

**INFLUENCE OF REGULATIONS, INFRASTRUCTURE AND GENDER
INTERACTIONS ALONG FOOD CORRIDORS ON FOOD ACCESS IN
KISUMU CITY, KENYA**

BY

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DECLARATION

DECLARATION BY THE CANDIDATE

This Thesis is my original work and has not been presented for a degree in any other university.

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Lastly, I want to express my deepest gratitude to my siblings; Atieno, Grace, Elijah, Elisha and Kema for their belief in my abilities and for their support. Your encouragement played an integral role in my accomplishments.

DEDICATION

I dedicate this PhD thesis to

Dad (Peter Loo), Mom (Leah Onyango) and Daughter (Rebekah Loch)

You are

My rock! My peace! My Light!

ABSTRACT

Inefficiencies linked to regulations, infrastructure and gender interactions within food corridors serving urban areas have compromised urban food access; a key component of urban food security. Conversely, studies in African Agricultural Growth Corridors and Kenya link limited food access to volatile and fluctuating food prices. These and other studies have thus yielded conflicting results on the factors that influence food access, indicating the need for more studies especially in urban areas which can only produce 30% of their consumption, and where 68% of the world's population will reside in 2050. The main objective of the study was therefore to determine the influence of regulations, infrastructure and gender on food access within the food corridors of Kisumu city. Specific objectives are: to establish how time taken to meet regulations within the food corridors affect food price in Kisumu city; to examine the influence of infrastructural costs within food corridors on Kisumu city's food prices; to establish the significance of gender price gap for men and women operating within the food corridors of Kisumu city on food access. Access theory was employed to investigate the variables highlighted herein and which the theory refers to as mechanisms of access. The mechanisms of access as unbundled by the theory aided in framing the relationships that were investigated in the study. Cross-sectional research design was employed targeting a population of 7480 business persons from which a sample of 366 was drawn. This was proportionately distributed amongst business persons trading in food from Kisumu – Kitale, Kisumu – Meteitei and Kisumu – Kebenet food corridors. Categorical, nominal and quantitative data were collected through Semi-structured interviews, Focus Group Discussions and surveys. The study found a positive relationship between time taken to meet regulation and food price expressed by the equation $y = 1641.9x + 12011$. Additionally, costs of infrastructure due to; private storage and collection points as well as poor transition from major roads to minor roads in markets also led to added costs via head loading and carts. As such, the study finds that food prices increase in time with transportation costs as evidenced in regression analysis with a positive coefficient expressed by the equation $y = 2.512194x + 18275.85$. However, gender price gap is characterized by low food prices in female traders who dominate food trade thereby highlighting an opportunity for increasing food access. Significance of price differences between male and female traders was established through a chi square analysis at a P-value of = .0004. The study concludes that food security initiatives should be geared towards increasing efficiency in the flow of food from hinterland to urban areas through reduced travel time. To this effect, the study recommends standardization of regulations governing food flows to save on time lost and to reduce double payments as a way of mainstreaming efficiency. In addition, guidelines for development of infrastructure critical to the operations of food corridors should be drafted to standardize their provision for reduced costs of transactions. Finally, the study recommends, increment of asset control by female traders to stabilize their performance and presence in food markets for continued provision of lower food prices which is critical to food access. This is in tune with the Kenyan government policy objective to increase the quantity and quality of food available and accessible in order to ensure an adequate, diverse and healthy diet.

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ACRONYMS

EPZ	Export Processing Zones
FAO	Food and Agriculture Organization
FEWS NET	Famine Early Warning Systems Network
GHI	Global Hunger Index
GIS	Geographic Information System
IFAD	International Fund for Agricultural Development
KALRO	Kenya Agricultural and Livestock Research Organization
LED	Light-emitting Diode:
NCPB	National Cereals and Produce Board
NEPAD	New Partnership for Africa's Development
NTB	Non-Tariff Barrier
NTSA	National Transport and Safety Authority
OECD	Organization for Economic Cooperation and Development
SACCO	Savings and Credit Cooperative Organization
SEZ	Special Economic Zone
UNDP	United Nations Development Programme
UN-HABITAT	United Nations Agency for Human Settlements
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
WRSC	Warehouse Receipt System Council
WTO	World Trade Organization

OPERATIONAL DEFINITION OF TERMS

Access to food / food access:	Food access in the study implies affordability which has been investigated by investigating food prices and the factors that contribute to its volatility and hikes. Factors like regulation, infrastructure and gender. The approach departs from the conventional measure of food access using income of consumers.
Agri-hub:	Networks specialized in handling of agricultural produce e.g., cleaning and grading produce, marketing of produce, transport to markets, sale of agricultural inputs and packaging materials, and provision of technical support.
Availability of food:	Actual or potential physical presence of food, including aspects of production, food reserves, markets and transportation
Business person:	A person (man or woman) involved in the business sector – in particular someone undertaking activities (commercial or industrial) for the purpose of generating cash flow, sales, and revenue within the food corridors: farmers, wholesalers, middlemen, retailers and transporters.
Flow of food:	Movement of food from production to consumption point.
Food security:	A situation that exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Food security has four dimensions identified as food availability, economic and physical access to food, food utilization and stability over time.
Food corridor:	Food distribution systems comprising; natural markets, trade routes, actors and processes involved in the movement of food from the production to the consumption area.
Food corridor interactions:	Refers to the interactions between actors within food corridors e.g. business persons and authorities

Infrastructure:	The basic physical system supporting the flow of food from production to consumption. Specifically, the study implies roads and their conditions, means of transportation, condition of display areas and food storage facilities.
Infrastructure cost:	Cost herein refers to; rents paid for storage space and other accompanying costs like security cost, cost of food transportation via different means of transport as well as cost of renting display areas.
Local food systems:	All elements and activities in Low - and Middle-Income Countries that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including socio- economic outcomes.
Regulations:	Official guidelines, procedures and rules that govern the participation of business persons in the food corridors.
Sukuma wiki:	This has been used in reference to collard greens commonly known as “Sukuma wiki” in Kenya. As such, the term collard greens would not be recognized by people in the study area. The study uses “Sukuma wiki” in the place of collard greens in order to resonate with the common understating of the vegetable in the study area.
Transporter	A person or company responsible for the transportation of food products from one location to another. This could include a driver or not for purpose of the study. However, the transporter as a company owner needs not to be a driver. Though he can have drivers in his/her employ.
Urban food supply:	A stream of food flowing onto the tables of consumers in urban areas.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

According to Kuhlmann *et al.* (2015), Turner (2012) and Chetty (2009) regulations, infrastructure and gender interactions within food corridors can result in inefficiencies thereby limiting food access in urban areas where 68% of the world's population is set to reside by 2050 (UN-Habitat, 2021). Escalating food prices against a backdrop of reducing incomes more so in developing countries where 71% of anticipated urbanization is set to happen exacerbate the situation (UN-Habitat, 2022). CSIS (2020) reiterates that urban households dedicate up to 75% of their income for food purchase thereby making food price an important determinant of food access. A factor which is reinforced by the low food production capacity of urban areas at 30% (FAO, 2012). Efficiency of the food corridors serving urban areas thus plays a critical role to urban food access in leu of its ability to regulate food prices against a back drop of increasing population that is financially constrained. Food access is one of the pillars that is critical to food security.

FAO, IFAD, UNICEF (2018) & FEWS NET (2013) define food security as ability of all people, at all times, to have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Actualization of food security is however dependent on its “four pillars” i.e. availability, access, utilization, and stability (FEWS NET, 2013). FOOD AND AGRICULTURE ORGANIZATION (2012) intimates that food insecurity and crises are linked more strongly to the accessibility rather than the availability of food hence the study's focus on food access. According to FAO *et al.* (2021), food access as adopted by the study refers to the ability of individuals to obtain food through markets

or other sources by purchase. The definitions of food access and food security as herein outlined however remain unmet to date (FAO *et al.*, 2021).

The regions with the highest Global Hunger Index (GHI) scores are South Asia and Sub-Saharan Africa, with GHI scores of 27.4 and 27.0, respectively which are considered serious. Similar to other regions, and the world as a whole, progress in reducing hunger has stagnated since 2014 (the most recent reference year), when South Asia's and Africa's scores were 28.0 and 28.1, respectively.

Sub-Saharan Africa has had the highest rates of undernourishment and child mortality, and South Asia has experienced the highest child stunting and child wasting rates. In both regions, conflict has been a major factor driving rising hunger levels in many countries, as have rising food and fuel prices during the COVID-19 pandemic, the war in Ukraine and extreme weather events such as ongoing severe drought in East Africa (Gustafson, 2022).

In the Horn of Africa, an unprecedented sixth consecutive season of drought was forecasted, and hunger surges expected on top of the already dire and deteriorating food security crisis in the eastern Horn of Africa. Another poor rainy season was experienced in November and December 2022, and forecasts indicated a significant likelihood that the March-to-May 2023 rainy season would also be below average, which in turn would affect planting and therefore harvests, adding to the effects of previous years' droughts. Consequently, record-breaking levels of acute food insecurity have been recorded across the region, increasing suffering and reducing coping mechanisms for communities in the eastern Horn (Gustafson, 2022). Efforts are thus being pumped into agriculturally viable areas to increase food availability through increased production (CSIS, 2020).

According to studies by CSIS (2020) food availability in urban areas refers to quantities delivered therein which is often in abundance yet abundance of food does not equate access to nutritious, safe, diverse, healthy, and affordable diets UN-Habitat (2021). As such, CSIS (2020) & UN-Habitat (2021) posit that emphasis on food access enables examination of ability to purchase food and is thus critical to food security in the urban areas of Africa where low incomes are predominant.

Kuhlmann et al. (2015) further observes that the ability to purchase food is influenced by interactions within food corridors which the study defines as food distribution systems comprising; natural markets, trade routes, actors and processes involved in the movement of food from the production to the consumption area. Kuhlmann et al. (2015), Turner (2012) and Chetty (2009) have highlighted regulation, infrastructure and gender as key interactions influencing efficiency within the food corridors of Africa and can result in inefficiencies thereby limiting urban food access.

FAO (2012); Badami & Ramankutty (2015); Ruel & Garrett (2004) reiterate that, efficiency within food corridors is critical to urban food access as urban areas outsource 70% of their consumption. However, while Kuhlmann et al. (2015), Turner (2012) and Chetty (2009) attribute limited urban food access to regulations, infrastructure and gender; Kenya, Ouko (2011) & Gillson & Fouad (2015) attribute it to volatile and fluctuating food prices. Nevertheless, an explicit link between the food corridor interactions and food price is missing in their research; yet, it seems that the two are key determinants of urban food access necessitating this study. This will be instrumental in responding to recommendations by USAID (2013), Nogales (2014), Ribot & Peluso (2009) and Kenya Government of. (2017b) on the need for evaluation of urban food access.

According to Kuhlmann et al. (2015), Turner (2012) Chetty (2009) and Ribot & Peluso (2009), interactions that occur within the food corridors are influenced by factors like regulations, infrastructure and gender of business persons. In the access theory by Ribot & Peluso (2009), a clear link between these variables and access is drawn. As guided by Ribot & Peluso (2009); Watts (1983); Weber (1978); Barham, Bunker, & O’Hearn (1994); (Peluso, 1992); Ribot (2000) and Peluso & Vandergeest (2001), the study has adopted the above variables and has sought to establish how their interactions in the food corridor affect food accessibility in Kisumu City. Tenets of the theory have been used to investigate access in property rights and charcoal value chain but not food as has been done in the study. In line with this, Battersby & Watson (2018), Gillson & Fouad (2015) and Africa Union (2005) show that numerous policies and regulations have been put in place globally to foster flows within the food corridor.

However, Nogales (2014) and Gillson & Fouad (2015) argue that in the case of Africa, policy instruments like export taxes and border measures hamper flows within the food corridors. The literature reviewed thus gives conflicting views so much so that it is not clear to the study whether regulations foster or hamper flows within food corridors. Furthermore, as outlined in the Kisumu County Integrated Development Plan of 2013 (Kenya Republic of 2017a), there are numerous regulations a business person must comply with; creating the need for an analysis on how regulations affect food flows.

The study thus sought to establish how regulations governing the movement of food within food corridors affect the flow of food to cities. More so, how regulations can impact on food flows by influencing travel time and consequent food prices thereby influencing food access.

In addition, studies by UNDP (1996), Reddy (2014) and Fan (2008) largely link availability of infrastructure like roads, space and equipment for processing, good storage and preserving facilities to increased food production. An allegation justified by infrastructural upgrade in Guinea where, graveling of an earth road led to doubling and tripling of yields per hectare (Africa Union, 2005). This notwithstanding, FAO (2012) and Reddy (2014), posit that increased food production does not equate access to food. However, the studies reviewed focus on linking infrastructure to food production as a key remedy to food insecurity necessitating this study.

UN Women (2018) and Depenbusch (2017) further intimate that there is a difference in the price that women receive compared to men when selling the exact same product. This is referred to as the gender price gap and it implies that the gender of business persons can actually determine how affordable or not food prices are. According to studies by UN Women (2018) the gender gap in Africa ranges from 8% to 30% with women often setting lower prices than men. The phenomenon could be very instrumental in food trade because it implies that dominance of women will result in lower food prices hence increased accessibility to food. Further, UN Women (2018) and Mehra and Rojas (2008) intimate that women dominate in food production and marketing the world over. This supposition coupled with allegations that women sell food at lower prices than men should therefore result in increased access to food.

However, Badami & Ramankutty (2015) holds that access to food in urban areas continues to be limited despite the ever-burgeoning urban population due to high and volatile food prices. Mehra and Rojas (2008) attribute this to challenges that bar women in food trade from optimal performance like ill placed development initiatives and gender roles robbing women of time and capital. This explains away the significance of gender price gap to increased food access. The

study saw the need to establish the significance more so because lack of sufficient data to inform gender-based initiatives has been sighted as an issue by authors like (Deppenbusch, 2017).

The claim can be evidenced by food security studies in Kisumu that have stopped at identifying gender of food traders and their distribution in the bid to understand the role of gender and food in food security (Hayombe and Omondi, 2019). The study sought to establish the nature and significance of gender price gap within the food corridors of Kisumu city to food access.

According to Modola (2012), focus on urban food access is very important because 13% of the high-density urban households in Kenya have unacceptably low levels of food consumption. Despite the fact that they spend 60% to 65% of their income on food, many of the urban poor still resort to coping strategies such as restricting consumption, eating fewer or smaller meals and eating cheaper product (USAID, 2013). More so for Kisumu City which has the highest food prices of the three major cities in Kenya (Kenya Government of, 2017b). The price of one 90kg large box of tomatoes for Mombasa, Nairobi and Kisumu is 5000, 4000 and 5500 respectively Hardman et al. (2018). The purpose of the study is thus to examine urban food access by analysing how the interactions that occur within the food corridors of Kisumu city affect food prices.

1.2 Problem statement

Inefficiencies linked to regulations, infrastructure and gender interactions within food corridors serving urban areas have compromised urban food access; a key component of urban food security. These are in form of nonphysical barriers like border delays that increase journey time and operational costs; poor road networks that increase operation cost and gender roles that hinder participation of women in massive food trade. Conversely, studies in African Agricultural Growth Corridors and Kenya link limited food access to volatile and fluctuating food prices Ouko (2011)

& Gillson & Fouad (2015). As such, the study felt that an explicit link between the two causes of food access was missing in the reviewed research necessitating this study.

In addition, numerous studies highlighted the need for evaluation of food access as it is key to urban food security. The study sees the need to investigate the relationship between food corridor interactions like regulation, infrastructure and gender within the food corridors on food prices to establish urban food accessibility in Kisumu City.

Globally, regulations exist to govern operations within food corridors which are critical to urban food access due to the limited potential of sustenance through urban agriculture.

However, based on the studies reviewed along the African food corridors, the study felt that policies though positive, can be translated into regulations that contravene their purpose. Incidentally, Kisumu City which is the study area has numerous regulations that a business person must comply with; creating the need for an analysis on how regulations affect food flows as they could hamper or foster flows within food corridors. More so because debates remain silent on the implications of regulations on travel time and food prices necessitating this research.

Further, Von Thunen and other authors posit that infrastructural implications like efficiency in transport directly affect food access. Yet as evidenced in Africa, numerous infrastructural projects and studies geared towards improving food security have not curtailed the volatile and high food prices that are critical to food access in food deficit areas like cities. Worse still, the study feels that research linking infrastructure to food access e.g., the Kenyan retail markets appear to be descriptive in nature. The study thus sees the need to draw an explicit relationship between specific forms of infrastructure and food prices.

In addition, prices by women are said to be lower than those of their male counterparts even when they are selling the exact same good resulting in a gender price gap. The study feels that having been sighted as the majority in food trade, the dominance of women selling food at lower prices than men ought to result in increased urban food access. Yet access to food in urban areas continues to be limited despite the ever-burgeoning urban population due to high and volatile food prices. The study thus seeks to establish whether the gender price gap exists in the food corridors serving Kisumu city and if so, why volatile food prices still persist thereby hampering food access. This will go a long way in informing development initiatives targeting women in food production as they have since mentioned lack of sufficient information to guide such initiatives for women who dominate food trade.

Kisumu City where the study has focused has the highest food prices of the three major cities in Kenya (Kenya Government of, 2017b). The price of one 90kg large box of tomatoes for Mombasa, Nairobi and Kisumu is 5000, 4000 and 5500 respectively (Hardman et al., 2018).

The high price could be attributed to inefficiencies in infrastructure showcasing that only 30% of roads in the region are regularly maintained and approximately 75% of traders in the city lack refrigeration thus hampering effective distribution of food. Such challenges are sure to influence food prices which is critical to access more so for urban areas. These are the relationships the study seeks to establish by investigating the influence of regulations, infrastructure and gender within food corridors on Kisumu city's food access.

1.3 Objectives of the study

The main objective of the study is to determine the influence of regulations, infrastructure and gender interactions within food corridors on Kisumu city's food access.

Specific objectives

1. To establish how time taken to meet regulations within the food corridors affects food price in Kisumu city.
2. To examine the influence of infrastructural costs within food corridors on Kisumu city's food prices.
3. To establish the significance of gender price gap for men and women operating within the food corridors of Kisumu city on food access.

1.4 Research questions

The study seeks to answer the following questions;

- 1 How does the time taken to meet regulations within the food corridors affect food price in Kisumu city?
- 2 What is the influence of infrastructure cost within food corridors on Kisumu city's food prices?
- 3 In what way does the gender of business persons affect profit margins for the men and women operating within the food corridors of Kisumu city?

1.5 Scope and limitations of the study

The study was conducted in Western Kenya spanning three major food corridors serving Kisumu City i.e. Kisumu – Kitale, Kisumu – Meteitei and Kisumu – Kebenet routes. The Food corridors are Trans-boundary in nature i.e., they traverse more than one county but are limited to Western Kenya for this study.

For each food corridor, respondents consisted of the business persons involved in the flows of food from the farm to the consumer. They were sought from Kibuye and Jubilee markets which are the main entry points for food into the city.

The study was limited to two staple foods of Kisumu city i.e., vegetable and maize. The study focused on; identifying regulations along the food corridors, the time taken to meet stipulated regulations, the cost of meeting those regulations as well as their consequent influence on food prices. It is important to note that food price was in reference to retail price at the market and not farm gate price. In terms of infrastructure, information regarding road condition, transportation means, duration and cost of transportation was collected. The study further took note of other forms of infrastructure critical to food access e.g., display areas and storage. In order to establish how gender of business persons within the food corridors affects food access; assets controlled by business persons, the value of those assets and profit margins between male and female business persons were sought.

One of the limitations to the study was accessing a documented list of business persons operating within the food corridors serving Kisumu City. The study therefore relied upon previous studies that have approximated the number of the said business persons thereby acquiring a target population from which a sample was drawn. Another key challenge faced by the study was the temporary nature of Market premises like Kibuye market. Due to renovations at the time of the study, traders were moving back and forth between Kibuye Market and the Moi Stadium area (Corona market) of Kisumu city. This made it challenging to locate contact persons like market superintendents. As such, the study was keen to keep detailed contacts of key informants like the market superintendents.

1.6 Justification of the study

According to Battersby & Watson (2018), Kisumu City as a net importer of food relies on external sources of food for approximately 75% of its consumption. In addition, the population of the city is increasing at an unprecedented rate despite the limited potential of urban agriculture in

contributing to its food and nutrition security. It is therefore critical that there be efficiency in the Food Corridors that serve the city. More so since Kisumu city is plagued by higher food prices and food price fluctuations than the other two cities in Kenya i.e., Nairobi and Mombasa.

Further, studies fail to explicitly link key aspects of food corridor interactions that could affect food access. This provided the basis for analyzing interactions in the food corridors of Kisumu city to better understand the nature of the inefficiencies experienced. Once the inefficiencies have been understood, solutions grounded on evidence can be generated and used to design intervention to mitigate the effects of inefficiencies. Information generated could thus provide a basis upon which local authorities can prioritize initiatives aimed at urban food security. Focus was placed on maize and “Sukuma wiki” because they have been identified as key staples in Kenya. More so, studies by Gilbert (2008) and Opiyo & Ogindo (2019) highlight them to be the most popular food items in Kisumu city.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

According to Kuhlmann et al. (2015) and Turner (2012) regulations, infrastructure and gender of actors within the food corridors can influence the efficiency with which food is accessed. FAO (2012) thus observes that food corridors are critical to urban food access as 70% of urban areas in the global south outsource food from hinterlands. Nevertheless, studies reviewed show that food security research continues to focus on food production as opposed to food access necessitating this study. As posited by Kuhlmann et al. (2015); Ribot & Peluso (2009) , the prerequisite for urban food access is efficiency in the flow of food from the hinterland which results in stable and affordable food prices in the urban areas. Food corridors which form the conduit through which the food flows from the hinterland to urban areas thus stand to increase access to food if well developed (Gilmore, 2015). Of importance to the study is how regulations, infrastructure and gender interactions within the food corridors influence urban food access.

FAO (2012) buttresses that focus on where food comes from is an important element of ensuring food access. Specifically, the author makes mention of the need for adequacy in food distribution networks that deliver farm products to retail markets. Of importance to the study is the direct link that the author tries to draw between food access and food distribution systems. More so because the supposition that equitable food access depends on food systems contradicts the school of thought that food access measures should assess the individuals' ability to obtain food. This perspective shifts the measure of food from the supply side (FAO, 2012) to the demand side (World Bank, 2022).

Africa Union (2005) further broadens the scope of measuring food access by positing that both high food prices and insufficient income can influence food access. Studies by Watson (2017) proceed to investigate the influence of food price variations on food access for low-income groups. The significance of food pricing to food access is reiterated by The World Bank studies which estimate that increases in food prices e.g., from June 2010 to January 2011 put 44 million people into food poverty (Korinek, 2005).

Broadening the measure of food access as postulated by Africa Union (2005) resonates with Beghin (2008) who puts forth that access dimension of food security can be measured at several other levels, including at the community, national, regional, and global levels.

Watson (2017) reiterates the need to focus on food price a key determinant of food access. What the study finds lacking in the literature reviewed (Watson, 2017) : (Africa Union, 2005) : (Beghin, 2008) : (Korinek, 2005) : (World Bank, 2022) is focus on the causes of volatile and high food prices which hamper food access as postulated herein. Focusing on the demand side alone gives insight into which prices are affordable and which ones are not. Yet, the causes of the fluctuations often embedded in the food distribution networks are seldom analyzed with regard to food access. The study refers to the food distribution systems as food corridors and focuses on linking the interactions therein to food access in line with propositions by FAO (2012). Food access in the study therefore implies, affordability which has been investigated by investigating food prices and the factors that contribute to its volatility and hikes.

