will be provided on how to use these devices. As a checklist or running order:

- Please make sure recorders are turned on by a sliding power bottom located on the bottom right side of the audio recorder.
- Check that the SD card is inserted into the memory card slot on the right hand side of the recording device.
- Before recording make sure that the audio level wheel of numbers at the top of the device is rotated fully anti-clockwise so that 10 is number indicated at the top.
- When you wish to record, select the red button in the middle of the device. Once the device is recording a red light will appear on the side of the button.
- Please face the device towards the person speaking and make sure nothing is covering or affecting the top metal microphone on the device.
- When finished recording press the red button in the middle of the device again until the red light switches off.

- The device will automatically move to the next recording and you can create a new file. If you need to check whether a new file is being created or not you can view the file name on the top right hand side of the screen located on the device.
- If batteries are running low, i.e if there is one bar of battery left on the device please tell the Lead Researcher (Euan) and he can supply with more batteries.
- At the end of the day please return the audio recorders to lead researcher (Euan).

Description of Questions:

The interview questions have been written to describe the four research objectives of this study.

These four key objectives are:

- Document current FL&W practices among table-top food vendors in Viwandani, Nairobi.
- Identify the drivers of why people deal with FL&W in specific ways in Viwandani?
- Identify who the key decision makers are, making the "final decision" on how to deal with food waste in the urban area.
- Investigate how various capitals within the livelihoods framework influence traders/vendors' attitudes and behaviors towards food waste management.

The questions themselves have been split up on the question sheet to attempt to cover these research objectives. It is important to keep in mind that these are exploratory, semi structured interviews. **They are not intended to act in the same way as a survey.**

These interviews are exploring a new topic and the desire is to understand the daily life and options of the individual interviewee. Food Waste Management in Informal Settlements is an under researched area and so while there is a structure for these interviews, understanding the daily livelihood and day-to-day story of the individual is the primary goal.

Ethical & Confidentiality Issues:

Please let participants know that their involvement in this study is completely voluntary and that they can choose to opt out at any point should they desire.

Participants are required to sign an informed consent form before the interview. This is for the protection of the participants themselves and for the wider study as a whole. Take time to make sure that they understand this document and that they have no further questions on anything regarding the study or the questions themselves.

Ethical and National Research Approval for this study has been obtained from Nacosti, the County Commissioners Office and the Kenya Ministry of Education.

For Facilitators it is important to:

Not disclose any opinions, claims, and other features that can be associated with individuals.

Use confidential information only for the purposes set out in the training, and not for any other purpose.

Not copy or retain any written information or record that could be associated with identifying features of individuals, or any other kind of identifying information.

Return all confidential information (including notes, memos, photographs) to the survey team at the conclusion of the surveys, or when demanded by the survey team.

Not disclose any confidential information to any employee, consultant or third party unless it has been approved by the survey team.

Participant Consent Form:

Investigation of Social Capital and Food Waste Management of Tabletop food vendors with vegetables

March/April 2024

Informed Consent Form for Semi Structured Interview participants

Investigator(s)	Celine Termote, PhD, PI – Senior Researcher - Alliance of Bioversity International and CIAT Dr. Irmgard Jordan Senior Researcher - The Alliance of Bioversity International and CIAT Euan Lindsay Researcher and Masters Student – affiliated with the Alliance Bioversity International and CIAT Mr. Nicanor Odongo Co-investigator/ PHD Research Fellow - The Alliance of Bioversity International and CIAT
Study Sponsor(s)	Alliance Bioversity International & CIAT
Collaborators	Utrecht University

This Informed Consent Form has two parts:
• Information Sheet (to share information about the study with you)
• Certificate of Consent (for signatures if you choose to participate)
You will be given a copy of the full Informed Consent Form

Part I: Information Sheet
Good morning/afternoon Mr/Mrs/Ms… My name is ….. and my colleague is ……..We are here on behalf of The Alliance of Bioversity International and International Centre for Tropical Agriculture (CIAT) to conduct a survey on *"into the practices of tabletop food vendors and how they deal with urban food waste reduction in the Viwandani, Nairobi*.

The study is being done in furtherance of a Masters Degree at the University of Utrecht in collaboration with the Alliance of Bioversity International. The Alliance is global research for development organization whose vision is to shape food systems and landscapes that sustain the planet, drive prosperity, and nourish people.

The project aims to better understand how tabletop retailers operating in Viwandani deal with their unsold food and food waste management. Together with a previous data set compiled by the Alliance this study aims to contribute to an overall study of "Piloting an organic food system in Kenya by connecting vulnerable consumers in Nairobi with small scale producers in Makueni county".

In this regard, and as part of the project, Alliance of Bioversity International and CIAT is conducting a food environment mapping in selected areas in one country Kenya: and within one locality Viwandani.

Who can participate?
You have been invited to participate in a semi structured interview as a you are a retail trader in the vegetable value chains. We aim to understand the patterns in the production and consumption of green vegetables, exploring the factors that facilitate or hinder their production and consumption.