2.2 Significance of food corridor regulations to urban food access

Reports by the World Bank (2022) note that as of November 24th 2022, “58 out of the 78 regulations put in place since the start of the 2022 Russian-Ukrainian war to curb price hikes e.g. export-restrictive measures on food, feed and fertilizers were still in place. Lifting those

restrictions is “fundamental to reducing price spikes and volatility (World Bank, 2022) more so because regulations govern all forms of trade including food trade both globally and locally (United Nations, 2012). For instance, the import, export and transit of goods and the means of transporting them are subject to national and international regulations. Due to the vast nature of regulations linked to food security, Nogales (2014) highlights the need for studies on how policies are manifested into regulations as well as their impact on the flow of food.

Reports by the International Trade Administration (2022) reiterate the significance of focusing on regulations governing food access as they can hamper food flows thus reducing urban food access. Globally, examples of trade-related regulations influencing food flows as outlined by the author are; subsidies, standardization, tariffs, quotas, licenses, permits export taxes. These are the main trade barriers used by countries seeking a protectionist policy.

Gillson & Fouad (2015) disfavor these popular choices of quantitative restrictions and border measures as policy instruments in food-insecure regions positing that they result in high costs of trade which hamper the benefits of free trade. Nogales (2014) reiterates that these have served as a hindrance to the participation of emerging economies in the global food trade due to strict licensing and standardization measures that are hard to achieve.

Additionally, Karanja (2022) echoes that, local level regulations affecting food trade in emerging economies like Kenya include, cess, weights and measures, taxation and anti-counterfeit inspection. The licenses to be acquired by a food trader are further broken down to include motor vehicle branding licenses and distribution licenses in emerging economies like Kenya where food access is a challenge. However, Karanja (2022) observes that the regulations are all administered differently across the counties in Kenya. The author points out that in Kenya, regulation of

domestic trade has been devolved to counties yet there is no legislation enacted to guide the regulation of the different sectors across all counties. County governments are thus expected to develop trade licensing acts to guide business regulation yet not all counties have done so. Those that have, have done so in isolation from the other counties despite intercounty dependency in trade like food trade. This leaves room for the study to examine the effect of the regulations on food trade thus creating a basis for harmonization of regulations across counties.

Watson (2017) highlights the significance of regulations governing food trade to food access by positing that interventions like reduction or elimination of import tariffs and quotas; increases in export taxes; imposition of export quotas or other controls have only served to hamper efficiency in the flows of food rather than reduce the food prices. The Millennium Development Goals which ended in 2015 rather aimed to ensure that all non-physical transport barriers that increase journey time, customs clearance, border delay and impede the flow of goods and services be dismantled by 2015 (Africa Union, 2005) (Beghin, 2008), (Korinek, 2005). This notwithstanding, regulations have continued to increase in number without clear structures of implementation both horizontally and vertically such that traders, their representatives and drivers therefore have had to undertake multiple formalities at border crossings to release and clear the goods Watson (2017).

Liu and Yue (2013) suppositions that the multiple formalities alluded to by Watson (2017) could increase waiting time for traders and create direct costs for leasing means of transport. The fluctuations in time are subject to the organization of border crossings, the procedures in place, and the management of the formalities. Delays are common and pictures of long lines of waiting trucks have become symbols of trade barriers particularly in the developing countries of Africa. Consequently, waiting time at border stations is used as a common indicator for trade facilitation

performance. The waiting time significantly harms transit traffic and cross-border trade. It causes unpredictable delivery time for traders and makes it difficult to participate in a time-sensitive logistics chain for the producer and cargo owners. Ultimately, the faster and more predictable the release process, the better the trader can plan, manage and optimize supply chains.

Ironically, Liu and Yue (2013); (Beghin, 2008); (Korinek, 2005) observe that the regulations which include customs and administrative procedures are meant to smooth trade across country borders. The procedures cover customs valuation, customs classification procedures, and customs clearance procedures such as inspections and documentation. However, inefficient customs and administrative procedures have become a leading Non-Tariff Barrier (NTB) that restricts trade. In Kenya, the Kenya Revenue Authority has put measures in place to curb similar challenges by automating systems at the country's borders. The reforms that have been adopted to support domestic trade include the adoption of I-Tax, an online platform for filing and paying taxes, and the simplification of the tax schedule to reduce the time spent submitting taxes (Karanja, 2022). Nevertheless, food prices remain high and are ever-increasing in the country.

World Bank (2022) reiterates that Domestic food price inflation continues to remain high in almost all low, middle, and high-income countries. As such maize and wheat prices are 28 percent and 18 percent higher, respectively, than in January 2021. Price volatility caused by speculation can increase food security risks, especially for low-income countries.

The 2022 Global Hunger Index (GHI) indicates that overlapping crises have exposed the weakness of food systems and that global progress against hunger has largely stagnated in recent years. Yet, according to a World Trade Organization (WTO) report, WTO member states are introducing trade restrictions at an increasing pace (World Bank, 2022) despite their potential to hamper food flows.

Member states have thus been called upon to refrain from adopting new export-restrictive measures, particularly those on food, feed, and fertilizers (World Bank, 2022).

Nonetheless, the case for Africa as pointed out by Nogales (2014) and Gillson & Fouad (2015), has been the same as the global one. Developing countries like Kenya continue to display heavily regulated and rigid economies that are synonymous with increased journey time. Such Countries reduce food trade openness as a response to increased hunger, suggesting protectionist policies. According to Mary (2019) this clashes with the World Trade Organization's regulations and current agenda as highlighted by World Bank (2022). A key regulation that has been highlighted as critical to the efficient flow of resources is business regulation, especially on farm entry (Freund & Bolaky, 2008).

Gilmore (2015) reiterates the significance of refraining from export-restrictive measures, particularly those on food; bearing in mind that urban areas are dependent on hinterlands and importation for food security. On the flip side Gilmore and Chasomeris (2015) observe that numerous countries have adopted measures to stimulate production as a response to urban food access by providing greater access to credit or inputs or both. However, the two approaches need to complement each other for food to be accessible more so in urban areas. Increasing production while restricting the movement of food could be counterproductive.

The Draft National Food and Nutrition Security Policy, Kenya Government of (2011) outlines initiatives in response to the challenges highlighted above. Policies have thus been put in place to; support investment in infrastructure to enable food to move quickly and at reasonable costs within local areas and from food surplus to deficit areas; Enhance farmer access to timely market information services; Support the establishment and strengthening of warehouse receipt systems

and agricultural commodity exchange; Ensure that the urban development plans provide for additional and better functioning wholesale and retail markets; and Ensure that counties invest an appropriate proportion of the revenue collections on market infrastructure development.

The policy provisions outlined cater to critical components of the food corridor i.e., infrastructure and trade. This is therefore an indication that Kenya as a country has noted the significance of intervening across actors within the food corridors. This approach is in tune with policies of developed nations like the Netherlands from which sophisticated innovations like the Agri-hub can be acquired. This is because, the Agri hub highlights the importance of a well-functioning multi-stakeholder distribution ecosystem and strengthening required policies and pathways to bring together governments, private organizations and development partners in food trade (Gilmore, 2015).

However, as depicted by the United Nations (2012) regulations governing food trade still pose a challenge to urban food access despite the sound policy provisions in Kenya and the good practices from which the country can learn. Challenges because processes at border crossings involve various agencies. Not only Customs but also multiple agencies are present to conduct their controls. There are at least three categories of agencies that are present: Customs, immigration, and other governmental control agencies, such as health, agriculture and environmental services. Coordination among them is therefore the key to reducing waiting times at border crossings by integrating processes and coordinating interventions on goods. This cooperation amongst agencies ideally also extends to the administrations across the border to enable the alignment of office hours or the sharing of infrastructure and equipment (United Nations, 2012).

To this effect the Kenyan Government of. (2011) posits that free trade is important for food access yet, the scenario highlighted by the United Nations (2012) showcases that numerous regulations must be adhered to, and that are administered haphazardly by differing parties hampering free trade. According to Kenya News Agency (2022), efforts were made in 2023 to try and consolidate actors in the tea trade for ease of business. Consequently, a regulation was passed stating that all tea in Kenya is to be purchased and sold through the national auction. The ruling has only served to increase the time between buyer and consumer from 5 days to 60 days. The quality and quantity of tea traded by farmers has thus reduced significantly. The alternative avenue of securing a waiver for direct access of tea from the farmers has however proven to be too rigorous and writhed in bias.

According to Karanja (2022), other initiatives targeting food trade regulations have been the automation of tax by the Kenya Revenue Authority at border crossings. Nevertheless, the intention was to eliminate loss of revenue rather than to increase the efficiency of operation by reducing the time between production and consumption. The study terms this as journey time which implies the time taken to move food from the surplus node to the deficit node within a food corridor. Food corridors connect these nodes via a combination of different segments e.g., expressway, boulevard, main street, auxiliary street, alley, etc. where speed level is varied depending on the segments of the route (Ezzatollah, 2022).

Delays increasing journey time are critical to food access and may arise from various reasons as highlighted by FAO (2017) thus, increasing economic cost. For highly perishable products, time delays at the border can lead to product weight or volume losses, product quality losses, and increased storage and treatment costs (Liu and Yue, 2013). The reliability of predictable journey

time on road networks is thus stressed by Fowkes et. al. (2004) as a cost-reduction strategy. The significance of time delays to trade is highlighted by Hausman et al. (2005) and Djankov et al. (2006) who posit that a 10% increase in time delays would reduce bilateral trade volumes by between 5% and 8%. More so trade in time-sensitive products which could imply less trade in “Sukuma wiki”s – a major consumption for the populace of Kisumu City.

Eifert and Ramachandran (2004) observe that for Ethiopia, firm-level productivity could increase by 18% if the number of days required to clear customs was halved. The author also posits that for shipping firms, each day saved in shipping time is worth 0.8% reduction of tariffs paid. Reduction and predictability of journey time in trade can therefore not be overemphasized. More so for agricultural produce since a lot of fresh produce is highly perishable and time delays would reduce the shelf life and quality of the product (Liu and Yue, 2013). For some other products such as newspapers that can only be consumed during a limited time window, time delays at the border could render the product useless and even drive the product out of the marketplace. Therefore, time delays could be a significant trade barrier for perishable products (Liu and Yue, 2013), (Djankov, Freund and Pham, 2010)

Other measures that have an impact on the release time at border crossings are: pre-arrival processing; the use of electronic payment for duties and taxes; possibilities for deferred payment; and authorized traders’ schemes that offer privileges for trusted traders (such as clearance at traders' premises). De minimis regimes also allow administrations to speed up the release of non-dutiable or low-value shipments and offer immediate release upon presentation of commercial documents. Customs can then allow immediate release and reduce waiting times at the border (United Nations, 2012).

In loss-averse economies, governments have used trade policy to shield domestic economies from large food price shocks (Giordani et. al., 2016). Yet one of the greatest challenges of the twenty-first century is still to ensure that the world population has reliable access to adequate, affordable and nutritious food sufficient to avoid hunger. Agricultural trade liberalization is an economic strategy aiming at ensuring this in developing countries. However, little is known about the effects of food trade regulations on food security in developing countries (Mary 2019). Worse still Olawale and Garwe (2010) reveal that licensing impedes SMEs' growth which represents food retailers.

However, Mullainathan and Scnabl's (2010) study of the effects of licensing reforms on procedures in Lima, Peru found that reform implementation enhanced business licensing of informal enterprises (Karanja, 2022) as more significant efforts are being made to reform business licensing by removing regulations that aren't achieving their intended purpose (Chen et al., 2008). Such initiatives are important because according to the literature reviewed, trade costs have both a financial and a time dimension and the latter has become increasingly important.

According to Chen et al. (2008), the significance of the latter has been displayed in Pakistan where higher costs of trade are reducing the pace of exports (drop from 15.7% in 2003 to 8.9% in 2018) thus implying that larger costs of trade lower down the speed of export growth. The trend could be detrimental to the operations of food corridors which are critical to urban food security where 70% of reliance on hinterland for food is exhibited (Noureen and Mahmood, 2022).

It is evident from Giordani et al. (2016) and Chen et al. (2008) that the situation varies from one location to another necessitating analysis at local levels to enable tailor-making of decisions that are relevant to local situations.

The text reviewed shows that numerous regulations have been put in place to increase efficiency in the flow of goods from producers to consumers. There seems to be an increase in the number of regulations being put into place, yet, WTO and the Millenium Development Goals have called for a reduction of regulations governing trade. These and other studies linking regulations to increased travel time advocate for a reduction in regulations. More so for time-sensitive products like food e.g., “Sukuma wiki”. The study feels that there is no clarity as to whether regulations foster or hamper trade based on the views reviewed. The significance of regulations to trade is however stressed as they can influence commodity prices and have been used by governments to do so.

Consequently, the study sought to provide insight into the role of government regulations as inhibitors or catalysts to the flow of food within the food corridors of Kisumu City. The National Food and Nutrition Security Policy, Kenya Government of. (2011) highlights the intention to enable food to move quickly and at reasonable costs within local areas and from food surplus to deficit areas. The City would thus benefit from the study as it has endeavored to highlight how food prices which are critical to food access are influenced by journey time and transaction costs that are linked to regulations.

2.3 Infrastructure critical for urban food access.

FAO (2012) and USAID (2013) posit that although enough food is being produced to feed the entire world; access to the food is hampered by problems of low income and distribution that lead to loss or wastage. Consequently, food is still out of reach for one out of six people on our planet (Reddy, 2014). UNDP (1996) attributes the poor distribution systems to a lack of good storage and preserving facilities that can reduce the risk of loss from spoilage, theft and damage. The prerequisites for this as posed by UNDP (1996) are knowledge, space and equipment for storage as well as equipment for processing. Good storage and preserving facilities will thus result in a

strong presence of street foods in a City, thereby increasing access (USAID, 2013) : (UNDP, 1996).

However, Jansma et al. (2018) posit that the need for urban food access has resulted in urban farming initiatives for leading economies like the Netherlands. Such Organization for Economic Cooperation and Development (OECD) countries have undertaken extensive research to inform policy on urban farming. This has led to investments in infrastructure to support vertical farming which is the newest technology being piloted in urban areas (Buhagiar, 2022). Spring Wise (2021) elaborates that the infrastructure needed to support vertical farming includes warehouse-like facilities fitted with large shelving units for food production. The farms use Light-emitting Diode (LED) lighting and controlled growing and nutrition systems to grow food. Copenhagen is home to Europe's largest vertical farm - Nordic Harvest - that uses renewable energy and applies robotic technology in innovative ways to recycle water, nutrients and fertilizers (Masterson, 2022).

Masterson (2022) posits that the global vertical farming market is steadily growing, and is expected to leap from \$5.5 billion in 2020 to around \$20 billion by 2025. However, studies by Fischer (2021) cap urban farming efforts to just 16% of total land budgets. This notwithstanding, vertical farming offers urban agriculture the opportunity to increase cultivatable space hence its significance in increasing access to food in urban areas. Ultimately, vertical farming can supply local produce from neighborhood buildings instead of growing fruit and vegetables on big farms and then transporting it over long distances in trucks and planes to cities. They also reduce emissions. But at 16% of land for production, the unprecedented urbanization which is also taking advantage of compact cities to increase City densities will need back up from hinterlands to ensure sufficient access to food for urban dwellers.

In this wise, Gilmore (2015) highlights the importance of farmer support centers in food distribution from surplus to deficit areas. The author highlights the Agri-hub as an example of a farmer support center. As explained by Gilmore (2015) the Agri-hub is a farmers' support center that offers the following services: handling of produce and its delivery to the hub, cleaning and grading produce, marketing of produce, transport to markets, sale of agricultural inputs and packaging materials, and provision of technical support. This model of operation where services are consolidated could open up new opportunities within the transit corridors to spur agricultural development more so by building on economies of scale (Gilmore, 2015).

The services provided by the Agri-hub as outlined by Gilmore (2015) can be very instrumental in addressing efficient movement of food within the food corridors that link food surplus to food deficit areas. However, the Agri-hubs as described by Gilmore (2015) are characteristic of food corridors in OECD countries like the Netherlands and Denmark. In Africa, several companies have come together to facilitate operations in what is termed the African Agricultural Growth Corridors. These include Yara International, Monsanto Company, Walmart Stores Inc. and Unilever. Other major players include; the Alliance for a Green Revolution for Africa (AGRA), The New Partnership for Africa's Development (NEPAD), the World Bank, FAO, Govts of the UK, US, Norway and the Netherlands.

The players highlighted come together to turn millions of hectares into industrial agriculture supported by the necessary infrastructure i.e. roads, railways, irrigation, storage, processing, ports. By bringing together governments, corporations and international institutions in the corridor projects, they hope to generate advantages and economies of scale to increase profits. However,

the infrastructure provided in the African Agricultural Growth Corridors is designed for export thereby failing to link food surplus and food deficit areas for local food corridors.

As such, FAO (2015), Fan (2008) & Gilmore & Chasomeris (2015) assert that improving infrastructure within local food corridors is critical to food access in food deficit areas. More so, the infrastructure supporting food processing and distribution. While this is well established in OECD countries as outlined by Gilmore (2015) and Spring Wise (2021) the reverse is evidenced in non-OECD countries.

FAO (2014) describes the transport system in non-OECD countries as riddled with poor roads, poor storage capacity and conditions and small crowded markets without cooling equipment. In addition, Kader (2005) posits that trucks transporting perishable produce like vegetables in the food corridors are open, unrefrigerated and manually loaded and offloaded resulting in post-harvest loss of 35-50%. As such Fan (2008) and Gilmore (2015), suggest that food corridors in Africa and as a whole can directly or, through feeder roads, indirectly reach the majority of Africa's populations and require a response to the broad range of problems highlighted above.

In response to this, one of the specific objectives of Ghana's Road Sector Development Program in 2015 was to reduce average vehicle operating costs for the transport of agricultural products by 10% (FAO., 2015). Similar interventions were successful in Guinea as illustrated in an ex-post-evaluation study by the African Development Bank (Africa Union, 2005). However, the provision of infrastructure in both examples stopped at upgrading road surfaces to ensure agricultural inputs reach food production areas faster and in a less costly manner. The literature thus fails to give a clear relationship between transportation and access to food. Rather, it shows that improving

transportation results in increased food production. As earlier stated by FAO (2012) and Reddy (2014), increased food production does not equate to access to food.

The studies reviewed introduce a critical point of departure from conventional planning for food corridors by showcasing that providing good roads to support the flow of inputs to farmlands does not guarantee an equivalent flow of produce from surplus to deficit areas. Focus has therefore been skewed towards production in most African food corridors leaving the question of the adequacy of infrastructure for food processing and distribution unanswered. Yet the flow of food from surplus to deficit areas is critical to urban food access as urban centers are often food deficit areas.

Similarly, Oniang'o (2005) points out that in Kenya; most high-yielding regions have noted the significance of the transport sector to agriculture thereby paying special attention to the improvement of roads serving production zones. This could make a significant contribution to consumer welfare, expansion of domestic and foreign trade, and faster economic growth (Kenya Government of, 2007). Yet, most deficit-producing parts of the country lack sufficient infrastructure for effective transport, distribution, and marketing of staple food commodities (FEWS NET, 2013). As of 2009, only 14% of the total roads were paved in the country (FEWS NET, 2013). Larsen (2009) goes further to describe the condition of markets in food deficit areas which are characterized by poor road access, higher transaction costs and price volatility.

Hardman et al. (2018) and USAID (2013) add that deficit-producing parts of Kenya suffer more price fluctuations and higher prices. The authors document that out of the three cities of Kenya i.e. Nairobi, Mombasa and Kisumu, the food price for most staples is highest in Kisumu which is a deficit-producing region.

The price for one 90 kg-large box of tomatoes for the three cities is Ksh.5000, Ksh.4000 and Ksh.5500 respectively. Recent studies of the food systems of Kisumu City highlight that only 30% of roads are maintained regularly and 75% of traders in Kisumu City lack refrigeration services leading to increased food costs (Hayombe and Omondi, 2019); (Opiyo and Ogindo, 2019).

Equally, Gillson & Fouad (2015) draw attention to increasing food prices as a threat to food security. They note that the level of world prices, as measured in nominal terms by the Food Price Index of the Food and Agriculture Organization (FAO) of the United Nations, doubled between 2005 and 2011. The Food Price Index increased by 25 percent in 2007 and by 26 percent in 2008. After a decline of 22 percent in 2009, prices increased by 18 percent in 2010 and by 23 percent in 2011, reaching a higher level than the previous peak in mid-2008. They remain well above the level of the 1995–2005 decade, and price volatility continues to be relatively high. Although large price spikes on world markets have occurred relatively infrequently in the past, there are many reasons to think that high and volatile prices are here to stay; a phenomenon that could reduce access to food.

While Gilmore (2015) and Spring Wise (2021), link infrastructure to food access, Larsen (2009), and Hardman et al. (2018) and USAID (2013) introduced the aspect of food price as a factor in food access. The authors posit that access to food in food deficit areas like cities is hampered by high and volatile food prices as opposed to focusing on infrastructure as the key influence to food access.

Literature by Gilmore (2015) and Spring Wise (2021), and Gillson & Fouad (2015), Larsen (2009), Hardman et al. (2018), USAID (2013) all highlight the significance of urban food access albeit from different perspectives. Gilmore (2015) and Spring Wise (2021), link food access to

infrastructure while Gillson & Fouad (2015), Larsen (2009), Hardman et al. (2018), USAID (2013) link it to food price. The link between infrastructure and food price is however not highlighted by the two approaches despite Gillson & Fouad (2015) highlighting the significance of food price to food access. The study responds to a call from Gilmore & Chasomeris (2015) and Béné (2020) to establish the relationship between infrastructure and urban food prices more so for local food corridors.

Béné (2020) accentuates the need for increasing resilience in local food systems in lieu of transport disruptions which led to food shortages during the COVID-19 pandemic. Research by the author highlights food prices and infrastructure as key determinants of food access. However, (Hayombe and Omondi, 2019) and (Béné, 2020) make mention of the link between food price and infrastructure as key determinants of food access albeit descriptively.

Knowing this therefore, the objective of this research was to specifically highlight the roads that are being maintained more so the ones critical to food supply for Kisumu City. The actual location of existing infrastructure like existing storage should also be investigated among other issues. This could explicitly highlight the relationship between infrastructure within the food corridors and food prices in Kisumu City thereby building on the studies outlined above.

The study therefore places focus on Kisumu city. This is because despite price volatility, a clear analysis of the influence of existing infrastructure on the economy is lacking; despite recommendations by the County Integrated Development Plan of Kisumu (Kenya Government of, 2017b). The information could be instrumental in helping the county prioritize its investments in infrastructural development for increased food access. The study would therefore benefit from an

evaluation of the condition of roads/infrastructure within key food corridors and their consequent influence on the price of food if any.

2.4 Significance of profit margins between men and women in food trade on food access within the food corridors of Kisumu City.

According to UN Women (2018) women produce half of the world's food and, in developing countries, between 60% and 80% of food crops. Women's knowledge, education, social status, health and nutrition, and their control over resources are therefore key factors that affect food production. As such, many studies show that women's social and economic empowerment – the result of improved education or access to regular income – is one of the most relevant factors contributing to improved children's health and nutrition (Scaling Up Nutrition, 2016; Cunningham *et al.*, 2015). Unfortunately, the persistence of gender-based discrimination means that women do not benefit equally from food system development.

Worse still, FAO (2011) posits that most food producers are women; yet, about 60 percent of people living in hunger are female. In Sub-Saharan Africa, the agricultural productivity levels of female farmers are between 20 to 30 percent lower than those of male farmers because of the gender gap in access to resources (FAO, 2017). Dolan and Sorby (2003) expound that this could be due to a lack of skilled labor among women in agriculture. The authors posit that while the globalization of agri-food systems is expanding paid employment opportunities for women outside of family farms, women working on commercial farms tend to be concentrated in labor-intensive, low-skilled jobs, and managerial positions are more likely to be taken by men (Dolan and Sorby, 2003), indicating the persistence of gender inequalities in the sector and insufficient gains in women's empowerment.

However, according to FAO, IFAD and ILO (2010), in other regions, remittances have enabled some women to move from poorly paid and exploitative occupations to decent employment, or from unpaid subsistence agricultural labor to running small businesses. Yet, even when women acquire more autonomy and decision-making power at the household level, this does not necessarily extend to social spheres, such as employment and their role within their communities (Global Migration Group, 2013).

Overall, FAO (2011) holds that women face particular barriers to access to productive resources, economic opportunities and participation in decision-making processes. Likewise, female farmers face several constraints in accessing agricultural inputs, services and markets that make it particularly difficult for them to rely on agricultural production as a pathway out of poverty (FAO, 2011; Quisumbing *et al.*, 2014). As such, the female gender is systematically disadvantaged compared to the male, with fewer endowments and entitlements and more limited access to information and services.

According to FAO (2017) the gender inequalities women and girls face limit their access to productive resources, services, and decision-making processes. Thus, their relative lack of equality, the burdens they carry as caregivers, their central role in food production, and other responsibilities expose them to particularly vulnerable situations.

Despite these challenges, the women in Sub-Saharan Africa still play a pivotal role in agriculture, being responsible for nearly all food production, 60% of marketing, and at least half the tasks involved in storing food and raising animals (Mehra and Rojas, 2008). These statistics show that the role of women is very key in food security.

This could be explained by UNDP (1996) observation that men and women use their assets differently. For instance, increasing women's control over household assets has resulted in positive effects on several important development outcomes, including food security, child nutrition, education as well as women's well-being (FAO, IFAD, UNICEF, 2018) & (Sathiabama, 2010). As such, an environment where the ability of women to earn is favored affirmatively could be strongly linked to increased food access (Kim, 2007). Concomitantly, Cruz (2014) illustrates how in the United States of America some environments favor women to thrive by entrusting them with positions of trust like being treasurer. Such environments are synonymously linked to increased income for the beneficiaries which could translate to the expansion of business venture (Duflo, 2012): (Sathiabama, 2010).

However, UN Women (2018) posits that in Sub-Saharan Africa there is a difference in the price that women receive compared to men i.e., the gender price gap. It implies that the gender of businesspersons can determine how affordable or not food prices are. This description of the Gender Price Gap resonates with Machelett (2019), who posits that gender price gap is a form of economic discrimination that occurs when one gender is charged a different price than another gender for identical goods or services.

Machelett (2019), examines the existence and structure of gender-based price discrimination in service markets and posits that women receive price quotes that are two percent (over 9 dollars) higher than men. On the same note, Price requests that appear to come from high-income households raise quotes for men but not women, also eliminating the gender gap. This implies that the gender price gap is an impression of a customer's ability or purchasing power and not a matter

of breaking even by the traders. The positive aspect of this is that the gender price gap can therefore be influenced upwards or downwards as it is based on assumptions and is not fixed.

As outlined by Machelett (2019), prices can be regulated based on the women's willingness and ability to buy commodities that are overpriced against their favor. The significance of this to urban food access is not lost on the study making it a point of focus in examining factors influencing food access.

Interestingly, UN Women (2018) and Machelett (2019) look at the Gender Price Gap from different perspectives. UN Women (2018) examines the gender price gap amongst traders selling agricultural produce while Machelett (2019) focuses on the price differences received by consumers in United States auto repair industry. The study adopts the approach by UN Women (2018) which is focused on food markets and targets food traders and not consumers thereby resonating with the study's scope.

UN Women (2018) puts forth that the gender price gap in agricultural production for Kenya, Ethiopia, Malawi and Nigeria is 8 percent, 11 percent, 28 percent, and 30 percent respectively. Mehra (1997) expounds that in some cases, women are paid less than men because of the dual assumption that they have lower wage aspirations than men and that they are secondary earners in their households. While the gender gap in agriculture results in reduced profits for women hence undesired (Tavener, 2019), the gender price gap implies that women traders often set lower prices than their male counterparts (Deppenbusch, 2017). This implies that female dominance in the food trade would result in increased access to food though previous studies have not explicitly established this.

Statistics showing the dominance of women in food production coupled with suppositions that they sell food at lower prices than men should ultimately culminate into an environment where food is accessible. Yet this is quite the opposite for urban areas where food prices are ever-increasing in tandem with urban populations (Badami & Ramankutty, 2015). Authors like Mehra and Rojas (2008) attribute this to challenges faced by women in the food trade which hinder their optimal participation. Other challenges barring women in the food trade from thriving as highlighted by Tavenner (2019) are time constraints and less mobility due to gender-based roles and socio-cultural norms that limit mobility.

Mehra and Rojas (2008) have thus directed that new strategies in development assistance and agricultural investments must recognize and support women's participation in the food trade more so in developing economies like Kenya which are faced with unprecedented increases in urban populations. Yet the development community lacks some key data on women's participation and roles in food access to better devise and refine programs (Deppenbusch, 2017).

Where data is available, Mehra and Rojas (2008) describe it to be spotty and overused. This is illustrated by studies in Kisumu City analyzing gender disparities in food retail that have stopped at identifying the location of premises, gender of operators and product mix (Opiyo & Ogindo, 2019) thereby missing out on deeper analysis like the implications of gender price gaps on food access. United Nations (2022) observes that gender nuances in food corridors are critical to food access calling for a special focus on women in the food trade who despite their leadership in responding to COVID-19, still trail men in securing the decision-making positions they deserve. As such commitment and bold action are needed to accelerate progress, including through the promotion of laws, policies, budgets and institutions that advance gender equality. Greater

investment in gender statistics is vital, since less than half of the data required to monitor Sustainable Development Goal 5 are currently available hence the study.

The significance of such a study is reinforced by (Kenya Government of, 2017b) (Kenya Government of, 2016). They illustrate that gender dynamics can interact to disadvantage participation of certain genders along the food corridors which the study feels could negatively influence food access. Establishing this significance should be instrumental in deciding whether to increase women's participation in the food trade for food access.

Under the Constitution of Kenya, the Government should ensure that gender disparities are eliminated (Kenya Govt. Of., 2011). This study can therefore help fill this gap by investigating whether the gender gap theory exists in the food trade and what fuels it to provide information that can be used to improve the performance of women in food trade for increased food access.

2.5 Theoretical Framework

The Food Security Brief of 2013 defined *food security* as a situation where all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life. These conditions are underpinned by the “four pillars” of food security i.e., availability, access, utilization, and stability. Availability, access, and utilization are hierarchical, in that food availability is necessary but not sufficient for access, and access is necessary but not sufficient for utilization (FEWS NET, 2013). Studies by CSIS (2020) reiterate that food availability in urban areas refers to quantities delivered therein which is often in abundance yet an abundance of food does not equate to access to nutritious, safe, diverse, healthy, and affordable diets UN-Habitat (2021).

FEWS NET (2013) posits that food *access* refers to a household's ability to obtain foods for a nutritious diet through a combination of production, purchase, gifts, and transfers. Access is influenced by physical access (infrastructure), sociopolitical access (e.g., traditional rights to common resources), and economic access (ability to generate income, purchasing power, and the evolution of real incomes and food prices). Additional factors include access and control of productive resources, such as land, seed and water; governance; legal and regulatory frameworks; the macroeconomic environment; gender dynamics; HIV/AIDS and other diseases; and emergencies and conflicts (FEWS NET, 2013).

CSIS (2020) & UN-Habitat (2021) call for a shift of focus from supply through increased production to focus on access to food. More so in urban areas of Africa where low incomes are predominant and 70% of anticipated urbanization is set to occur. However, while Kuhlmann et al. (2015), Turner (2012) and Chetty (2009) attribute limited urban food access to regulations, infrastructure and gender; Kenya, Ouko (2011) & Gillson & Fouad (2015) attribute it to volatile and fluctuating food prices.

The lack of clarity on the actual causes of food access calls for the establishment of an explicit link between the food corridor interactions and food price which are the key determinants of urban food access. This will be instrumental in responding to recommendations by USAID (2013), Nogales (2014), Ribot & Peluso (2009) and Kenya Government of. (2017b) on the need for evaluation of urban food access.

CSIS (2020) reiterates that urban households dedicate up to 75% of their income to food purchases thereby making food price an important determinant of food access. A factor that is reinforced by the low production capacity of urban food production at 30% (FAO, 2012). Efficiency of the food

corridors serving urban areas thus plays a critical role in urban food access as more than 345 million people face high levels of food insecurity in 2023 (WFP, 2023). To establish how urban interactions within the food corridors serving Kisumu City affect food access, the study has adopted the tenets of access theory by Jesse Ribot which highlights mechanisms to be examined when establishing access.

In his theory, Ribot (1998) defines access theory as “the ability to derive benefits from resources”. The theory originated from property rights studies. In the theory, access is defined as “the ability to derive benefits from resources,” broadening from property’s classical definition as “the right to benefit from resources.” Access, following this definition, is more akin to “a bundle of powers” than to property’s notion of a “bundle of rights”. Using this framing, a method of access analysis for identifying the constellations of means, relations, and processes that enable various actors to derive benefits from resources is suggested. The intent is to enable scholars, planners, and policymakers to empirically “map” dynamic processes and relationships of access (Ribot & Peluso, 2009).

Although access theory has been used in commodity chain analysis e.g. to analyze access by different actors in the charcoal processing value chain of Senegal (Ribot, 1998); it is yet to be used in analyzing a food value chain. This study proposes to employ the principles of access theory in analyzing access to food within the food corridors of western Kenya. This is in line with Angotti (2015) who points out the need for thick description of local practice and analysis in food related studies.

Nevertheless, copious food-related studies that have attempted detailed analysis of food systems - (Certomà & Tornaghi, 2015);(Tornaghi, 2017);(Hardman et al., 2018);(Purcell & Tyman, 2015) - have focused on urban agriculture or rural food production leaving out the corridor in between that connects urban areas to hinterlands.

This critical element of the food value chain has not been emphasized as evidenced in studies by (Gilmore & Chasomeris, 2015);(Paul & Steinbrecher, 2013);(Kuhlmann et al., 2015) which focused on production mechanisms.

Likewise, the contribution of Planning theories to the food security concept has often focused on the designation of zones for food production. Often marked as agricultural zones. These are often in the periphery of urban nodes but most predominantly are in the hinterlands and are often predetermined by agro-ecological characteristics. Use for such zones is often prescribed during planning processes and restrictions and regulations are made concerning subdivisions. The assumption is that the area should provide sufficient food to feed its target population.

The next contribution of planners is then seen in the food markets. These are distributed along food distribution systems and vary in scale. Planning is mandated to site the location of markets and design them to ensure optimal use. Road networks linking the markets are also part of the planner's scope of work. These are referred to as food corridors in the study. The study is keen to highlight the interactions between the food corridors because they stand to hamper or foster food flows by influencing food prices upwards or downwards. Plans laid by planners and other actors in ensuring efficiency on the food corridors are therefore of interest to the study. More so, the study acknowledges that this is a multidisciplinary effort and the design works of planners are overlaid by software like regulations that are altogether critical to food access. This is the tapestry

that the study hopes to weave in understanding the factors that influence food access and are thus critical to food security.

Food can be produced as intended in agricultural zones, yet, by the time it gets to food deficit areas it is too costly thus hampering access. What factors therefore are causing the volatility and fluctuation in food prices despite the designation of different, regulations and infrastructure aimed at easing the flow of commodities for better trade? The players and their potential to stabilize food prices are thus key to food access hence food security. More so for food deficit areas relying on hinterlands for their consumption. Consequently, this study emphasizes the food corridor and uses access theory to establish mechanisms that hinder or foster access to food within the food corridors of western Kenya.

Access theory describes access analysis as the process of identifying and mapping the mechanisms by which access is gained, maintained, and controlled. As postulated by Ribot & Peluso (2009), one of the mechanism through which access can be gained include; access to technology. This refers to modes of extractions whereby more advanced technology benefits those who have access to them. However, the term could be used to imply something as simple as a fence which is a direct barrier to access though low tech. Roads, weapons and wells are also examples given in the attempt to unpack technology as a mechanism of access. A road for example has been highlighted as having the ability alter the number of people and type of vehicles able to reach remote localities.

Access to capital is also postulated by Amartya Sen (1981) and Ingram et al., (2013) as access to wealth in the form of finances and equipment that can be used to derive benefits e.g., having money to rent a parcel of land; thus, gaining access to its resources. Access to markets, highlights the point that one may have the right to a market but not have the ability to commercially benefit from

it. It therefore talks about the ability of individuals or groups to derive benefits from a market by gaining control or maintaining entry into exchange relations. Access to labor and labor opportunities implies the ability to labor for oneself and to maintain access to the opportunities at one's disposal. It also refers to those who control access to labor and mentions the nuances of hiring laborers during scarcity of work and the power dynamics that influence access.

Access to knowledge implies expert status acquired through access to privileged information, higher education, and specialized training or apprenticeship, or even from the ability to employ the signifiers of such status (degrees, titles, etc.), can give people privileged access to labor opportunities, group or network membership, or privileged physical access to resources. Bardhan (1980) & Ribot (1993;1995) argue that knowledge may allow individuals to manipulate others' beliefs and therefore has direct benefits. The holders of specialized technical information may use the information to maintain their access to labor opportunities or income when they have skills or specialized knowledge that is in demand, e.g., the geographic knowledge of local guides.

Access to authority is an important juncture in the web of powers that enables people to benefit from things. In effect, authorities are nodes of direct or indirect forms of access control where multiple access mechanisms or strands are bundled together in one person or institution. People and groups gain and maintain access to other factors of production and exchange through them.

Access to social identity profoundly affects the distribution of benefits from things. Postulates that access is often mediated by social identity or membership in a community or group, including groupings by age, gender ethnicity, religion, status, profession, place of birth, common education, or other attributes that constitute social identity (Moore, 1986; Bullard, 1990; Shipton and Goheen, 1992; Berry 1989, 1993; Foster, 1993; Young, 1993; Pulido, 1994; Agarwal, 1994; Li, 2000;

Peluso and Vandergeest, 2001). Overall, the supposition is that exemptions are made to persons based on social identity which may work in their favor or not in terms of gaining access to a resource. Ribot and Peluso (2003) put forth that the mechanisms of access outlined above are heuristic and none is distinct or complete. As such they may enable, conflict with, or complement other access mechanisms and result in complex social patterns of benefit distribution.

Nevertheless, the mechanisms have been used in over 200 hundred studies to investigate access in numerous fields including; charcoal value chain (Gustafson, 2022), gender and materiality as well as Ecosystem Services. The studies reviewed resonate with Ribot and Peluso (2003) supposition that the mechanism as presented in the theory is not complete. Hicks & Cinner (2014) respond to this by constructing a theoretical/analytical framework that combines the entitlement framework of Amartya Sen (1981) with the mechanisms of access proposed by Ribot and Peluso (2003).

They apply the framework to assess benefits (conceptualized as ecosystem services) from coral reefs. What the constructed framework does is replace the ‘institutions’ that shape people’s entitlements (Leach *et al.*, 1999) with the ‘mechanisms of access’ (Ribot and Peluso, 2003). According to Myers (2012), the initiative turns the framework and the resulting empirical work into something identical to A Theory of Access and access mapping. The framework combines access and entitlements, but does not extend either of them considerably.

Further, Estache and Valletti (1999) posit that mechanisms of access as highlighted in the access theory have been employed by scholars, planners, and policy makers to empirically “map” dynamic processes and relationships of access. Specifically, the theory has been used in commodity chain analysis to analyze access by different actors in the charcoal processing value chain in West Africa (Ingram *et al.*, 2013). The paper focuses on institutions as the mechanism

critical to accessing the charcoal value chain. This resonates with Ribot and Peluso (2003) supposition that institutions are nodes where direct or indirect authority is accessed. Ingram *et al.* (2013) test whether formalization of charcoal institutions will help increase access to charcoal trading for a positive livelihood outcome.

While access theory highlights authority as a prerequisite of access Ribot and Peluso (2003); Ingram *et al.* (2013) posits that authority in the form of formalized institutions can have negative consequences, such as: conflicts of interests over tax revenues, and disproportional benefits reaped by more powerful urban-based actors. Ingram *et al.*, (2013) concur that authority is a prerequisite for access but recommends: devolving power and responsibilities for wood fuel management to a local level, monitoring wood fuel trade, (tax) incentives for sustainably produced charcoal and reinvesting taxes in social and environmental aims.

Overall, the study borrows from the approach by Ingram *et al.*, (2013) which shows that access theory if applied as is, yields nuances that differ for each context hence its application in examining access within the food corridors serving Kisumu City. This study stands to gain from the theory's pedagogical approach to analyzing access. As postulated by Ribot and Peluso (2003), mechanisms of access as highlighted in access theory are heuristic and incomprehensive giving leeway for researchers to populate mechanisms based on their contexts. Ingram *et al.*, (2013) depict this in the analysis of the charcoal value chain which focuses on only one mechanism of access i.e., institutions. Consequently, rather than duplicate the mechanisms of access outlined by Ribot and Peluso (2003), the study has reviewed the literature to determine the access mechanisms in food corridors that enable or constrain urban food access.

To this effect, Ribot and Peluso (2003) description of authority as a mechanism by which access is gained has been adopted by the study. The authors describe authority as policies, laws, regulations and norms. They postulate that these policies/laws/regulations are nodes of control or institutions of power (Weber, 1978; Watts, 1983) that influence access. They can thus influence the efficiency of operations within food corridors thus hampering or fostering food access. To examine this, regulation was selected as a key variable for the study. The selection of regulation as a key variable was informed by Ribot and Peluso (2003) and buttressed by World Bank (2022) who put forth that regulation is fundamental to reducing price hikes evidenced in food export.

In addition to this, United Nations (2012) observes that regulations govern all forms of trade hence the need to investigate the impact of regulations on food due to the vast nature of regulations linked to food security. The authors all stress the need to establish the influence of regulations on food access hence the study's selection of regulation as a key variable. To cap this argument, Mary (2019) posits that little is known about the effects of food trade regulations on food security yet they can hamper food flows thus reducing food access (International Trade Administration, 2022).

Having established regulation as a key variable for the study, indicators to be measured were further derived from literature that highlighted regulation time and food price as critical measures of establishing the influence of regulations on food access. To this effect, Watson (2017) posits that regulations can hamper efficiency in food flows which MDG (2015) attributes to journey time increase linked to compliance with regulations. As such waiting time has become a measure of trader facilitation performance (African Union, 2005; Beghin, 2008; Korinek, 2005; Liu & Yue, 2013). These studies grounded the choice of regulation time and food prices as measures of examining the relationship between regulation and food access.

Studies by FAO (2017) and Fowkes *et al.*, (2004) however anchored the choice of relating time taken to meet regulation and food prices. To this effect, FAO (2017) puts forth that increasing journey time affects the cost of food trade so much so that reliability of time can be used as a cost reduction strategy. In light of this, the study sought to draw an explicit relationship between the time taken to meet regulations and consequent impact on food price.

In line with Ribot and Peluso (2003), the second variable adopted by the study as a mechanism through which access can be gained is infrastructure which access theory encapsulates under technology. Peluso (1992) breaks down infrastructure to mean roads, highlighting its significance to physical access to a resource. That would imply physical access to food in the study. FAO (2014), FAO (2021) and FEWS NETS (2013) further break down infrastructure and roads to imply transportation costs which if high, can lead to high and volatile food prices (Larsen, 2009).

Since food deficit areas suffer price fluctuations (USAID, 2013) and are often characterized by low road maintenance, the study is keen to examine the relationship between transportation costs and the consequent food price to establish the influence of infrastructure on food access. The measure of infrastructure for the study is thus transportation cost. Gilmore (2015), Spring wise (2021) and Volpe *et al.*, (2013) reiterate the significance of focusing on transportation costs which they posit is a significant component of price paid for food. Further to this, UNDP (1996) links infrastructure to storage and display facilities in food distribution systems which if poor would result in food insecurity. These form qualitative measures of infrastructure for the study. They were thus examined qualitatively to establish conditions of infrastructure that are critical to food access.

In line with Ribot and Peluso (2003), the study's third mechanism of access was social identity which access theory demystifies as gender amongst other indicators. Moore (1986) and Peluso & Van dergeest (2011) hold that gender mediates access thus affecting the distribution of benefits from resources. The reason for selecting gender as a key variable for the study was also reinforced by Cunningham *et. al.*, (2015), FAO (2011), FAO (2017) and Polan & Sorby, 2003 who observed the persistence of gender-based discrimination resulting in fewer benefits from food systems by gender. The literature reviewed thus highlighted the significance of focusing on gender as a key mechanism of access.

However, to measure gender, the study was guided by UNWOMEN (2018), which highlights the need to focus on the gender price gap because there is a difference in the prices that women receive compared to men. The author stresses that the difference in pricing between men and women has the potential to influence food access.

The study thus sought to establish the implications of the gender price gap on food access by establishing the significance of profit margins between men and women in the food trade.

On the whole, the study has borrowed from three mechanisms of access as unpacked by several authors who reviewed access theory (Weber, 1978); (Barham, Bunker and O'Hearn, 1994); (Peluso and Vandergeest, 2001); (Peluso, 2009); (Ribot & Peluso, 2009), and developed its mechanisms of access that are similar but not identical to the ones of Jesse Ribot. These include regulations, infrastructure and gender respectively. To this effect, the study finds access theory sufficient in determining the influence of these interactions on Kisumu City's food access. The theory has been chosen due to its ability to explicitly highlight critical mechanisms to be studied when investigating access without which the study would not have been theoretically viable.

2.6 Conceptual framework

This section begins with a brief overview of the theory grounding the study. Key concepts derived from the theory are then highlighted and relationships drawn between key variables to illustrate how the study objectives will be examined. To this effect, access theory by Jesse Ribot is the main theory grounding the study. The theory puts forth that there are mechanisms by which access to a resource can be measured. The study has highlighted the following mechanisms as relevant to examining the influence of food corridor interactions on food access; authority, technology and social identity. As such authority, technology and social identity all have a bearing on access to a resource. For purposes of the study, this means they have a bearing on food access.

In the theory, authority is elucidated to mean regulations, technology to mean infrastructure and social identity to mean gender (Ribot and Peluso, 2003). Reasons for focusing on the authority's interpretation as regulation amongst other interpretations is due to literature pointing to the significance of regulations to food access (United Nations, 2012) more so time loss linked to regulation (MDG, 2015) and the impact of that on food price (FAO (2017)). What this implies in terms of conceptualization is that, to establish the influence of regulation on food access; time spent while meeting regulation will be taken to be the independent variable. This will be measured against food price to establish influence if any. Food price will thus be the dependent variable. Authority is thus conceived as regulation and measurable aspects of regulation and food access are conceived as regulation time and food price in this study.

The other key variable of the study is infrastructure. The guiding theory which outlines mechanisms of determining access, discusses infrastructure as a component of technology (Ribot and Peluso, 2003), thus it postulates that technology has a bearing on access to resources.

Infrastructure more so food storage (UNDP, 1996) , roads (Peluso, 1992) , transportation cost (Larsen, 2009) and its impacts on food prices have been highlighted as measurables in the study. Volpe *et al.*, (2013), Bene (2020) and (UNDP, 1996) have stressed the importance of infrastructure to food access more so road transport, its cost and food price. To this effect, transportation cost has been considered as an independent variable and measured against food price to establish its influence on food price. Food price is thus the dependent variable. The relationship is examined to establish the extent to which infrastructure influences food access. Other components of infrastructure like storage have also been studied for in depth analysis albeit qualitatively.

The third key variable of the study is gender. This was derived from access theory's breakdown of what social identity means. The theory posits that social identity is critical to access and breaks down social identity into numerous components among them gender. Gender was highlighted among the others due to suppositions by (Moore, 1986) and Peluso & Van dergeest, 2011) that gender influences the distribution of resources. Gender thus implies being male or female in the context of the study. To measure how gender influences food access, the study was guided by (UNWOMEN, 2018) and (FAO, 2017) who hold that there is a difference in the prices set by women in food trade as opposed to men. Profit margins between the two were thus examined to establish whether one gender sets higher profit margins than the other because that would have a bearing on food prices hence hamper of foster food access.