Procedure of participation
As part of this study, you will be interviewed by a trained and hired Facilitator. This interview will ask questions of how you deal with spoiled and unsold vegetable waste.
Although most of our discussion will be on vegetables, we will also ask some questions to understand how you experience a sense of community with your customers and fellow traders in Viwandani. These questions will mainly discuss any shared norms or values you have with traders or fellow customers, whether you ever experience reciprocal acts being carried out by other traders or customers and whether you consider that you have continuous and meaningful relationships with fellow traders or customers in the Viwandani area.

The information provided will be treated with utmost strict confidentiality and analyzed in an anonymous way. Moreover, there are no right or wrong answers! This interview will be audio-recorded. However, your responses will remain confidential, and no names will be included in the final report. You can choose whether to participate in the interview, and you may stop at any time during the course of the study. Please note that there are no right or wrong answers to interview questions. We are interested in hearing the many varying viewpoints you may have and would like to thank you hugely for the contribution of your thoughts. Feel free to be honest and open with us at all times.
The Interview itself will take about 30 minutes.

Voluntary participation
Your participation in this semi structured interview is completely voluntary, and refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled, and you may discontinue participation at any time without penalty or loss of benefits, to which you are otherwise entitled.

What is involved in this project?
This study involves understanding the practices retail traders take with their food waste in the target areas. We are also interested in understanding food environments, determinants. We are, therefore, seeking your consent to participate in the study where you will be interviewed, and the information mentioned above collected.

What are the risks?
The risk associated with participating in this study is not expected to be greater than what you would encounter on a day-to-day basis.

What are the benefits?
Your participation is likely to help us find out more about how to improve the problems associated with food loss and waste in this community. In addition, this information will be used to identify potential nutrition interventions and policies for improving diets. This will also lead to improved livelihoods of the community.
How will we protect your information and maintain confidentiality?
Your answers will be COMPLETELY CONFIDENTIAL and will only be used for research purpose by the Alliance and its partners in this study. The researchers will make every effort to protect your confidentiality. All the information and data collected from this study including personal contact information will be

confidential and will only be used by the project team for potential follow up questions and research purposes (including publication) and to prepare reports. Further, all data and any personal information given will be handled securely and ethically in accordance with the national law and General Data Protection and Regulation of the African and European Union. We will only gather non-sensitive data, that is, we shall seek your permission before gathering any data that enables one to identify you, such as your name and telephone number during semi structured interviews. The discussions will be audio-recorded and will be analyzed anonymously. The semi structured interviews will be set up with the utmost privacy possible.

What will happen with the results?
The research is and will be carried out in a fully participatory and consultative way involving all beneficiaries and stakeholders at all times and from the outset. Communication of research results and dissemination will be done through policy papers, policy briefs and press releases, live blogs, social media, and workshops, whereby policy-makers and other civil society actors will be invited to reflect and discuss the project's result and implications for their work and some information will be used for fulfillment of an MSc in international Development at the University of Utrecht. Scientific publication in international peer-reviewed journals and conference presentations will be considered to disseminate results in the wider scientific community. Personal identifier like phone numbers of names will not be shared with anyone.

Compensation
Please note that there is a token of appreciation for participating in the study.

Who can I contact?
If you have any questions, you can ask anyone from our team now or later. If you have questions later in regard to the study, you may contact, Euan Lindsay, E.B.Lindsay@students.uu.nl
If you have questions about your rights as a study subject, you may contact: N.Odongo@cgiar.com

Final invitation
Please, note Mr/Ms/Mrs _____ we herewith invite you to participate in this study. Before you decide it is important that you understand the background of the study, its purpose, procedures involved, potential risks and benefits and your rights as participant. Please note that your participation in this study is voluntary. You will not be penalized in any way if you refuse to participate in this study. You are also free to withdraw from this study at any time and your withdrawal will not result in any punishment or loss of personal privileges and should neither result in denial of any services. If you choose to participate, please note that during this study, we shall:

- Ask you questions about your food wastage, or food storage or community behavioral patterns
- You will be invited to a Semi Structured Interview

Do you have any questions at this time?

Part II: Certificate of Consent

I have read the above information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction.
I consent voluntarily to participate in this study.

Print name of Subject	[at least forename and surname]
Signature of Subject	
Or Thumb/Footprint of if *visually impaired, physically impaired, mentally impaired or illiterate*	
DD/MM/YYYY	

☐ Recording and photos: Photos and voice recording are a part of the project, however not mandatory if they make you feel uncomfortable. If you are comfortable being photographed and voice recorded then please tick the following boxes – remember any mark in the boxes mark your consent:

I give my consent to being photographed for this project:

☐

I give my consent to having my voice recorded for this project:

A copy of the consent form has been handed over to the participant.

Documentation of consent:
Printed name of person obtaining consent (RA): …….

Signature of person obtaining consent (RA): ……Date: …….