With this as a background, the study developed a conceptual framework in which three mechanisms of access have been identified as guided by Ribot & Peluso (2009). They include regulations, infrastructure and gender as illustrated in Figure 2-1. These form the independent variables of the study. The study holds that the mechanisms manifest within the food corridors in

a manner to foster or hamper urban food access. Overall, access to food was investigated by establishing the relationship between regulations and food price, infrastructure and food price, as well as gender and food price as depicted.

Further, Figure 2-1. explicitly shows how the mechanisms that the study adopts as variables were measured. To establish how regulations, affect the flow of food to Kisumu City under objective one; The time taken to comply with regulations (travel time) was explored. For objective two direct relationship was drawn between the influence of transport costs on the price of food. Under objective three, the study sought to establish the gender price gap between the men and women in food trade by computing and analyzing variations in profit margins. In a nutshell, mechanisms of access which were selected as regulations, infrastructure and gender have been broken down into independent variables (Time taken to comply with regulations, Cost of transport, Profit margins), that have been measured against food price as the key dependent variable. This gives the outcome as to whether food is accessible or not based on the relationships drawn.

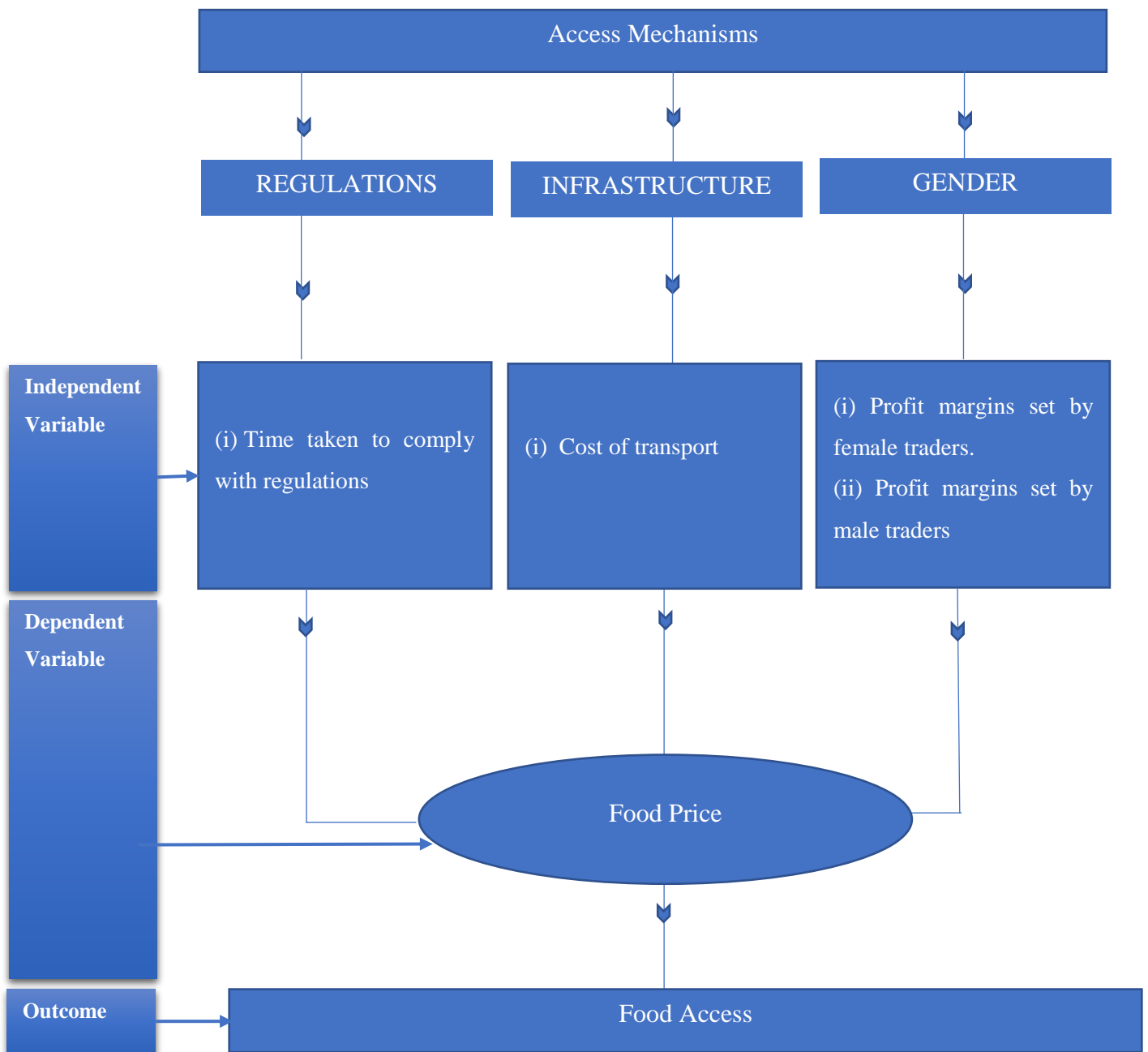


Figure 3-1: Conceptual Framework

Source: Author (2023)

The Table 2-1. Briefly highlights how the variables were measured and the relationships that were explicitly drawn from them. Under the first mechanism of gender, regression analysis was conducted for the at a 0.005% level of significance. This was to conclude the influence of time taken in compliance with regulations on food price.

Further to this, opinions of respondents on the effect of time loss due to compliance with regulation were subjected to odds ratio at 0.005% level of significance. This enabled the study to test the probability or the odds that regulations influence food prices. For the second objective, a regression analysis was conducted for the second mechanism at a 0.005% level of significance. This was to conclude the influence of transport costs on food prices. Finally, profit margins between men and women in the food trade were subjected to chi square analysis at 0.005% level of significance to test the presence of a gender price gap in food prices set by the traders. The variables outlined are contained in the Table 2-1.

Table 3-1: Access mechanisms determined by literature review, guided by Ribot and Peluso (2009)

Mechanism	Description	Response	Analysis and level of significance
Regulations	Regulations were measured through (i) time spent meeting Regulations (ii) subsequent cost of food	(i) Time in minutes (ii) Price set by trader when selling food (KES)	Regression; 0.05% level of significance Odds ratio
Infrastructure	Infrastructure has been measured through (i) cost of transport (ii) subsequent cost of food	(i) Amount spent on transport by trader (KES) (ii) Price set by trader when selling food (KES)	Regression; 0.05% level of significance
Gender	Gender as a mechanism has been measured via (i) Profit margins set by female traders. (ii) Profit margins set by male traders	(i) Profit margin (Count)	Chi square; 0.05% level of significance

Source: Author (2023)

The variables measured though adopted from Jesse Ribot’s access theory were tailor made to fit the needs of this study as guided by (Weber, 1978); (Barham, Bunker and O’Hearn, 1994); (Peluso and Vandergeest, 2001); (Peluso, 2009); (Ribot & Peluso, 2009). The authors helped the study unbundle what the theory implies by authority, technology and social identity. The study thus reckons the theory sufficient as a guide for the research because it explicitly highlights critical mechanisms to be studied when investigating access.

CHAPTER THREE

METHODOLOGY

3.1 Research design

The study's research design is informed by the research paradigm adopted by the study. To this effect, the study adopted a pragmatic research paradigm to enable use of both qualitative and quantitative research methods. This was of importance because the study variables drawn from access theory are both of quantitative and qualitative nature. This research paradigm is appropriate because it bridges the gap between qualitative and quantitative methodologies, recognizing that each can offer valuable insights depending on the research question. Most importantly, the approach was used to emphasize understanding of how the variables each influence food price recognizing that different actions are necessary to ensuring food access. The research design used to operationalize the pragmatic research paradigm is thus discussed hereafter.

As guided by Kumar (2011), the study adopted cross-sectional research design and was designed to have one contact with the study population. Cross-sectional research design was employed because it allows for both qualitative and quantitative data collection (Kumar, 2011). Both data types have been instrumental in answering the research questions.

The study was conducted in Kisumu city and it covered food corridors that bring food into the city. The corridors include Kisumu – Kitale route, Kisumu – Meteitei route and Kisumu – Kebent route. The corridors were preselected based on the nature and volume of food flows (Gilbert, 2008). Gilbert (2008) outlines the top five most eaten foods in Kisumu city as maize, “Sukuma wiki”, traditional vegetable, cabbage and eggs. However, maize and “Sukuma wiki” which are by far the most popular foods are mainly supplied by the routes highlighted above (Faso, 2017); (Hayombe

and Omondi, 2019); (Opiyo and Ogindo, 2019). This prompted purposive selection of the three food corridors as sample sites for the study.

The study commenced with focus group discussions targeting middlemen in each of the main markets supplying Kisumu city with food i.e., Kibuye market and Jubilee market. Middlemen representing the food corridors of choice were selected with the aid of the market superintendents. Basic information was obtained from them as well as the development of a key informant contact list which was instrumental in facilitating the process of snowballing when contacting participants. Participants were engaged via semi-structured interviews and surveys. For surveys and semi structured interviews, respondents were targeted at the end of the corridor i.e., in Kibuye and Jubilee markets

Key informants aided the study in purposively identifying drivers ferrying food into the wholesale market i.e., Kibuye market via lorries or pickups (along the three study sites). Focus was placed on lorries and pickups as they are likely to originate from one clear origin and head for another clear destination. The drivers then helped link the study to the wholesalers whom they supply. The wholesalers in turn linked the study to retailers whom they supply. Snow balling was used in each category of traders to get the desired number of respondents before purposively moving to the next category.

3.2 The study area

Kisumu city lies within longitudes 33° 20'E and 35° 20'E and latitudes 0° 20'South and 0° 50'South in western Kenya and has a population of 952,645 (Kenya, Republic of., 2009). The city is a net importer of food that is considered food insecure hence the importance of food corridors linking it to food surplus areas. Nasongo & Owuor (2017), Faso (2017) and Ouko (2011) attribute the city's food insecurity to an unproductive agro ecological zone. The main agro-ecological zones

(AEZ) in Kisumu County falls under Lower Midland Zones (LM) ranging from LM1 to LM4 with pockets of upper midland zones which have a high agricultural potential. The County has potential for producing various food crops in the high potential zones. However, only 15% of Kisumu City residents grow some of their own food while 26% keep some livestock (Battersby & Watson, 2018).

Battersby & Watson (2018) states that Kisumu City residents widely consume the following key food items; maize/sorghum, fish, vegetables and eggs. Fish include the silver cyprinid (*Rastrineobola argentea*), the Nile tilapia (*Oreochromis niloticus*), and Nile perch (*Lates niloticus*) which are locally sourced from fish stock in the gulf around Kisumu City's Lake Victoria. While fish is one of the staple proteins in the city, its supply from local fishing does not meet the local demand (Mairura 2010).

It is therefore imported into the city from areas more than 70km away like; Yimbo, Bondo, Rarieda in Siaya County; Mbita and Sindo in Homa Bay County; Sori in Migori County; Migingo Islands; Busia (Port Victoria); Busia (Uganda) and China (Battersby & Watson, 2018).

Kisumu City produces traditional vegetables seasonally from Kajulu in the peri-urban areas of the city. They also seasonally come from Kano which is within the county. Cabbage and "Sukuma wiki" are imported from Bomet, Kisii, and Nakuru Counties. They are also seasonally brought into the city from Sondu and Kano within Kisumu County. However, more reliable sources are Vihiga County and Kisii County, which are 30km to 100km away. The city gets its local egg supply from poultry farms in Kibos which are the main suppliers to supermarkets and eateries in Kisumu. However, demand exceeds supply resulting in importation of eggs from Uganda and Nakuru County (Nakuru and Naivasha towns). Maize/sorghum is sourced from Trans-Nzoia, Uasin-Gishu,

Narok, and Bomet counties as well as Busia (Kenya) and Busia (Uganda) (Battersby & Watson, 2018).

The text reviewed paints Kisumu City as a food deficit area due to insufficient urban agricultural activity. As such, the city relies on key surplus-producing agricultural markets located in the western and central regions of Kenya, particularly in the highlands of the Rift Valley. Food corridors connecting the city to the surplus areas were therefore deemed critical to urban food security.

Corridors supporting the flow of maize and “Sukuma wiki” were preselected based on the nature and volume of food flows (Gilbert, 2008). Maize and “Sukuma wiki” were also highlighted as the most popular foods in Kisumu City (Faso, 2017); (Hayombe and Omondi, 2019). The food corridors transporting them to the city include Kisumu – Kitale route, Kisumu – Meteitei route and Kisumu – Kebent route. By using the term food corridor, the study implies food distribution systems comprising; natural markets, trade routes, actors and processes involved in the movement of food from the production to the consumption area. The Figure 3-1. Below displays the maize and “Sukuma wiki” food corridors linking Kisumu City to key surplus areas.

It is important to note that the study focused on sources of food within the western economic block in order to endorse trade within local food systems. Figure 3-1. below displays roads linking Kisumu and its key sources of food.

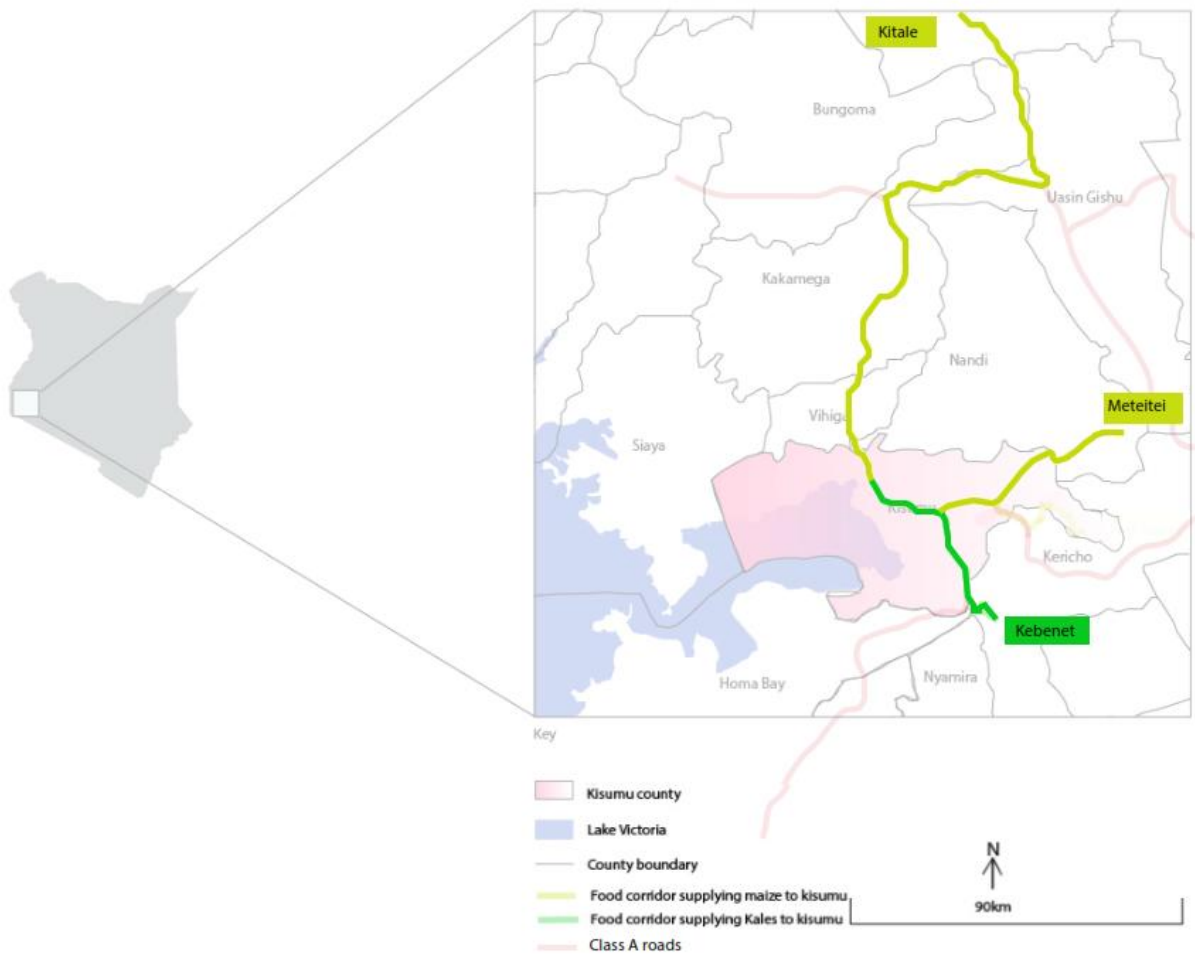


Figure 4-1: Study area
Source: Author (2023)

3.3 Description of the Food Corridors Serving Kisumu City

The most popular foods in Kisumu city are Maize and “Sukuma wiki” which are ranked first and second out of the top ten types of food favored by the residents as captured in Table 3-1. Focus was on maize and “Sukuma wiki” as guided by previous studies that highlighted the two as the most consumed food items in Kisumu (Gilbert, 2008).

However, popularity of other food types was also considered in order to confirm allegations by Gilbert (2008) that maize and “Sukuma wiki” are the most popular food items in Kisumu City.

As displayed in the Table 3-1. the food types were ranked in descending order as follows; maize, “Sukuma wiki”, rice, beans, fruits, fish, Irish potatoes, eggs, green grams and groundnuts. Maize and “Sukuma wiki” were ranked 1st and 2nd thereby confirming the position of Gilbert (2008) regarding their popularity as food items in Kisumu city. The food types highlighted contain starch, protein, vitamins and carbohydrates which the UN deems critical to food security (FAO, IFAD, UNICEF, 2018).

Table 3-4-1: Ranking of ten most popular foods in Kisumu city and their sources

NO.	Food type	Source			Quantities coming in per day/week	Rank FTCs
		County	Sub county	Main entry point in Kisumu		
	Maize 	Trans-nzoia Nandi Uasingishu Vihiga Busia <i>Uganda</i>	Kitale Meteitei	Kibuye Market Kibuye Market	3 lorries per day 3 lorries per day 10 lorries per day	1
i.	”Sukuma wiki” 	Kiambu Trans-nzoia Nakuru Kericho, Kisumu, Kakamega	Limuru Kitale Molo Kebenet Ahero Vihiga	Kibuye Market Kibuye Market Kibuye Market Jubilee Market	1 Lorry per day 3 lorries per day 20 bags per day 40 bags per day	2
ii.	Rice 	<i>Tanzania</i> <i>Uganda</i> Kisumu Kirinyaga	<i>Sirare</i> Muhoroni Mwea	Kibuye Market Kibuye Market	1 lorry per day 20 bags per day	3
iii.	Beans 	<i>Uganda</i> Mt.Elgon Bungoma Trans-nzoia Busia	Chwele Kitale	Kibuye Market	 1 lorry per week 1 lorry per day	4
iv.	Fruits 	Kisii Mombasa <i>Uganda</i>		Kibuye Market	3 lorries per day	5
Other important foods ranked top 10						
v.	Fish	Siaya Homa-Bay Busia	Bondo Mbita	Jubilee Market Patel Flats	1 lorry per day	
vi.	Irish potatoes	Nakuru Bomet	Molo	Jubilee Market	20 bags per day	
vii.	Eggs	<i>Uganda</i> Nakuru	Naivasha	Jubilee Market	1 lorry per day	
viii.	Green-grams	Busia		Kibuye Market	1 lorry per day	
ix.	Ground-nuts	Uasin Gishu	Eldoret	Kibuye Market	2 lorries per month	
<i>NB: Quantities have been captured based on responses during data collection.</i>						

Source: Author (2023)

Interestingly, the food flows into Kisumu from as far as Tanzania and Uganda. In comparison to Tanzania which only supplies rice according to the findings; Uganda supplies five food types to the city which includes maize, rice, beans, fruits and eggs. Tanzania on the other hand only supplies rice. Nevertheless, these foods are found within the country. Yet, the number of tonnes coming in from Uganda and Tanzania surpass local quantities.

This is seen in the maize sector where Uganda supplies 10 lorries @ 9 tonnes totaling 90 tonnes while local food corridors supply an average of 3 lorries @ 9 tonnes totaling 27 tonnes. Figure 3-2. shows the main sources of maize and “Sukuma wiki” for Kisumu city. Sizes of green dots (sources of “Sukuma wiki”) and yellow dots (sources of maize) have been varied to showcase volumes flowing into the city based on study findings. Nevertheless, Béné (2020) posits that focus on local food systems regardless of size should be prioritized via capacity building to the level of the vendors and hawkers.

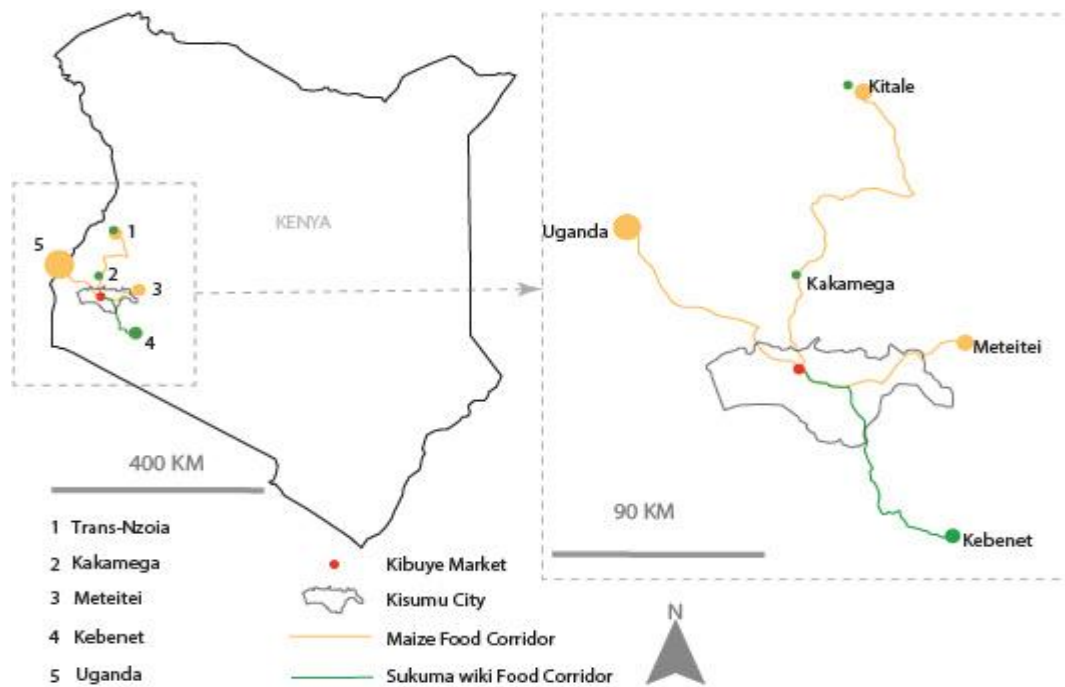


Figure 4-2: Main sources of maize and “Sukuma wiki” for Kisumu City
Source: Author (2023)

Consequently, the study interrogated local food corridors that bring food into the city. These are food corridors that commence from any of the 14 counties that make up the Lake Region Economic Bloc (UNOSSC/UNDP, 2023). As such the corridors include Kisumu – Kitale route, Kisumu – Meteitei route and Kisumu – Kebent route as shown in the Figure 3-2. They commence from Trans-nzoia, Nandi and Kericho County all within the Lake Region Economic Bloc.

Further, the selected food corridors have been singled out because they supply maize and beans which are ranked 1st and 2nd as the most popular foods consumed in Kisumu city. This is in line with previous food security studies in Kisumu (Faso, 2017); (Hayombe and Omondi, 2019); (Opiyo and Ogindo, 2019). As displayed in the Table 3-1. the food corridors selected also supply the largest volumes of maize and “Sukuma wiki” to Kisumu City. “Sukuma wiki” for example can be supplied by local food corridors commencing from Trans-nzoia (Kitale), Kericho (Kebenet), Kisumu (Ahero) and Kakamega Figure 3-3. However, volumes flowing to Kisumu city from the four sources are 250 bags, 750 bags, 20 bags and 40 bags respectively. Focus has thus been placed on food corridors with highest volumes of food flows like Kisumu-Kericho (Kebenet) as depicted in Figure 3-3.

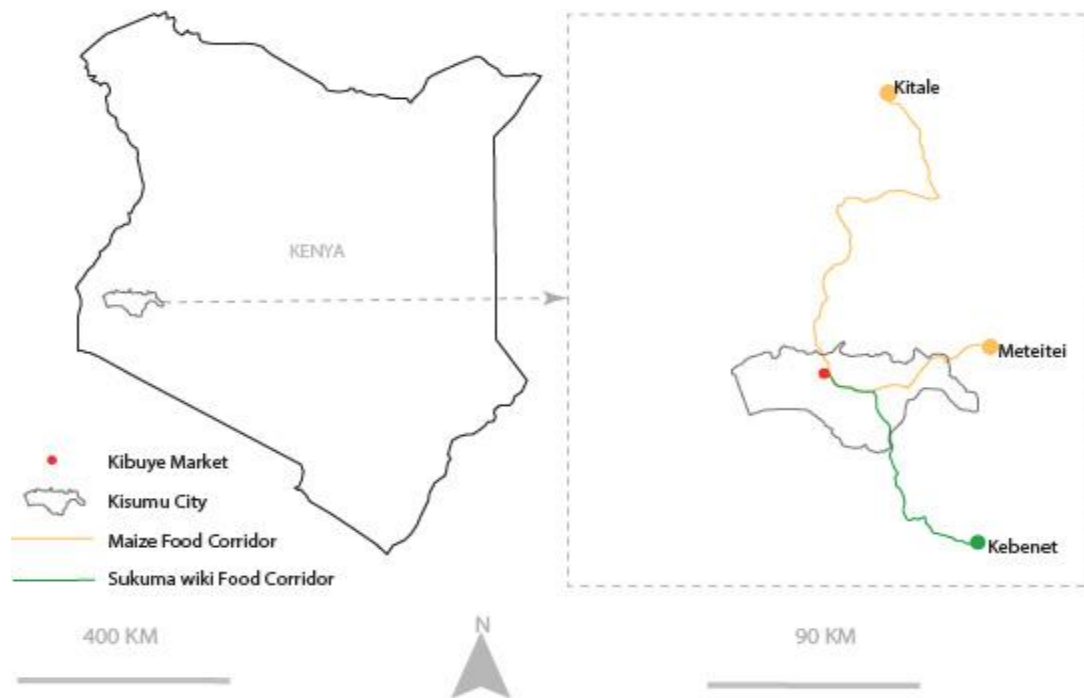


Figure 4-3: : Sources of food from the western region
Source: Author (2023)

The distance between Kisumu and Kitale is 158.3 km, Kisumu and Meteitei is 91km and Kisumu and Kebenet is 67km. These form the study’s area of focus. Kisumu - Kebenet is the shortest distance which is ideal for delivering perishable products like “Sukuma wiki”. The Table 3-1. highlights quantities of food ferried into Kisumu city via the three key food corridors.

Approximately six loads of lorries carrying maize and three loads of lorries carrying “Sukuma wiki” are supplied via these local food systems daily as indicated in the Table 3-1. For maize which is the most favored food type, 640 bags are received from Kitale and Meteitei daily in Kibuye market – the main food entry point. This amounts to approximately 6^{1/2} Lorries carrying a capacity of 100 bags each. In total, the market receives approximately 16 Lorries of maize daily. On the other hand, the city receives 750 bags of “Sukuma wiki” daily from Kericho amounting to 3 Lorries per day. The sum total of bags received in the market daily is approximately 2000 bags

which is equivalent to 8 Lorries. The food corridors selected thus contribute to 40% and 37% of the total maize and “Sukuma wiki” supplied to the city.

3.4 Study population

The study has a target population of 7480 consisting of retailers, wholesalers, middlemen and lorry drivers ferrying food to the main markets. These are referred to as business persons and form the unit of analysis for the study. The study chooses business persons over household as the unit of analysis because the interactions being investigated are those within the food corridors e.g., how long it takes to comply with regulations and transportation cost which then impacts food price. Business persons therefore have more information than households about food sources, routes followed and the regulations required for operation. The business persons were sought from the main food entry points of Kisumu city i.e., Kibuye and Jubilee Markets.

As such, the target population for the study was derived from Oudia (2016); Alal (2018); Onyango et al. (2013) who estimated the population of Kibuye market to be 6000 and Jubilee market to be 1480 respectively totaling 7480. It is noteworthy that these are indicative figures that have been confirmed from sources like: Kisumu strategic Urban development plan and market records. Key informants for the study included; market superintendents, transport associations (SACCOs) and policy makers. They were sought along the food corridors and others at the termini of the corridors.

Sampling frame

A study sample of 366 was drawn from the study population of 7480 using an online sample size calculator (<https://surveysystem.com/sscalc.htm>) Creative Research Systems (2012). The sample size was calculated at a confidence level of (95% = 1.96) and a confidence interval of (0.05 = ±5). The sample frame in Table 3-2. indicates how the sample was proportionately distributed amongst the different categories of business persons within the three food corridors. This was applied across

the whole sample of 366. The proportions per category as guided by Reddy, Murthy, & Meena (2010) are 58% for retailers, 22% for wholesalers, 14% for middlemen and 6% for drivers. After calculating the proportion of the sample comprising retailers (213), the number was equally distributed across the three food corridors i.e., 71 retailers per food corridor.

Table 4-2: Sampling frame

Categories	Percentage of population	Number of respondents			Clusters
		Kisumu-Meteitei	Kisumu-Kebenet	Kisumu-Kitale	
Retailers	58%	71	71	71	213
Wholesalers	22%	26	26	26	80
Middlemen	14%	17	17	17	51
Drivers	6%	8	8	8	22
Totals	100%	122	122	122	366

Source: Author (2023)

NB: Study Population is 7480

This was repeated for all the other strata; wholesale traders, middlemen and drivers. The number of respondents to be contacted under each stratum was guided by Reddy, Murthy, & Meena (2010) who outline the proportion of different actors along the value chain. Their study was borrowed from because it has the same dynamics as the study area. Under each stratum, cluster sampling was employed in determining where to locate respondents who were then approached through snowballing.

Overall, the sample was equally divided amongst the three food corridors of choice. Equal distribution was guided by studies ranking the food corridors as the top suppliers of maize and “Sukuma wiki” to Kisumu city which are also the most popular food items (Gilbert, 2008) and (Opiyo and Ogindo, 2019). This study finds the three food corridors to be therefore of equal

significance to Kisumu city's food supply. As such proportionate distribution of sample was only reflected in the sample as a whole (Column 2 of Table 3-2) and not in each food corridor.

3.5 Data collection

The study holds that food flows can be affected by the time and cost it takes to meet trade regulations consequently altering food prices. In order to investigate the actual scenario in the food corridors of Kisumu city, collection of qualitative and quantitative data was conducted in the context of semi structured interviews (Birner, Cohen and Ilukor, 2011);(Schiffer and Hauck, 2010). It was applied here to track the regulations required to move food from the farm to the urban consumers (Raabe *et al.*, 2010). Information was thus collected through recording of actors' narratives. In addition to recording actors' narratives about the formal requirements for moving food, quantitative information regarding the cost, time duration and resulting food prices were also collected through surveys.

Further to this, secondary data was used to collect information on regulations governing food flows in the local, global and regional arena as well as the actors therein. Some of the literature reviewed was from: Domestic Trade Regulation and Growth of Wholesale and Retail Firms in Kenya; The Ministry of Industry, Trade and Cooperatives in Kenya; World Resource Institute, World Economic Forums, Agribusiness and Food Security.

Under objective two, the study holds that infrastructure is critical to food corridors as it directly influences food prices and quality (Faso, 2017). In order to establish this, the study reviewed literature from the Food and Agriculture Organization, Crop, Livestock and Fisheries Assessment Reports, Kenya Vision 2030, County Integrated development plans, Landscape and Urban Planning as well as Planning and Governance of Food Systems. These sources of literature were used to establish infrastructural requirements for the movement of food along the food corridors.

Open-source data and focus group discussions targeting middlemen were used to spatially identify the infrastructural services available along the food corridors. Data collected included routes/roads followed, condition of roads, means of transportation, travel time and cost of transportation. Through the aid of semi-structured interviews, information regarding the location of infrastructural services of value to market traders e.g., storage and display areas, as well as their condition was sought.

The study was keen to highlight key innovations and challenges throughout the data collection process. Surveys were further used to capture food prices and the infrastructure accessible to business persons.

Eventually, the study investigated the significance of gender to urban food access. Consequently, middle men were engaged in focus group discussions to map actors engaged in the food corridors; determine their distribution by gender; as well as challenges /opportunities for male and female actors along the food corridors. Respondents were purposively selected. Surveys targeting business persons engaged within the three sites were also conducted to collect gender segregated data on; food prices, amount of capital or assets controlled by a business person, the value of the assets and profit margins. In line with the National Commission for Science, Technology and Innovation, all the data collected will be stored for at least five years after completion of the study (NACOSTI, 2020). Due to this prolonged duration, both paper and electronic forms of data collected will be submitted to the custody of the School of Planning and Architecture for safe keeping.

3.5.1 Secondary data

Secondary data was collected from institutional reports compiled by bodies like FAO; United Nations Agency for Human Settlements (UN-HABITAT); Ministry of Trade and Industry; Services and Standards Department at the National Level; Kenya Revenue Authority; Ministry of

Agriculture; Ministry of Transport; and Publications. Documents from the listed institutions were reviewed to shed light on; regulations required to move food, guidelines outlined for food traders as well as licenses required to transport and trade in food.

3.5.2 Primary data

Methods and instruments of data collection

I. Key informant Interviews

Policy makers, market superintendents and transport SACCO representatives were purposively sampled for key informant interviews. Appointments were made prior to the interviews. The interviews were guided by interview schedules which were sent to the respondents before the actual interview in an attempt to get better informed answers. Interviews were conducted at respondent's places of work or convenience.

II. Focus group discussion

The study also conducted focus group discussions until saturation point was reached. Saturation implied the point at which no new themes, ideas, or insights were emerging from the data. For each market place, the study organized focus group discussions targeting middle men operating in the food corridors of choice. Participants were selected with the help of market superintendents. Since gender is a factor, focus group discussions for male and female respondents were held separately in order to ensure a gender sensitive focus. A list of leading questions and issues of aligned to study objectives was used to guide the focus group discussions. The questions were framed to capture: existing regulations, time taken to comply with them, condition of roads in food corridors of interest, means of transport, transport cost and gender of traders.

A total of four FGDs were conducted, two in Kibuye market and two in Jubilee market. In each market, FGDs for women and men were held separately. The group discussions had an average of 12 people and none exceeded a seating of 14 participants. Participants included middlemen, wholesalers and retailers. The FGDs were also focused and were thus designed to gather in-depth insights on regulations, infrastructure and gender implications on food price. Participants were thus selected purposively with the aid of the market superintendent and snow balling from identified qualified participants.

III. Semi-structured Interview

Semi structured interviews targeting business persons from each of the three food corridors were also conducted until data saturation was reached. Participants were purposively selected with the help of market superintendents. Information was captured through note taking and recording.

IV. Surveys

Surveys were conducted with the aid of questionnaires. The questionnaires had both closed and open-ended questions. For each food corridor, questionnaires were administered to business persons found in Kisumu city's main markets i.e., Kibuye and Jubilee market. As indicated in Table 3-2. drivers and wholesalers were contacted at Kibuye market which is the main wholesale market for Kisumu city. Middlemen and retailers were sought from both Kibuye and Jubilee markets. Consent was sought before administration of questionnaires to ensure maximum cooperation. Questionnaire administration was conducted via Kobo Collect with the aid of enumerators.

Students from the School of Planning and Architecture – Maseno University – were intentionally selected as enumerators, due to their expertise in the use of Kobo Collect Kit as a data collection and analysis tool during their studio units.

3.6 Data Analysis and Presentation

3.6.1 Data Analysis

The study's unit of analysis is the trader. Under objective one, variations in the time spent while complying with regulations were captured. In order to illustrate the causal conditions, regression analysis was used to exhibit the influence of time spent while complying with regulations on food prices. This was established at a significance level of 5%. Further, opinions on the effect of time on food price were further tabulated in a four-by-four table. The table shows the count of respondents who feel that time affects food price and those that don't. It further displays the views on the intensity of temporal effects on food price. The table was subjected to odds ratio analysis to establish how probable it is that time affects food price.

Under objective two, information collected was mapped through the aid of open-source data, Google maps and Geographic Information Systems (GIS). In order to illustrate the causal conditions regression analysis was used to exhibit the influence of transport cost on food prices. This was established at a significance level of 5%.

Under objective three, cross tabs illustrating profit margins of business persons by gender were generated. Chi square analysis was then employed to establish the statistical significance of any differences observed. This was established at a significance level of 5%. For purposes of triangulation, the study conducted both qualitative and quantitative analysis as illustrated above.

3.6.2 Data Presentation

Quantitative data highlighting food prices, travel time, asset value and profit margins have been presented using tables, bar graphs and cross tabs. As such, Table 4-3. has been used to display regulations required to move food from the farm to urban consumers thus highlighting time spent

while complying. Under objective two, maps displaying the distribution of roads, their condition, location of storage facilities and display areas have also been used to present study findings.

3.7 Reliability and Validity

3.7.1 Reliability Test for Data Collection Instrument

Kipkebut (2010) points out that the reliability of a research instrument concerns the extent to which the instrument yields the same results on repeated trials. As such, two pre-tests of questionnaires and focus group discussion tools were conducted before the full study (Subjects of pretest did not form part of the study). A reconnaissance was done prior to the pre-test to make preliminary links with officials at Jubilee market and Kibuye Market found at the end of the food corridors where surveys were conducted.

The main aim of the reconnaissance was to try and clearly identify the study population from which a sample was drawn. The questionnaire and checklist were then administered and checked for clarity, ease of administration, repetitions and sensitivity. Objectivity of tools was also tested to ensure that meaning is retained even upon translation. Corrections were made after the first round of testing. Edited tools were then tested a second time with focus on flow, clarity and simplicity of questions.

3.7.2 Validity Test for Data Collection Instrument

According to Thietart (2001), validity of a research instrument is the degree to which the results are truthful thereby measuring what it asserts to measure. As such validity in the research was tackled throughout the research process. To begin with, access theory was employed to guide the study. Internal validity was realized by ensuring that variables for which data was collected were selected as guided by the access theory. In line with access theory the variables that were investigated constituted regulations, infrastructure, gender price gap and food prices.

The tools which were used for data collection included focus group discussions, key informant interviews, semi-structured interviews and surveys. Internal validity of the data collection tools selected for the study was linked to the study objectives/variables and shared with the supervisors to ensure that the questions posed as well as the tools were valid and had the potential for scaling up in other settings. Further, the study ensured external validity by stratifying the sample for which questionnaires were to be administered to ensure all key actors within the food corridors were captured i.e., drivers, middlemen, wholesalers and retailers.

3.8 Research Ethics

The research sought to uphold the highest ethical standards during field studies. To this effect, permission to carry out the research was sought and obtained from Maseno University Ethics and Review Committee. Thereafter, research assistants sought informed consent from respondents prior to interview sessions. The purpose of the study and research process was briefly presented to the respondent before their consent was requested vide a signature. This was conducted with the aid of a consent form (Appendix 8) which was presented to the respondent before commencement of the survey.

Voluntary participation was encouraged when conducting interviews. Any respondent who felt like stopping the survey was free to do so at any point as was highlighted in the consent form. Objectivity was maintained at all times during the research to avoid bias in data collection, analysis and interpretation.

Respondents were assured of confidentiality hence only gender of respondents was captured in the questionnaires. As such details like respondents' names were omitted except where there was need

and permission to do so. Likewise, any pictures taken for use in the thesis were taken subject to respondents' informed consent.

Questionnaires were administered via Kobo Collect which is a digital data collection software that allows for real time data entry and analysis. This was to help overcome the risk of data loss that is akin to hardcopy questionnaires which can be easily destroyed during storage or shipping. The application captured location of interview as well as time when interview was administered and duration of interview among other capabilities. This increased accuracy in the work done by enumerators thereby increasing credibility of the data collected. The study strove to collect sufficient information via the data collection method and others to enable it establish the inefficiencies within food corridors that are compromising urban food security. More so with regards to the influence of regulations infrastructure and gender on food access within the food corridors of Kisumu city.

Study findings are to be disseminated as reports tailor made for the consumption of business persons, policy makers and researchers. This will constitute brief reports with lots of illustrations, policy briefs, thesis and scientific publications. The study endeavors to avail the reports to all study respondents through public offices like the market superintendent's office. The principal investigator to be contacted during and after the study is Loice Loo of email loiceloo@gmail.com. As the ethical reviewing body that examined this study, Maseno University Ethics Review Committee is also available via the email sanyona@maseno.ac.ke for any ethical issues regarding the study.

CHAPTER FOUR

FINDINGS AND DISCUSSIONS

4.1 Overview

This chapter presents the results and discussion of the findings of the study. Findings discussed herein were analyzed using odds ratio, chi square and regression analysis. The findings and discussions are presented according to the study objectives under the following themes: Effect of time taken to meet regulations within the food corridors on food price in Kisumu city; Influence of infrastructure within food corridors on Kisumu city's food prices; Significance of gender price gap for men and women operating within the food corridors of Kisumu city on food access.

4.2 Effect of time taken to meet regulations on food prices

This section addresses the study's first objective which was to establish how time taken to meet regulations within the food corridors affects food price in Kisumu city. Traders operating within the main food entry points in the city were therefore interviewed. They were engaged through key informant interviews and surveys at their places of work. Data collection centered on key variables like number of existing regulations, time consumed when meeting the regulations, cost of existing regulations and the impact of all these on food price. This was to help the study establish whether processes involved in meeting trade regulations often increase journey time and costs of food flowing within food corridors hence food price.

Data collected from Kibuye and Jubilee market which are the main markets of Kisumu city established that there are a number of regulations by which food traders must adhere to in order to fruitfully trade within the food corridors serving the markets. The regulations total seven and are administered by different authorities ranging from the national to the local level as outlined below.

They include; driving license, cess, transport operator business permit, trading license, market entry fee, municipal tax and health test and have been expounded on below;

i. Driving license

Drivers transporting food from source to retail markets are required to obtain driving licenses. Since the drivers targeted all had driving licenses, they narrated the process of renewing driving license as a bit tedious in instances where it has to be done physically.

However, the preferred mode of renewal was through digital portals set up by the National Transport and Safety Authority (NTSA) which takes about five to ten minutes. For new applications however, NTSA officials reported that it could take up to 2 weeks after application before getting the license. An interim driving license is thus availed for use within the waiting period. Time duration thus differs based on whether one is applying for a new license or renewing an existing one. As outlined in the statement below by a driver, the study found that payment for driving license averaged one thousand four hundred Kenya Shillings amongst drivers ferrying food to Kisumu. The Legislation governing this requirement was enacted in 1979 though revised in 2012. Over a decade has passed since the revision necessitating revision.

“Getting a driving license is very affordable because we only have to pay an average of one thousand four hundred Kenya Shillings”.

On average, respondents engaged in transporting food spend one thousand four hundred when applying for their driving licenses. However, as captured by Njeri (2023), the process of acquiring driving license is quite costly. A driver seeking a first-time driving license will be required to schedule a driving test with the NTSA. The booking is done online, and an application fee of Kshs. 1,050 is charged. Upon notification of competence, the driver is expected to apply for digital

driving license as stipulated by NTSA at cost of Kshs. 3,050. The applicant then has to book an appointment for a physical meeting for biometric registration at the NTSA office where they made their application.

It then takes five working days for the document to be processed. The total cost of getting a license based on these findings from NTSA differ from the respondents who states that they spend an average of Kshs.1400 in acquiring a driving license. Alternatively, they may have been making reference to the old version of licenses which is being phased out. Currently, the total cost of acquiring a digital driving license is Kshs. 3050 for renewal and Kshs. 4100 for a first-time applicant. Drivers who have outdated licenses expose themselves to complications from authorities as highlighted in the text below.

“We are expected to leave tips at almost every road block we meet.”

According to the respondent, there are about five road blocks between Kisumu and Kitale food corridor. Drivers ferrying maize to Kisumu are expected to leave bribes at each of the road blocks to steer away from extensive checks by the authorities. International Trade Administration (2022) points out that such are the practices that hamper food flows thus reducing urban food access, more so if the additional costs are transferred to food prices as postulated by (Karanja, 2022).

ii. Cess

Cess refers to a levy imposed on tradable agricultural produce by county governments. Maize traversing county boundaries from Kitale to Kisumu is thus subject to payment of cess. The tax is intended to help improve production and distribution of agricultural commodities. Farmers pay cess at 400 Kenya shillings per trip at specified locations like Kapsabet along the Kisumu Kitale route. County finance departments are in charge of implementing this law as provided for in the

Kenya Market Trust report since 1986 though the regulation was revised in 2012 (Bayesian Consulting Group, 2016).

Cess is a transboundary tax levied upon local goods leaving one county to another for trade. It should be charged by the county producing the good. According to FAO (2012) the transaction costs can be inflated by double payments, paid at each county boundary passed; thereby increasing cost for trans-boundary goods. Minot et al (2013) reiterates that cess, transportation and parking fee (for those selling in Nairobi and Mombasa) are some of the most burdensome charges, impacting maize trade due to levying at multiple levels. The increase in transaction cost is often transferred to the consumer through increased food prices thus reducing access to food from hinterland.

iii. Transport operator business permit

Food transporters are required to acquire transport operator business permits annually. The cost is county specific and ranges from Ksh. 2000, Ksh. 3500, Ksh.8,000 as evidenced in Kwale, Meru, and Bungoma respectively (Ministry of Industry, Trade and Cooperatives, 2017). The permit is limited to one vehicle only. The payment has been in operation since 1979 with revisions made in 2012 by the transport licensing boards at the county level. In addition to this expense, traffic fees are charged at specific locations e.g., at Serem along Kisumu Kakamega route.

The money is paid in cash to traffic police on duty at the check points. The finding resonates with that of cess where additional payments are required of traders despite acquisition of officially recognized regulation.

iv. Trading license

Kenya, Government of. (2017) stipulates that in addition to the other regulations, food traders are further required to acquire trading licenses for all nature of spaces including informal Semi-Permanent structures. In addition, for one to acquire a trading licence, evidence of location i.e., Land Registration No., Certificate of Incorporation or Business name registration must be produced (Ministry of Industry, Trade and Cooperatives, 2017).

The license cost varies based on size of space occupied. It is stipulated in the regulations that traders occupying temporary constructions that are less than 5m² should be charged Ksh. 2000 annually as trading license (Kenya, Government of. (2017). The trading license cost is the same for persons operating in verandas or temporary buildings. The 5m² represents 50% of spaces occupied by food vendors operating in market places (Kenya, Government of., 2017).

However, study findings show that food traders in Kisumu pay approximately Ksh. 1000 annually as trading license. The county licensing authority is responsible for executing this regulation which was revised in 2015.

v. Market entry fee

Within the local markets like Kibuye and Jubilee, county governments expect traders to pay market entry fees since 1990. This is oversighted by the county department of finance and economic planning and is yet to be revised. If one is trading in maize, the number of bags supplied to the market are counted and charged Ksh. 40 Kenya each. Tax on the commodity as illustrated is however charged once i.e., upon entry. County government officials in charge of the process receive payments at the market entry points and write receipts for parking and offloading to food traders.

vi. Municipal tax

In addition, a license fee costing 30 Kenya shillings is paid daily by traders as long as their premises are open for business. A food retailer at Kibuye market in Kisumu City observed that municipal tax ranges from Ksh. 30 to Ksh. 140. The range is subject to numerous factors like number of square meters occupied by trader. The dynamics are captured in the response of a food trader highlighted below.

“The markets charges 30 shillings per day and sometimes 50. Sometimes we just buy them tea and don't have to pay”

The food traders response speaks to an environment where regulations are implanted in a manner that is not standardized. As such municipal tax would vary based on square meters which varies daily for hawkers. On the other hand, variation based on rapport with market managers also predisposes traders to harassment and double payment when there is no evidence of “the tea” one bought. Lack of standardization in compliance with regulations is bound to result in high costs of trade which hampers the benefits of free trade according to Gillson & Fouad (2015).

vii. Health test

Middle men and transporters are expected to undergo health tests in some instances e.g. maize traders moving from Uganda to Kenya. The test is often done at the Kenya-Uganda border office at a cost of 160 Kenya shillings. The process lasts for approximately 10-45 minutes per person. The study is focusing on local food corridors so the national boundary is not in its scope. However, health test is a requirement for food traders in local food corridors as well. Yet, it is not practiced for food transported along Kisumu - Nandi, Kisumu - Kericho and Kisumu – Kitale despite provisions for this by the county health officers.

According to Karanja (2022) local level regulations affecting food trade that were not mentioned by the study include weights and measures, anti-counterfeit inspection, motor vehicle branding licenses and distribution licenses. On the other hand, the study also highlighted a critical regulation in food trade omitted by Karanja (2022) i.e., acquisition of driver's license. This has been unearthed by the study as a critical regulation to the flows of food.

In addition, other regulations like cess and transport operator business permits exhibit challenges in their administration which results in double payments.

The Table 4-1 below displays the amount of money spent by food traders when complying with the regulations discussed above. Overall, a driver has to comply with highest number of regulations which reflects in the amount of money paid in compliance i.e., 6170 KES -12170 KES. The reverse is true for farmers who only have to pay Cess at 400 KES in case they are moving goods from one county to another. This implies that the higher the number of regulations, the higher the cost of transactions. In addition, to this, lack of standardization in pricing is also evidenced in transport permit costs that range from 2000 to 8000 between two counties. All these costs are transferred to food prices ultimately hampering access to food access.

The findings shed light on the cost implications of regulations thus responding to Mary (2019) who puts forth that little is known about the effects of food trade regulations on food security. The findings also buttress, suppositions by International Trade Administration (2022) that regulations can hamper food flows thus reducing access to food as evidenced in high and unregulated costs.

Table 4-2: Amount spent by traders when complying with regulations

<i>Regulation</i>	<i>Category of traders</i>				
	<i>Farmers</i>	<i>Drivers</i>	<i>Middlemen</i>	<i>Wholesalers</i>	<i>Retailers</i>
1. Driving license		4100			
2. Cess	400		400		
3. Transport permit		2000-8000		2000-8000	2000-8000
4. Trading license				1000	1000
5. Market entry fee		40		40	
6. Municipal tax		30	30	30	30
7. Health test					160
Total	400	6170-12170	430	3070-9070	3190-9190

Source: Author (2023)

Further, the regulations are administered at different locations and by different institutions so much so that the disconnect can result in difficulty when one needs to acquire a health permit and a transport operator business permit for example. The study is therefore keen to further analyze the influence of the regulations on time as this could be important for perishable products like “Sukuma wiki”.

4.2.1 Influence of regulation time on food price

The regulations highlighted above affect food traders differently based on their categories. As indicated in the Table 4-2, food traders supplying Kisumu city can be divided into the following categories; drivers, middlemen, wholesalers and retailers. Going by central tendencies, a mode of four indicates that traders are likely to meet at least four of the seven regulations highlighted by the study. The regulations necessary for them to trade are however subject to their category as traders. Drivers, wholesalers and retailers bear the brunt of the numerous regulations as they each have to meet a total of four regulations. They are thus subjected to more regulations than the farmers and middlemen who adhere to 1 and 2 regulations respectively. It is important to note that farmers are featuring here as a category despite their omission in the definition of the sample frame.

They have been included to help illustrate study findings in which they were mentioned though they did not form part of the studies unit of analysis.

Table 4-3: Regulations affecting traders by category of trade

<i>Regulation</i>	<i>Category of traders</i>					<i>Number of categories affected by regulation</i>
	<i>Farmers</i>	<i>Drivers</i>	<i>Middlemen</i>	<i>Wholesalers</i>	<i>Retailers</i>	
1. Driving license		√				1
2. Cess	√		√			2
3. Transport operator business permit		√		√	√	3
4. Trading license				√	√	2
5. Market entry fee		√		√		2
6. Municipal tax		√	√	√	√	4
7. Health test					√	1
Total number of regulations adhered to	1	4	2	4	4	

Source: Author (2023)

The Table 4-2. also enables an analysis of the regulation that affects most categories of traders. Municipal tax tops the list as it affects all categories except the farmers. On the other hand, driving license is only required of drivers transporting food. Of significance is that the regulations have implications on travel time and trading costs hence their significance to urban food access as depicted in Table 4-2.

Table 4-4: Time spent by traders when complying with regulations

Regulation	<i>Time in minutes</i>					<i>Number of categories affected by regulation</i>
	<i>Farmers</i>	<i>Drivers</i>	<i>Middlemen</i>	<i>Wholesalers</i>	<i>Retailers</i>	
1. Driving license		5				1
2. Cess	10		10			2
3. Transport operator business permit		10		10	10	3
4. Trading license				120	120	2
5. Market entry fee		10		10		2
6. Municipal tax		5	5	5	5	4
7. Health test					45	1
Time consumed in meeting regulations	10	30	15	145	180	
Count of regulations adhered to by traders of each category	1	4	2	4	4	

Source: Author (2023)

The Table 4-3. highlights a detailed interrogation which helped the study establish that meeting the regulations would range from a total of 10 minutes to 180 minutes. As found by the study, farmers are required to comply with only one legal requirement which is Cess. Cess payments result in a 10-minute increment in the travel time of food by farmers. On the other end, retailers comply with four regulations on average thereby consuming approximately 180 minutes of their time. However, wholesalers who are also required to comply with an average of four regulations consume approximately 145 minutes in doing so.

It is important to note that the frequency of meeting the regulation varies. Regulations like driving license, trading license and transport operator business permits are sought annually. The other regulations i.e., Cess, Market entry fee and municipal tax are paid with every food transaction done.

The purpose of the compilation of Table 4-3 is thus not to draw comparison across different regulation times but rather to give a snap shot of how long it would take if one had to comply with all the regulations relevant to them in a day. The purpose is to show that the more regulations one has to comply with, the more time is lost hence inefficiency in the flow of food which could impact food access.

The findings indicate that more time is lost in meeting regulations at the end of the food corridor (wholesalers and retailers) than in between (drivers and middlemen). Farmers on the other hand are only obligated to meet one regulation which is payment of Cess. Overall, the findings showcase that regulations affect travel time so much so that travel time increases with the number of regulations a trader is expected to meet. These findings speak to the supposition of FAO (2017) that delays increasing journey time may arise from various sources. The delays are termed critical by Hausman et al. (2005) and Djankov, Freund and Pham (2010) more so for perishable goods like “Sukuma wiki”. The finding is aligned to literature reviewed by confirming that regulations though introduced to support commodity flow (Chen et al., 2008); have ended-up hampering.

A regression analysis was therefore conducted to establish the influence of time spent meeting regulations on food prices as displayed in the Table 4-4. below. Findings showed statistical significance as evidenced by a P-Value = 3.41E-18. The regression line of $y = 1641.9x + 12011$ was derived from the regression analysis. The relationship is positive due to the positive coefficient (1641.9) implying that food prices increase with time. The finding affirms the position that there exists a positive relationship between time taken to meet regulations and food prices (Rodrigue and Slack, 2020) and (Lipinski et al., 2016). Specifically, a unit increase in the time taken to meet

regulations will result in a percentage increase of 0.008337992%. This can be rounded off to 0.01%.

Table 4-5: regression analysis output on the influence of time on food price

SUMMARY OUTPUT					
<i>Regression Statistics</i>					
Multiple R	0.454112				
R Square	0.206218				
Adjusted R Square	0.203798				
Standard Error	24162.71				
Observations	330				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	4.97E+10	4.97E+10	85.2115	3.41E-18
Residual	328	1.91E+11	5.84E+08		
Total	329	2.41E+11			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	12011.33	1604.835	7.484464	6.67E-13	8854.263	15168.4	8854.263	15168.4
X Variable 1	1641.856	177.8631	9.231007	3.41E-18	1291.96	1991.752	1291.96	1991.752

Source: Author (2023)

As further expounded by the study, fluctuations in time taken to meet regulations can be due to the fact that they are administered by different authorities as illustrated in the Figure 4-1. The Figure shows that regulations highlighted by the study are administered by different authorities thereby creating potential for increased loss of time which could negatively impact food trade (World Economic Forum, 2021).

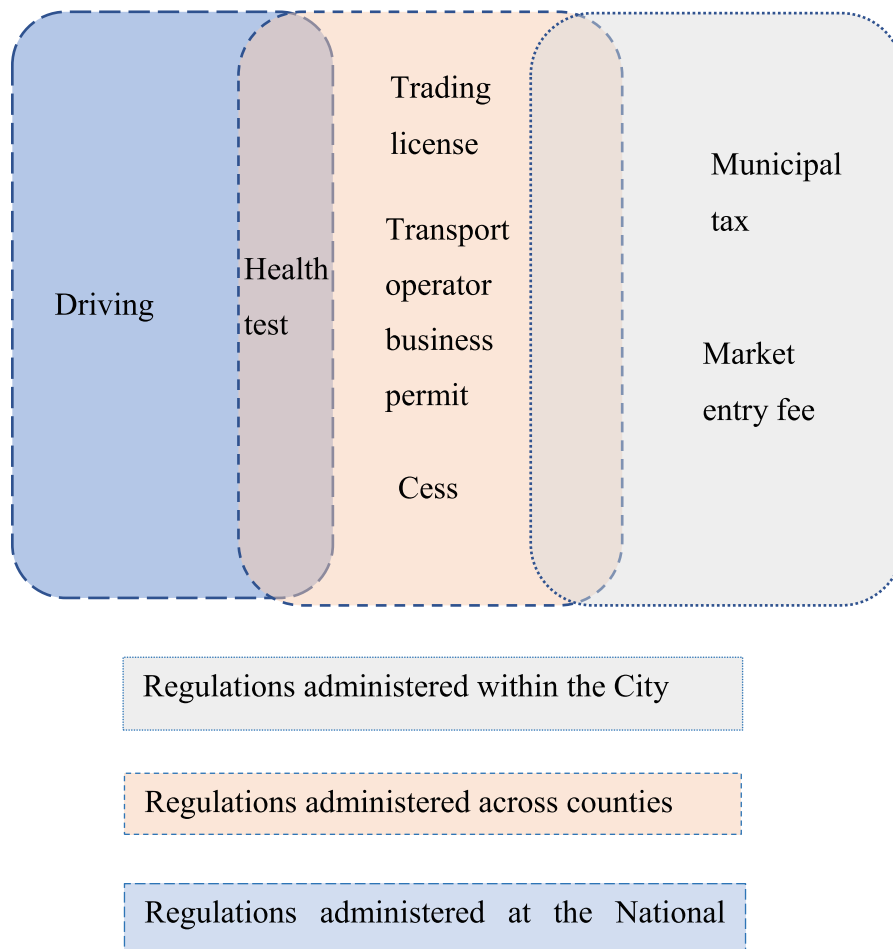


Figure 4-1: Analysis of locations where regulations are administered

Source: Researcher (2023)

The regulations are administered by authorities at the national level, county level and local level. However, at each level, the regulations administered differ as illustrated in the Figure 4-1. In example, the health test is supposed to be administered both at the national and county level.

A driver transporting food from Uganda to Kisumu would thus have to take time at the border paying for the test. More time will be lost in Kisumu where the test is conducted away from the market. In addition, the statement below by the market superintendent shows that there is no coordination between the two authorities necessitating a repeat of the test.

Table 4-6: Location Administration

Regulation	Location of administration	Administrator
Cess	Specified locations along food corridors – by the road sides	County finance departments
Transport operator business permit	transport licensing boards offices	transport licensing boards
Trading license	Traffic fees The county licensing authority offices	check points The county licensing authority
Health test	county health offices	county health officers

The market superintendent’s observation buttresses the position of Watson (2017) that regulations have continued to increase in number without clear structures of implementation. Liu and Yue (2013) posit that this could lead to multiple formalities increasing waiting time for traders thus creating direct costs for leasing means of transport ultimately leading to increased food price.

Further to this, horizontal analysis of the administrative levels indicates lack of coordination in the administration of regulations. To this effect, the county level administers four regulations i.e., Cess, transport operator business permit, trading license and health test. All the regulations are administered at different locations as shown in the Table 4-5. The locations include, designated check points along food corridors, transport licensing board offices and county health offices, county finance departments and county licensing authority. Retailers have to comply with three out of the four outlined regulations. This increases the chances of them losing time when meeting the regulations.

In addition to the threat of time loss, practice has been observed where the regulations are not a hindrance rather, a platform that can be used by rogue enforcers to frustrate persons transporting food as depicted in the statement of a driver transporting maize from Kitale to Kisumu. In such

Instances, the actual regulations may not be the problem but the fact that they allow avenues for money extortion from business persons in food trade.

“Cess is charged on maize as we cross our county border to sell the maize to other counties. The receipt issued upon purchase is supposed to be displayed at any other subsequent county border crossing before targeted destination. However, crossing subsequent county borders at times results in extra charges as the receipt documenting payment evidence is not always sufficient”

Drivers transporting maize from Kitale to Kisumu have to cross three county border checks thus increasing their exposure to extortion from rogue enforcers. Such are the non physical barriers to trade that impede the flow of goods and services and should have been dismantled by 2015 (Africa Union, 2005) (Beghin, 2008), (Korinek, 2005).

Solutions to the scenarios highlighted above are evidenced in South Africa where there is a well-established centralized legislative system that protects the operations of traders and workers with regard to wages, working environment, health and safety statutes (Pasquali and Godfrey, 2021).

An equivalent system to this in Kenya is the HUDUMA Centre which is a government initiative that aims to provide efficient and accessible Government services at the convenience of citizens through various integrated service delivery platforms (Njeri, 2023). Nonetheless, services offered by the government initiative do not mirror the services needed along the food corridor as illustrated in the Figure 4-2.

- a) National Social Security Fund – NSSF Services at Huduma Centres
- b) National Hospital Insurance Fund – NHIF Services at Huduma Centres
- c) Kenya Revenue Authority – KRA Services at Huduma Centres
- d) National Construction Authority – NCA Services at Huduma Centres
- e) Civil Registration Department Services at Huduma Centres
- f) Kenya Power Services at Huduma Centres
- g) Business Name Search and Registration Services at Huduma Centres
- h) National Registration Bureau Services at Huduma Centres
- i) Gender and Affirmative Action Funds Services at Huduma Centres
- j) Independent Electoral and Boundaries Commission – IEBC Services at Huduma Centres
- k) State Department for Immigration, Border Control and Registration of Persons Services at Huduma Centres
- l) Kenya Police Service at Huduma Centres
- m) The State Department for Labour Services at Huduma Centres
- n) Ministry of Lands Services at Huduma Centres
- o) National Transport Safety Authority – NTSA Services at Huduma Centres
- p) The National Treasury Services at Huduma Centres
- q) Attorney General – Registra of Marriages Services at Huduma Centres
- r) County Governments Services at Huduma Centres
- s) National Environmental Management Authority – NEMA Services at Huduma Centres
- t) Retirement Benefits Authority – RBA Services at Huduma Centres

- a) Driving license
- b) Cess
- c) Transport operator business permit
- d) Trading license
- e) Market entry fee
- f) Municipal tax
- g) Health test

Figure 4-2: Comparison between services in Kenya Governments' one stop shop and those required in the food corridors

Source: Author

Only two out of the seven identified regulations are captured within the centralized system leaving a huge demand for a similar system in governing food trade operations. More so because the regulations left out are recurrent and unregulated in terms of persons administering, mode of administration and location; all which have an implication on the time it takes for food to reach

the consumer. The need for directing administration of regulations in the food corridor can thus not be overemphasized (Hausman et al., 2005).

Kenya Govt. of., (2012) and Kenya Govt., of (2015) have made strides in streamlining administration of regulation in Special Economic Zone (SEZ) and Export Processing Zones (EPZ) areas. These are areas gazetted for the creation of an enabling environment for processing, manufacturing and trading of goods via the element of tax reliefs and one stop shops. The perks of the SEZ and EPZ areas could be introduced into specific food corridors earmarked for such. The point of departure would however be that EPZ and SEZ areas are plots and not corridors thereby introducing an interesting element worth exploring in further research. This will entail the possibilities of redefining the geographical reach of what an SEZ or EPZ could be. It could provide an avenue for regularizing the manner in which regulations are administered within the food corridor for efficiency and optimal use of time in the flow of food from hinterland to food deficit areas.

Having established that uncoordinated administering of regulations within the food corridors increases journey time, the study further explored the implication of this on food prices. Study results showing respondents opinions on the effect of time on food price are displayed in the Figure 4-3. According to the findings, 72% of respondents felt that time affects food price. The statistics were thus subjected to further analysis via odds ratio as illustrated in the Table 4-6. and Figure 4-3. They show that the time taken to meet regulations ultimately affects food price at ratio of 1.3 which is statistically significant (Kalra, 2016 & Kumar, R. (2011).

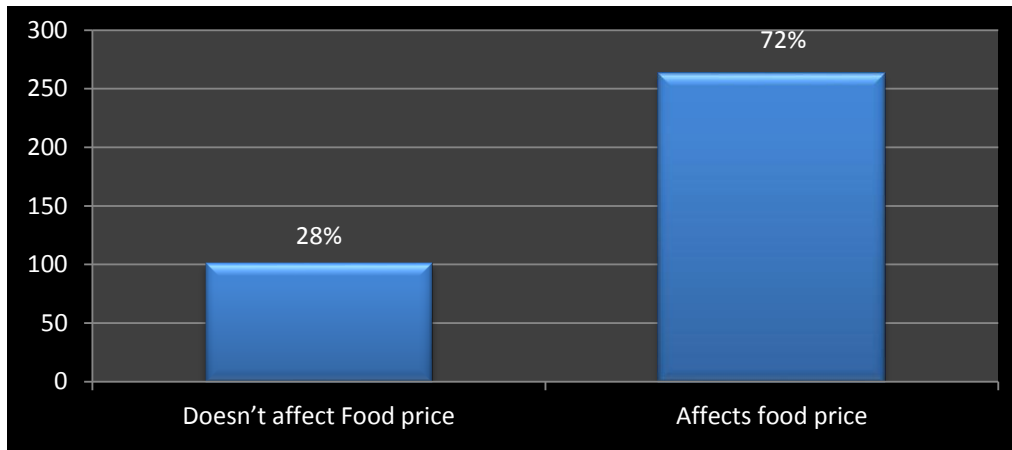


Figure 4-3: Effect of time loss on food price

Source: Researcher (2023)

Table 4-6: Table showing the odds of time affecting food price

	Affects Food price	Doesn't affect Food price
A lot	76	51
A little	127	110
Odds ratio		1.3

Source: Author (2023)

NB: 364 out of 366 respondents (2 missing)

Given that time affects food price a lot. The odds are 76/51

Given that time affects food price a little. The odds are 127/110

$$(76/51) \div (127/110) = 1.5 \div 1.2 = 1.3$$

OR greater than 1 means – increased frequency of exposure among cases

OR = 1 No change in frequency

OR less than 1 means – decreased frequency of exposure

The odds are 1.3 that journey time affects food price a lot. Out of the 72% respondents who feel that time affects food price, there is 30% chance that the effect is great as calculated below. The implication of this finding is that consumers are 72% more likely to be paying high food prices due to regulation costs which are ultimately affected by increased journey time.

$$(1-OR) 100 = (1 - 1.3) 100 = 30\%$$

Establishment that consumers are 72 % more likely to be paying high food prices due to increased journey time effected a closer view into the cost of meeting regulations. The review into the cost of meeting regulations showcased a marked variance in charges. To begin with, driving license is the only regulation with a standard price out of the seven that were analyzed by the study.

The remaining reviewed regulations are characterized by fluctuating costs due to lack of a standardized format of administration (Ministry of Industry, Trade and Cooperatives, 2017).

According to the Ministry of Industry, Trade and Cooperatives (2017), transport operator business permits for example range from Ksh. 2000 to Ksh. 8000 from one county to another. In addition, trading licenses differ based on the sizes of spaces occupied by traders. Yet, while the regulations require traders in 5m² spaces to pay Ksh. 2000 produced (Ministry of Industry, Trade and Cooperatives, 2017), the respondents alluded to paying an average of Ksh.1000 per year. The lack of moderation in regulation costs as shown in the food corridors serving Kisumu city, thus, has far reaching impact. The implication of this is that where there are additional costs, they end up being reflected in food prices further hampering access to food in food deficit areas like Kisumu city.

Overall, the study finds that despite existence of numerous regulations meant to ensure food security, there lacks standardization in their execution. This is evidenced in; instances of double

payment, fluctuation in the time spent while meeting regulations and fluctuation in cost of meeting regulations. These culminate into the increase of food price thus hampering food access. Presence of numerous regulations in the food corridors thus fail to ease flow of food from hinterland to food deficit areas as was intended at their inception. Further the study details the extent to which each regulation within the food corridor hampers food flows thus highlighting potential areas for intervention for food access.

4.3 Infrastructural Implications of food corridors on food prices

4.3.1 Introduction

This section addresses the second specific objective of the study which was to examine the influence of infrastructure costs within food transit corridors on Kisumu city's food prices. The study looked at infrastructure in terms of storage areas, transportation routes and display areas. The cost implications of the highlighted forms of infrastructure on food formed the basis of the analysis. Cost herein refers to; rents paid for storage space and other accompanying costs like security cost, cost of food transportation via different means of transport as well as cost of renting display areas. Cost of constructing the various forms of infrastructure is therefore beyond the scope of the study.

4.3.2 Storage and Display

The study found that storage of food is done at source, within the food corridors and at the end of the food corridors as well. As seen with the case of maize production, farmers have their own storage at one end of the food corridor. In addition to this, there are collection points where middlemen bulk maize from different farmers for sale. The collection points also serve as storage facilities for maize, though not at the farm level. The Figure 4-4 shows distribution of the collection points / storage facilities in the study area. The collection points are located closer to the farm areas than they are to Kisumu city which is the largest urban settlement in the region in terms of population.

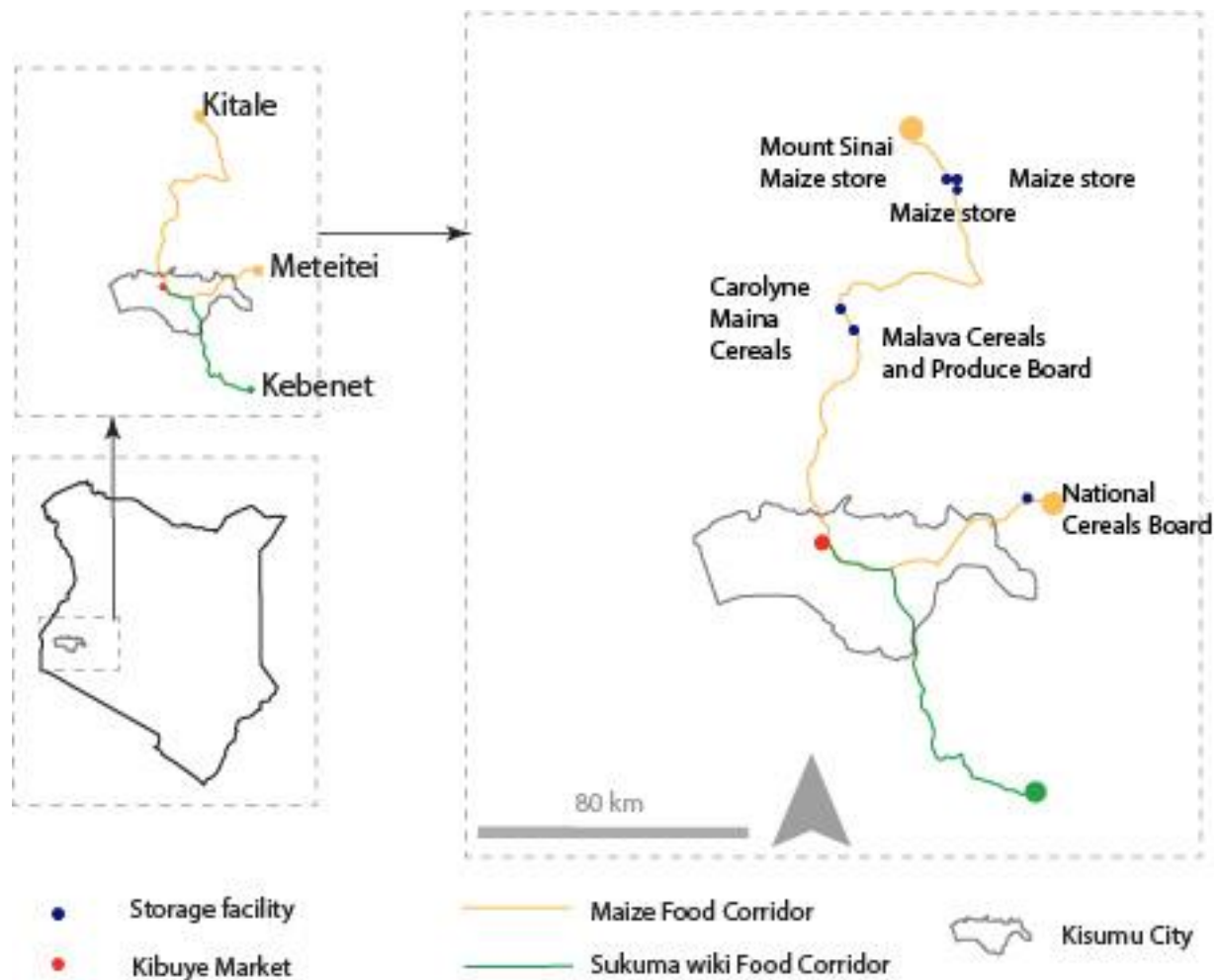


Figure 4-4: Collection points along food corridors
 Source: Author (2023)

At the market places i.e., at the end of the food corridor, storage of maize is done by individual retailers and wholesalers. This is often done right at the place of selling. Display areas therefore double as storage areas. On the other hand, “Sukuma wiki” is not stored at source due to its perishable nature. As such, there are no blue marks along the Kisumu - Kebenet food corridor as displayed in Figure 4-4. The produce is transported to market places as fast as possible where only left-over stock is stored as discussed herein. Display areas which also double as storage are once again used for storage and display of “Sukuma wiki”. They are located at the end of the food

corridors as shown by the big blue mark on Figure 4-4. i.e., Kibuye and Jubilee markets according to study findings.

i. Maize Storage and Display Along Kisumu - Kitale Food Corridor

The Figure 4-5. shows the distribution of storage facilities along Kisumu – Kitale food corridor which supplies the city with maize from the hinterland. It depicts a scenario where storage facilities are located at the end point of the food corridors, as well as at collection points found in between the source and end points of the food corridor. The storage facilities are more concentrated at the end of the chain than they are in between the end points of the food corridor. What the study found to be interesting is that the storage areas at the end point also double as display areas.

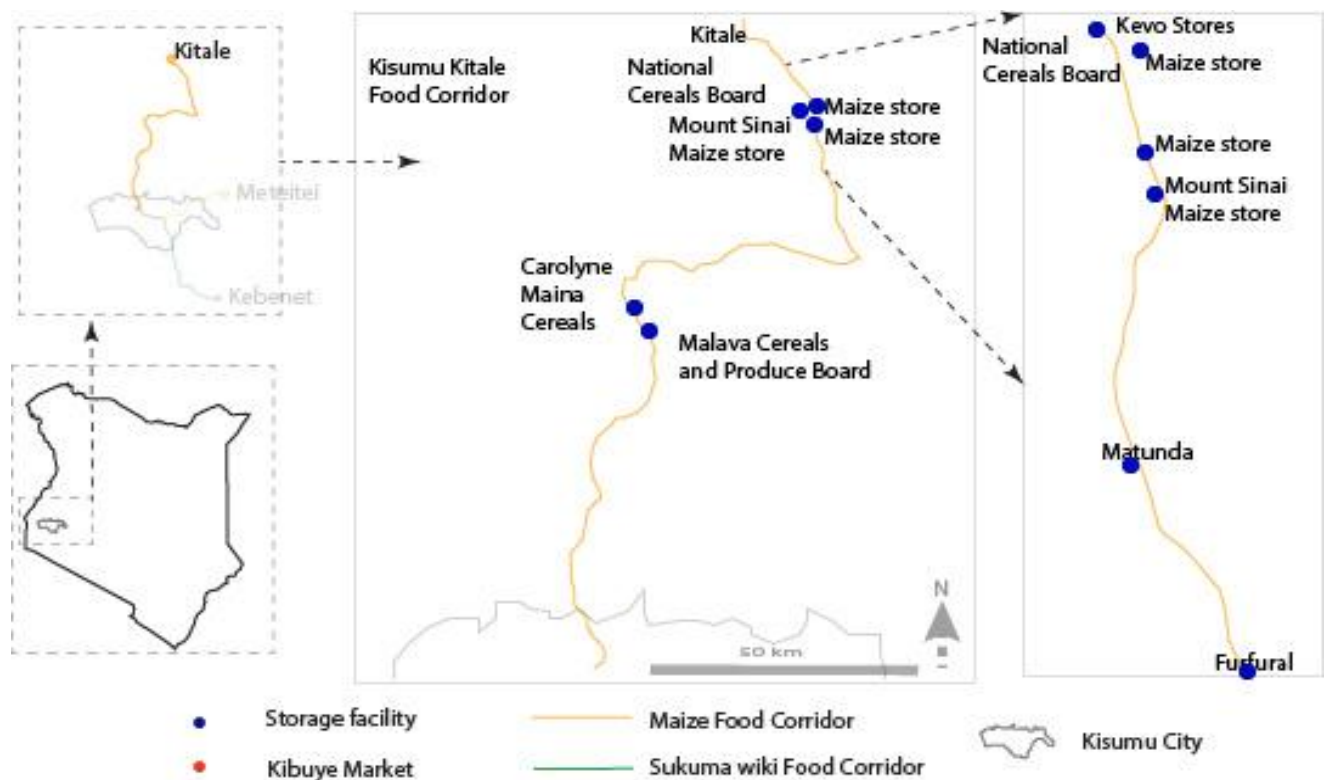


Figure 4-5: Distribution of storage facilities along Kisumu – Kitale food corridor
Source: Author (2023)

The collection points highlighted in the Figure 4-5. are located in shopping centers of maize producing areas. The study finds that location close to maize farms is ideal for the services conducted at the collection points which include shelling, drying and bagging. The study thus went further to establish the condition of the collection points in relation to activities highlighted. The state or condition of the collection points is captured in Figure 4-6 which represents a collection point in Matunda along Kisumu – Kitale food corridor. As displayed in the Figure 4-6., maize is placed directly on the floor in storage rooms with minimal aeration or lighting. The stores are not fitted with rodent proofing features as recommended by the Kenya Agricultural and Livestock Research Organization, (KALRO) (Ndirangu, 2023). Yet, the research organization attributes 40% of maize loss to rodents despite advancements in storage bags designed to keep off other pests like weevils. In addition to storage, basic equipment was also on site as a testament to the activities carried out at the site. There was a sheller to support shelling of maize. Shelled maize was then dried on the ground as indicated in the Figure 4-6. The dried maize was then bagged and stored in readiness for transportation to food deficit areas. One of the middlemen bulking maize for sale to larger markets alluded to challenges related to storage as captured in the statement below.

“At collection points, maize being dried is exposed to natural elements like sunlight, wind and rain which vary in intensity posing a threat to quality of maize”

According to OECD and WTO (2013), collection points are important features in food systems and should be established closer to producers. The authors make reference to adoption of storage facilities like warehouse receipt system platforms where farmers can deliver their produce without the need to go to markets.

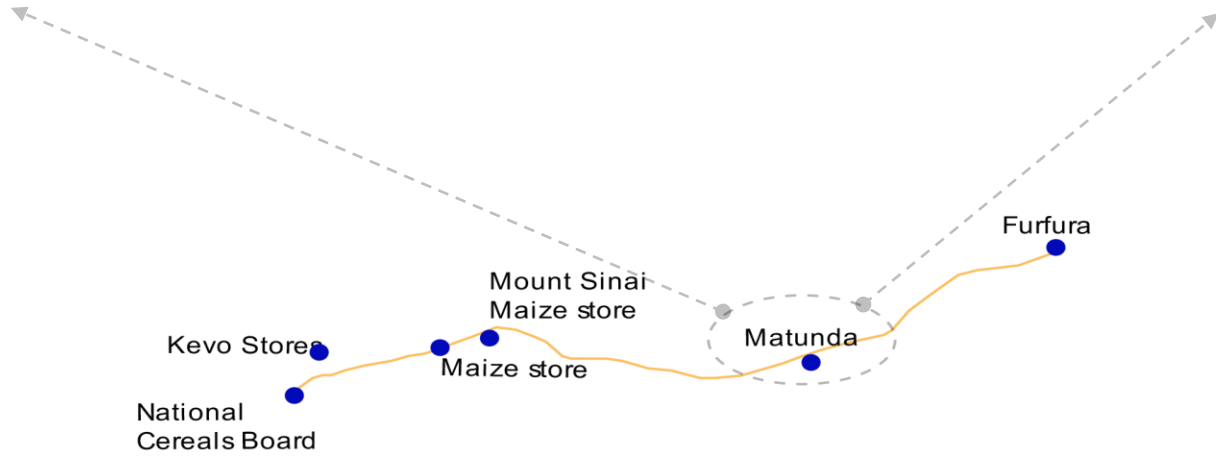


Figure 4-6: Condition of the maize collection and storage points
Source: Researcher (2023)

i. Maize Storage and Display Along Kisumu - Meteitei Food Corridor

Another food corridor highlighted by the study was the Kisumu - Meteitei food corridor. The corridor also supplies Kisumu city with maize which is ranked 1st as the most consumed food produce by the residents. As depicted in the Figure 4-7., Kisumu - Meteitei food corridor has only one main storage facility in Meteitei owned by the Kenya National and Cereals Produce Board. In between Meteitei and Kisumu, there are no storage / collection points. However, storage is predominantly done at the market place i.e., at the end of the food corridor as depicted in Figure 4-7. by the blue dot in Kisumu. The storage in Kisumu is at Kibuye Market and Jubilee market. The spaces also double as a display area. Collection points present in Kisumu – Kitale food corridor as recommended by OECD and WTO (2013) are therefore missing in the Kisumu - Meteitei food corridor.

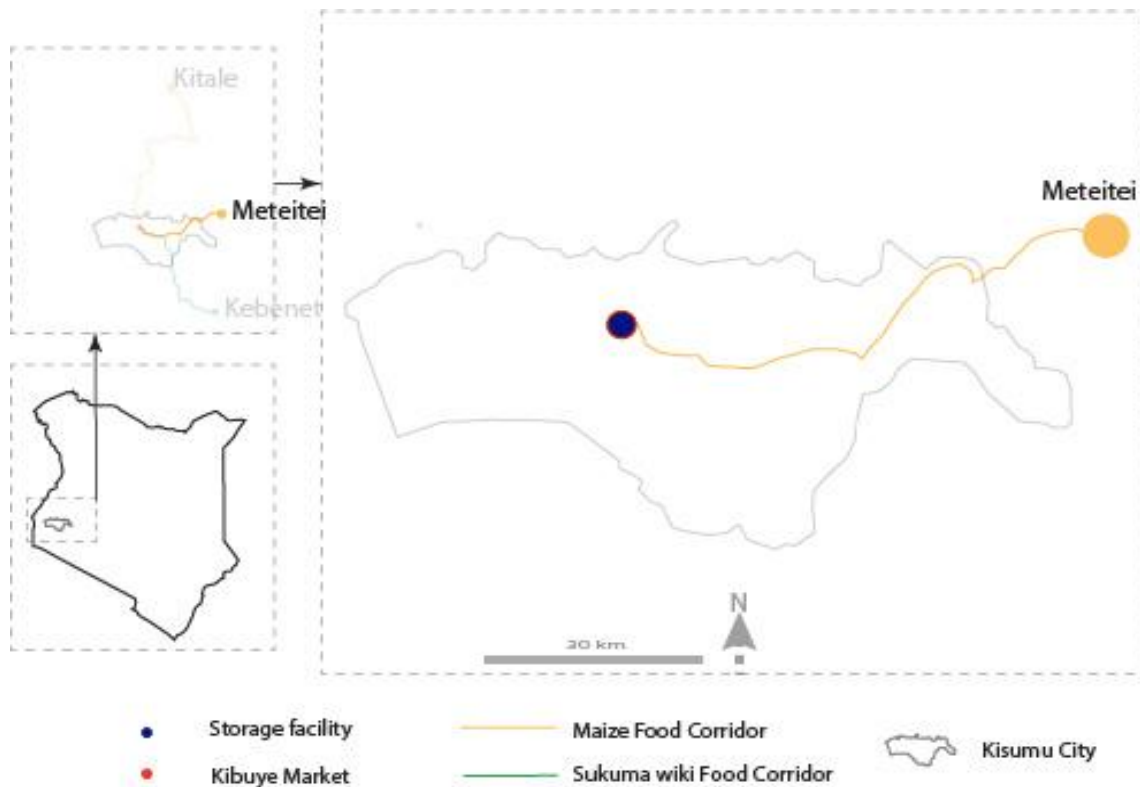


Figure 4-7: Maize storage and display along Kisumu - Meteitei food corridor

Source: Author (2023)

8. “Sukuma Wiki” Storage and Display Along Kisumu - Kebenet Food Corridor

The Kisumu – Kebenet food corridor is the third corridor highlighted by the study. The corridor commences from Kebenet and supplies Kisumu city with “Sukuma wiki”. The corridor mirrors that of Kisumu - Meteitei where storage and display are found at the end point of the food corridor as displayed in Figure 4-8.

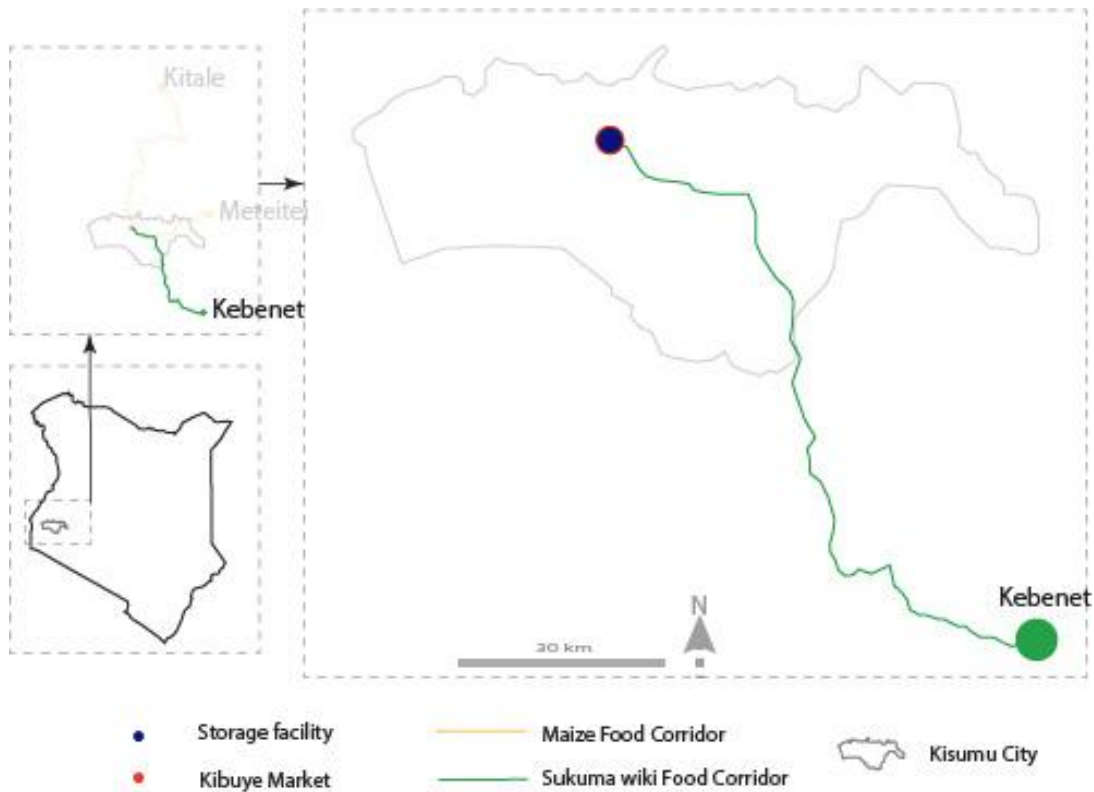


Figure 4-8: “Sukuma wiki” storage and display along Kisumu - Kebenet food corridor
Source: Author (2023)

Images from Kibuye and Jubilee market which are the end points of the food corridors show the storage and display areas supplying Kisumu City with food. The Plate 4-1. shows a trader selling maize. During the day, the maize is displayed in the temporary shed for sales. At the end of the day, the sacks of maize are carefully closed, lumped together and covered with non-

absorbent material as a storage mechanism till the next morning. The food trader however has to pay security guards who watch over produce in the market. The statement below by a maize retailer reiterates this.

“We have to pay watchmen KES 20 daily for security of our produce whether we have stock or not.”



Plate 4-1:Infrastructure Supporting Maize display and storage at Kibuye Market

Source: Researcher (2023)

The same scenario was depicted amongst “Sukuma wiki” traders. The Plate 4-2. below shows an example of a “Sukuma wiki” display area that doubles as storage whenever there is left over. The storage technique is like that of the maize traders. The display / storage area is temporary in nature

and though well aerated; is susceptible to harsh weather conditions like storms that are common in Lake-side cities like Kisumu City. Nevertheless, Jubilee market has a section that is well protected from rain and sun.



Plate 4-2: Infrastructure used to store and display “Sukuma wiki” in Kibuye market
Source: Author (2023)

The display and storage facilities depicted in Plate 4-1 and 4-2 are individually owned. Traders have thus made individual effort to provide protection from direct sunlight and have acquired baskets to hold their “Sukuma wiki” instead of placing the food on the ground. Yet, the forms of infrastructure seem to be lacking adequacy in hygiene and protection from natural elements like rain and sun.

This notwithstanding, there are storage facilities governed by the Kenyan National Government like the National Cereals and Produce Board (NCPB) silos for maize which are of good infrastructure. The food corridors transporting maize to Kisumu city have a cereal and produce Board at Meteitei and also one along Kisumu Kitale route. However, equivalent facilities are lacking along the food corridor supplying “Sukuma wiki” to Kisumu city.

The National Cereals and Produce Board warehouses in Plate 4-3. are of a permanent nature like those of the collection points observed at Matunda (Figure 4-6) along Kisumu – Kitale food corridor. However, the similarities end with permanence of structure. This is because the warehouses constructed by the Kenyan National Government have state of the art infrastructure to ensure desired moisture content is maintained within the stored cereal. This reduces chances of food loss due to rotting or infestation by pests.



Plate 4-3: National Cereals and Produce Board warehouses in Eldoret
Source: Author (2023)



Plate 4-4: Infrastructure for Drying of maize at a NCPB warehouse
Source: Author (2023)

As depicted in the Plate 4-4., NCPB storage facilities are fitted with equipment to support drying and weighing of maize. The drying facilities in major silos are located in Narok, Nakuru, Moi's Bridge, Eldoret, Kitale, Kisumu and Bungoma. The objective of establishing the storage facilities is to ensure reduced post-harvest loss on grain. The NCPB facilities differ from the privatized collection points e.g., the ones located at centres like Matunda along Kisumu-Kitale food corridor (Figure 4-6). This is because maize processing in the private collection points is carried out in a rudimentary fashion thus creating room for inaccuracies in weighing as well as damage to food from natural elements like the rain. The Table 4-7. below outlines the distribution of NCPB storage facilities in counties traversed by the three food corridors highlighted in the study.

Table 4-7: Distribution of NCPB in the counties traversed by the food corridors of the study. (NCPB, 2023)

County	Location of NCPB	County	Location of NCPB
Kericho	Kedowa Kericho kipkelion	Trans Nzoia	Kitale
Bomet	Bomet Ndanai Sotik	Uasin gishu	Ainabkoi Eldoret Kipkabus Kikparen River Kipkaren Salient Moi's Bridge Turbo Ziwa
Nandi	Lessos Meteitei Mosoriot	Kisumu	Fort Ternan Muhoroni Kisumu
Kakamega	Butere Kakamega Malava Lugari	Vihiga	Chavakali Hamisi

Source: Author (2023)

The storage facilities in each of the counties outlined in Table 4-7. average three. However, there are eight NCPB facilities in Uasin-Ngishu which is a testament to the volumes of maize produce in the region. At the warehouses, the produce is tested, cleaned, graded and then stored. This affords farmers the opportunity to delay selling produce until the price is in their favor (Gitonga et al. 2015). Kenya also currently experiences an estimated 20–30% postharvest loss of staple grains yearly, which poses great challenges to the country's food security and economic development (Onyango and Kirmi, 2017). Over \$4 billion USD in food losses occur yearly in Africa due to inefficiencies in the chain of production, storage, and marketing activities that connects farmers to consumers (Barrett, 2017). The NCPB were therefore established to reduce post-harvest loss as well as to store sufficient grain for release into markets if supplies fall below typical levels of

consumption. There is wide recognition that strategic grain reserves play a vital role in ensuring Kenyan food security (Njoroge et al., 2019).

As such, private sector has stepped in to bridge the deficit between demand for storage infrastructure and supply (NCPB, 2023). The Government of Kenya has taken cognizance of this and is inspecting and licensing private grain storage facilities through the National Cereals and Produce Board (Kisia, 2023). However, provision of the private cereal storage facilities e.g., by AFEX Fair Trade Kenya is demand and profit driven. The facilities therefore differ in size, provision of equipment for maize processing as well as in their geographical location. AFEX Fair Trade Kenya for example has established 17 warehouses spread across two counties in Kenya and has registered over 11,000 farmers and traded over 11,000 metric tonnes of maize. In Uasin Gishu County, A farmer service and supply chain company in Kenya has received a certification for one of its warehouses, the first to be issued to a private firm. The certification was done by the Warehouse Receipt System Council (WRSC) at the Soy Mateeny warehouse (Kisia, 2023).

Study findings and the subsequent literature review indicates that storage of maize more so at collection points seems to be taking shape. However, standardization in establishment of the storage facilities is key to sustained quality and quantities of food released into the market. More so for storage areas which double as display areas at market centers as displayed in Plate 4-1.

According to *Gitonga et al. (2015)*, the storage and display areas supporting food flows along food corridors as discussed in the study are however not without cost implications. Farmers choosing to store food in NCPB warehouses for example are charged a one-off drying and weighing fee as well as a recurrent fee for storage. The longer goods are stored, the more one pays. Farmers pay maize drying fees at approximately KES 30 per unit drop of moisture (Ngotho, 2020). In addition

to this, they are charged KES 48 for a 90-kilogramme bag in the first month of storage with the subsequent months attracting a KES 9 charge according to (Andae, 2022)

However, for collection points, the traders purchase maize at a low price from the farmer and hold it to sell to other traders who then transport it to deficit areas. Costs incurred during storage are usually transferred to the next traders at such points of exchange. Some of the storage costs include labor for measuring, bagging, moving to storage, purchasing bags, keeping away rodents, renting the premise and security for the premise. The maize is therefore sold at a much higher price than when it was bought as was established by a middle man from Kisumu – Kitale food corridor.

“We buy maize during harvest time when prices are low. We store it in bulk and sell slowly to markets in deficit areas when prices have hiked. Costs that come with running a maize collection points are often towards shelling of maize, drying of maize, bagging and security. The price can therefore not be the same when we sell to retailers and wholesalers.”

Maize bought from collection points is then transported to the markets by the collector or traders who purchase from the collector. The transportation cost further raises the cost of transaction thus reflecting in the food price. Retailers thus get the food at much higher prices. At this point there are additional costs for storage, security, movement to storage and back; all transferred to the end user i.e., consumer. The statement below by a retailer at Kibuye market is a testament to the implications of the additional costs to food price as of 2022.

“Maize sourced from Nangili this year has hit a record high of KES 70 per kg against KES 40 per kg of last year. In Meteitei, my source has also fluctuated from KES 35 per kg to KES 75 per kg .”

FAO (2012) reports that infrastructure is key to stability of food prices; a feature that helps local food systems provide better nutrition over time. Focus needs to be placed on infrastructure because Renkow et al. (2004) expounds that lack of critical infrastructure results in additional marketing costs often equivalent to about 15% tax on sales to consumers

4.3.3 Transport

The study further paid special attention to transportation of food more so to draw a direct link between its cost and food prices at the end of the food corridor. As the link between food surplus and food deficit areas, transport infrastructure is important for moderating price levels and price volatility in food markets more so when it is associated with provision of safe, reliable, and affordable transport services. For urban areas which rely on hinterlands for over 70% of their food demands, the infrastructure supports flow of food from hinterland to market place and is thus critical for urban food access FAO (2012). The Figure 4-9. shows the food corridors that are the top suppliers of maize and “Sukuma wiki” for Kisumu city. These being the staples and most widely consumed food products in the city showcase the significance of the food corridors to the city’s food access. Of greater significance is the fact that the Food Corridors emanate from the western block of Kenya and thus increase Kisumu’s resilience from external shocks that could cut off food supply from other regions. The condition of the roads is shown in the Figure 4-9.

The Figure 4-9. shows the infrastructure facilitating the transportation of goods along the Kisumu-Kebent food corridor. As depicted in Figure 4-9., the food corridor commences from C19 which connects Kebent to Katito (a main shopping center). The road is in good condition before Katito. However, after Katito, the corridor connects to A1 which is plagued by potholes as indicated in Figure 4-9. The corridor eventually terminates at the market center which is Kibuye market. At the market, the corridor is reduced to a narrow dirt road hosting motorbikes, pedestrians and vehicles.

The findings show a variation in the condition of roads within food corridors. As depicted, conditions vary from well-maintained road sections to sections that are run down and in need of repair. Overall, the transport system can be described as inefficient and this leads to additional costs which raises the food prices as supported by Gómez & Ricketts (2013).



Figure 4-9: Transition from main route to access roads within the market
Source: Researcher (2023)

i. Means of transport

There are different means of transport used within the roads depicted in Figure 4-9 e.g., motorbikes and vehicles. The means of transport are illustrated in the Figure 4-10. and include; lorries, pick-ups, matatus, motorbikes and others. Along the Food Corridors, the most popular means of transport is Pick up at 33% while matatu comprises the least popular transportation at 1%.

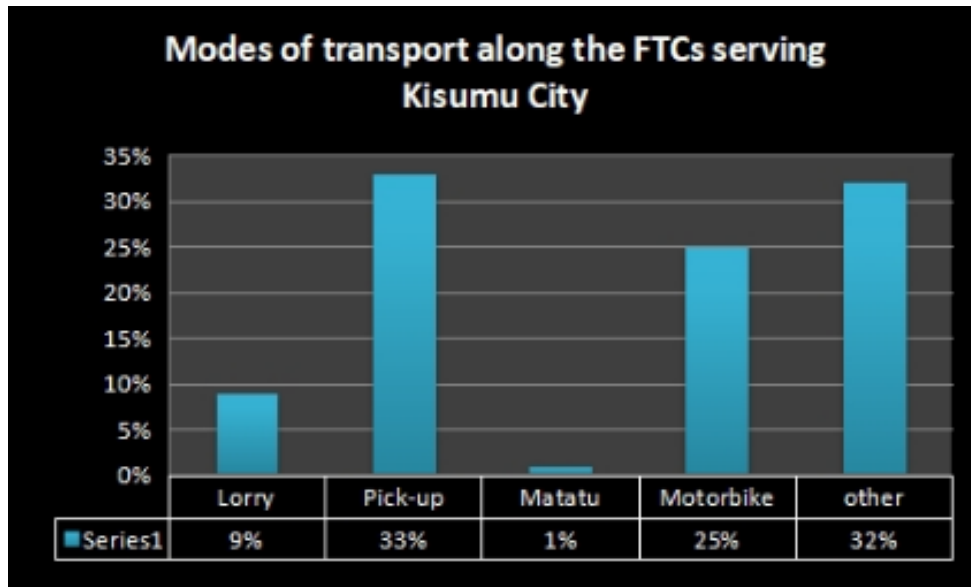


Figure 4-10; Means of transport along the FCs serving Kisumu City
Source: Researcher (2023)

While in the food corridors of Western Kenya Lorries are the largest in terms of capacity, the geography of transport systems shows that large transportation means can include: rail carrying 100 cars, semi-trailer trucks and panama containership carrying up to 5000 tones in comparison to the max 10 tones ferried in the FCs of western Kenya. In addition, much more can be done to improve the transportation situation more so with regard to continuity of means within the transport system.

This refers to the transition from big to small, farm to retail and involves transfer from one means of transport to another often referred to as intermodal transportation (Rodrigue and Slack, 2020).

This requires an interconnection where it is possible to transfer from one means of transport to the other. Such focus is important because the study has shown that in the food corridors of western Kenya, transition happens from road transportation in bulk to transportation in smaller quantities within destination markets.

The Table 4-8. below shows the preferred means of transport across varying categories of traders clearly depicting the transition postulated by (Adero, 2015). As highlighted in the Table 4-8., 75% of drivers transporting food use Lorries, 65% of wholesalers use pickups. This shows a clear transition in the quantities transported from producer to middleman i.e., from Lorry to Pick up. Wholesalers further step it down from pick up to motorbike used by 53% of traders in the category as the preferred means of transport.

The term ‘others’ in the study implies head loads, wheel barrows and wheel carts donkeys. They are predominant in the food markets found at the end of the Food Corridor marking transition from bulk transportation to retail at 40%.

Table 4-8: Preferred means of transport across varying categories of traders

Category of business	Lorry	Pick-up	Matatu	Motorbike	Other	Total	
						%	Count
Drivers	75%	25%	0%	0%	0%	100	12
Middleman	10%	65%	0%	0%	25%	100	40
Wholesaler	12%	15%	0%	53%	20%	100	68
Retailer	3%	33%	2%	22%	40%	100	190
							310

Source: Author (2023)

The variation in quantities being transported by differing categories of traders has implications on the spaces required for circulation within the business persons' areas of operation. More so because road infrastructure is a large consumer of space (Rodrigue and Slack, 2020). An example from Kibuye market as illustrated in the Figure 4-11. highlights inaccessibility of roads thus lorries would lack adequate access to the market during drop off leading to obstruction and offloading in areas that can lead to contamination of food. In addition, access and circulation at the markets is tight considering that 9% (27) of respondents expect Lorries to be offloading at the market as the predominant means of transport.

Further, the access roads showcased in the Figure 4-11. are inadequate in providing efficient accessibility to market core. This is due to incidences of overcrowding on road reserves within the market as shown in the Figure 4-11.

The challenges showcased call for improvement of transport infrastructure supporting transition from bulky means of transport to lighter means. More so because studies postulate that the quality of road infrastructure can strongly influence food price Minten and Kyle (1995).

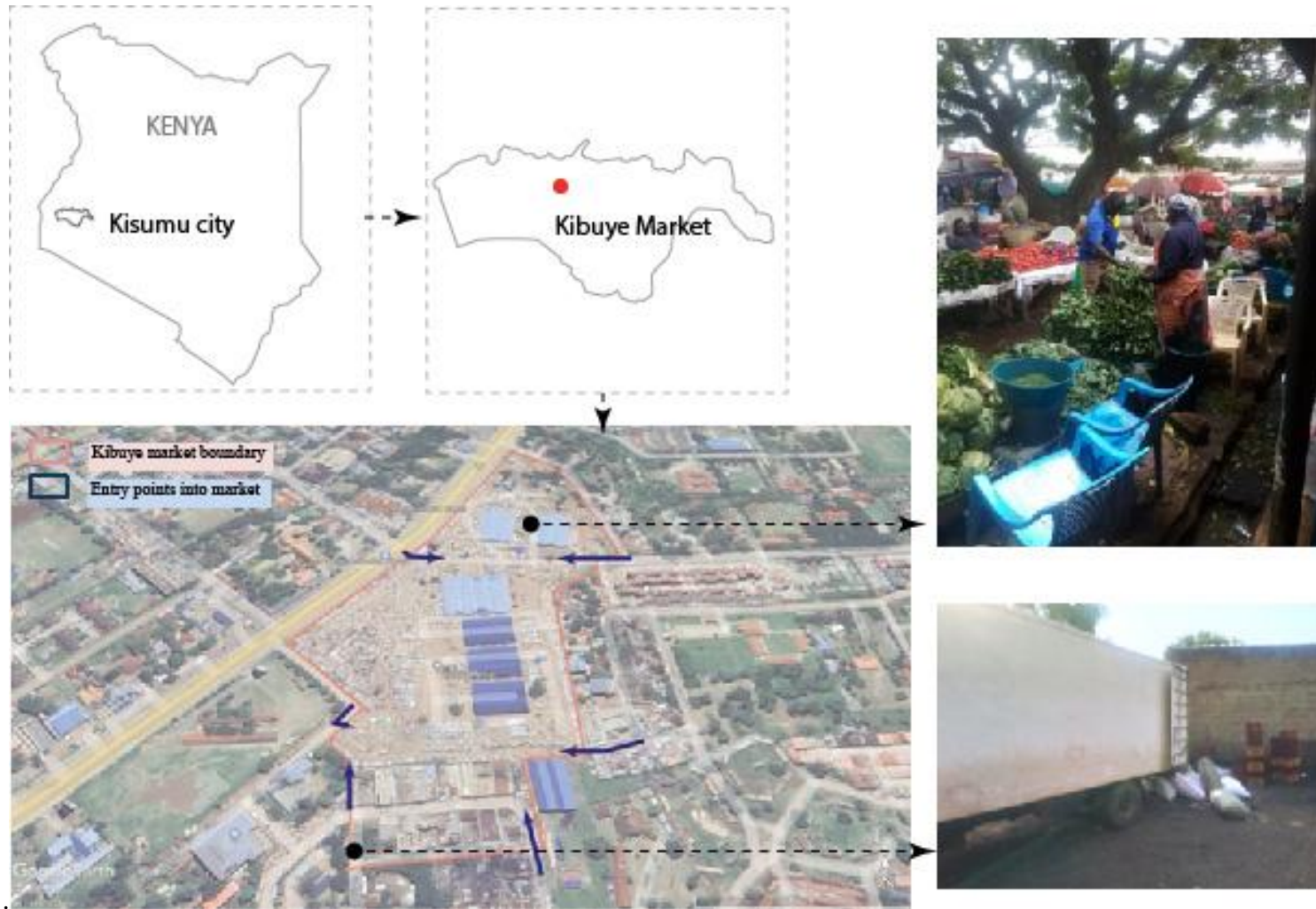


Figure 4-11: Inaccessible entry points and overcrowding hampering the inter-modal transport in Kibuye market

Source: Author (2023)

Rodrigue and Slack (2020) reiterates that commodity prices are higher on bad roads. The author thus advocates for improvement of access as this will lower additional costs on traders thereby reducing food prices. The author further posits that means of transport can compete or complement one another in terms of cost, speed, accessibility, frequency, safety, comfort. The significance of the connection between external and internal transport infrastructure is the cost implication on commodity/food prices. The study therefore further analyses the Cost of transportation across the different means of transport for each food corridor as depicted in Table 4-9.

ii. Cost of transport

Table 4-9: Table detailing the cost of transportation across each food corridor.

Maize from Kitale					
		Section_3/cost_of_transportation1-unit cost	Daily average total sales per category - bags	Unit cost by average total sales per category	Transportation distance-km - means
Retailer	<i>Lorry</i>	100	3	300	30
	<i>Pick-up</i>	100	3	300	36
	<i>Other</i>	100	3	300	24
		100	3	300	30
Wholesaler	<i>Other</i>	300	11	3300	0.5
Middleman	<i>Pick-up</i>	500	12	6000	36
Maize from Nandi					
Retailer	<i>Lorry</i>	150	3	450	42
	<i>Pick-up</i>	130	3	390	24
	<i>Motorbike</i>	166.6667	3	500	
		148.8889	3	446.666667	

Wholesaler	<i>Lorry</i>	200	7	1400	0.05
	<i>Pick-up</i>	50	7	350	
	<i>Other</i>	100	7	700	0.05
		116.6667	7	816.6666667	
	“Sukuma wiki” from Kebenet				
		Section_3/cost_of_transportation1 -unit cost	Daily average total sales per category - bags	Unit cost by average total sales per category	
Drivers	<i>Lorry</i>	110	80	8800	51
Middleman	<i>Pick-up</i>	64	69	4416	50
	<i>Lorry</i>	125	69	8625	51
		95	69	6521	
Retailer	<i>Matatu</i>	50	4	200	5
	<i>Motorbike</i>	67	4	268	2
	<i>Other</i>	27	4	106	
		48	4	191	
Wholesaler	<i>Lorry</i>	121	18	2184	51
	<i>Motorbike</i>	50	18	900	1
	<i>Other</i>	50	18	900	1
		74	18	1328	

Source: Author (2023)

The study findings show that along Kisumu-Kitale Food Corridor, Middlemen use pickups predominantly to transport maize. Distances covered by the pick-ups ranges from 24 kilometers to 36 kilometers as shown in Table 4-9. Wholesalers in the food corridor however use other means of transport like carts though they cover less distance in terms of kilometers; as low as 0.05

kilometer as indicated in Table 4-9. Retailers on the other hand use pick-ups, other means of transport as well as lorries. Distance covered by retailers ranges from 24 kilometers to 36 kilometers as indicated in the Table 4-9. Subsequent average costs of transportation range from KES 300 per day for retailers to KES 6000 per day for middlemen (Table 4-9).

According to the data displayed in the Table 4-9, transportation cost within a particular food corridor seems to vary based on the quantities transported in terms of bags and not distance. Along the Kisumu-Nandi Food Corridor, wholesalers use lorries, pick-ups and other means of transport to get food to the market. The distance they cover averages 0.05 kilometers. Yet retailers in the same food corridor ironically seem to transport maize across longer distances (42 kilometers) than wholesalers who are often thought to supply retailers. This is displayed in Table 4-9. The following response from a retailer explains the anomaly.

“We as retailers no longer wait for maize to get to the market. Rather, we hire a lorry as a group of retailers then call scouts on the ground to collect maize from farms and load onto a pooled transport. The transporter and scouts ensure goods well labeled for each retailer in the pool. We wait for the lorry to arrive with our maize in the market.”

Further analysis shows that transportation ranges from KES 350 per day to KES 1400 per day. Transportation of maize via pick-ups ranges from KES 350 to KES 390 per day based on the distance and quantity to be transported as shown in the Table 4-9. The statistics thus show that unit cost of transportation is influenced by distance travelled. However, the observation contrasts with observations made in the Kisumu- Kitale food corridor where the unit cost of transportation was affected by quantities only.

Transportation along Kisumu-Kebenet is multimodal for drivers and middlemen transporting “Sukuma wiki”. The means of transport used as found in the study are lorries, matatus, motorbikes

and other means of transportation like carts. They both use lorries to transport “Sukuma wiki” while only middlemen use pick-up as an additional means of transport. According to the respondents, distance covered by the drivers and middlemen range from 50 kilometers to 51 kilometers as shown in Table 4-9. Wholesalers in the food corridor register travel distances ranging from 1 kilometer to 50.5 kilometers as shown in the Table 4-9. Further, distance covered by retailers during transportation along the Kisumu-Kebernet food corridor ranges from 2 kilometers to 5 kilometers.

Cost of transportation along the food corridor via lorries ranges from KES 2184 per day by retailers to KES 8800 per day by drivers. The difference is due to quantities sold which range from 18 bags per day to 80 bags per day respectively. Cost of using motorbikes which are used by wholesalers and retailers ranges from KES 900 per day to KES 268 per day respectively.

Overall, the findings in the Table 4-9. show that the unit cost of transport increases with distance and quantities transported. This is clearly shown by the unit cost of transportation which ascends from Kisumu- Kebernet food corridor, to Kisumu – Meteitei to Kisumu – Kitale. The average unit cost for the food corridors highlighted range as follows: KES 47 to KES 110 for Kisumu- Kebernet, KES 116 to KES 148 for Kisumu – Meteitei and KES 100 to KES 500 for Kisumu – Kitale. Due to the variations in comparing transportation cost for each food corridor against category of traders and means of transport, an overall analysis was done irrespective of the food corridors to clearly highlight existing relationships in the data. As such, the Figure 4-12. displays the cost of transportation on average for the different means of transport discussed herein.

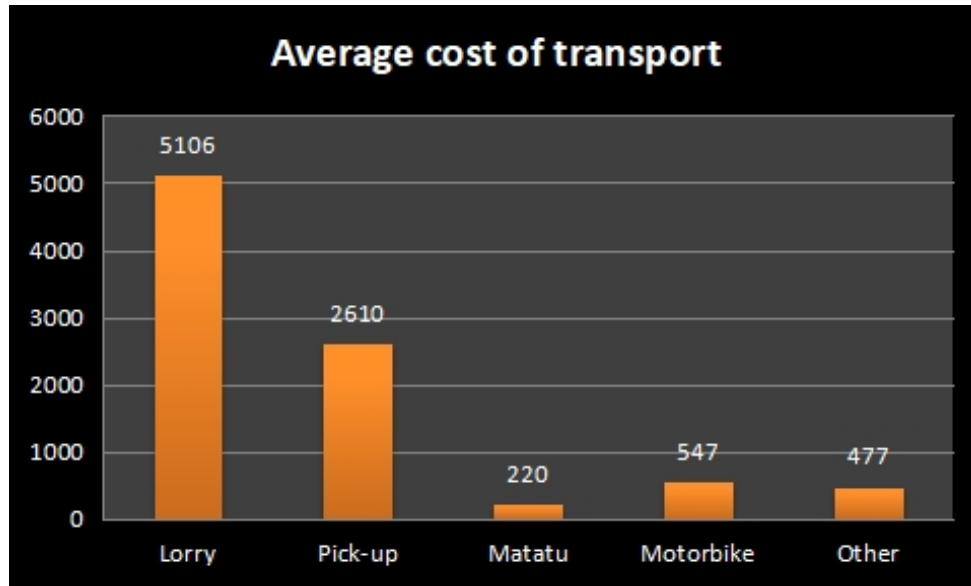


Figure 4-12: Average cost of transport

Source: Researcher (2023)

As displayed in the Figure 4-12., the study finds that on average, the cost of transportation across the different means of transport is 5106 for lorries, 2610 for pick-ups, 220 for matatu, 547 for motorbike and 477 for other means e.g., carts and head loads.

The range is between 5106 and 220 approximately for Lorries and Matatus. The range is big but most important is to note that the additional costs are all transferred to the selling price. Consequently, transportation costs make up a larger share in the price of produce, so that an increase in the transportation cost will raise the price of goods proportionately (Dombroski, 2017). FOOD AND AGRICULTURE ORGANIZATION (2017) reiterates the position of Dombroski (2017) positing that there exists a positive relationship between transport cost and food prices.

This is depicted in Table 4-10. where study findings show that retailers who sell less quantities (14,836 KES per day) make less sales than drivers (90,000 KES per day) who supply the retailers and wholesalers (28,223 KES per day). Cost of transportation incurred by the different categories

of traders differs as displayed in the Table 4-10. Retailers spend the least in transportation at 89 KES per day while transporters spend the most (4000 KES per day).

Table 4-10: Summary of Transport cost and selling price

<u>Category_of_business</u>	<u>Selling price</u>	<u>Cost_of_transportation</u>
Retailer	14,836	89
Wholesaler	28,223	1,638
Middleman	32,288	281
Drivers	90,000	4,000

Source: Author (2023)

To further investigate the trend depicted in Table 4-10. the study conducted regression analysis to establish whether transport costs highlighted in the study influenced food prices. The table used to run the regression analysis displays total transportation costs and total sales per trader. The regression analysis output report is displayed in Table 4-11. Displaying a positive relationship between the two variables due to the positive coefficient (18275.85). Influence of transportation costs on food prices can thus be calculated using the equation line $y = 2.512194x + 18275.85$. A measure of how much the change in selling prices is driven by the changes in transport cost was further confirmed by a significance $F = 0.025896118$. This ratifies the strength of the relationship between transport costs and food prices.

The finding affirms the position that there exists a positive relationship between transport cost and food prices (Rodrigue and Slack, 2020) and (Lipinski et al., 2016). More specifically, a unit increase in the cost of transportation will result in a price increase by 0.008873856% which can be rounded off to 0.01%

Table 4-11: Table showing Regression analysis of transport cost on food price

<i>Regression Statistics</i>								
	0.16888							
Multiple R	9							
	0.02852							
R Square	3							
Adjusted R	0.02287							
Square	5							
Standard	23573.0							
Error	8							
Observations	174							

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	2.81E+09	2.81E+09	5.050072096	0.025896118
Residual	172	9.56E+10	5.56E+08		
Total	173	9.84E+10			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	18275.85	1858.048	9.83605	2.15198E-18	14608.34167	21943.37	14608.34	21943.37
X Variable 1	2.512194	1.117904	2.247237	0.025896118	0.305617419	4.718771	0.305617	4.718771

Source: Author (2023)

Minten and Kyle (1995) shed light on the finding by observing that poor transport infrastructure raises the cost of transaction higher thus impacting more severely on commodity selling prices. Such information can be very critical to urban planning in designating routes to be dedicated as critical food corridors by factoring in the transportation costs along different routes. Further, food corridors characterized by poor transport infrastructure can be mapped for upgrading as a strategy for reducing food prices for increased access to food in urban areas.

Mittal, Krejci and Craven (2018) highlight the success of such an approach in Sweden where it was observed that the greatest logistical inefficiencies occur at the beginning and end of the supply

chain, where numerous short but indirect first/last-mile hauling routes increase the per-unit hauling cost. Interventions thus targeted specific areas of need. The findings are in line with Von Thunen's deduction that transportation cost should be kept at a minimum as it has a direct influence of food prices (Fujita & Krugman, 1995).

Overall, the study establishes that storage and transport related costs borne by business persons within food corridors are ultimately transferred to consumers at the end of the corridor. In addition to this, the relationship between cost of transport and food price as established in the study is positive and linear, thereby spiking food prices. The findings also help identify potential areas for injecting intervention e.g., areas of interconnection where transfer from bulky transportation to less bulky transportation occurs in a manner resulting to additional transportation costs that are ultimately transferred to food prices thereby hampering food access.

The challenge at the interconnecting points (at the end of the food corridor) is exacerbated by the fact that planning provisions have guidelines on markets and guidelines on roads separately and this could be the reason for the disconnect seen. Overall, the study has highlighted critical forms of infrastructure for food flows from food surplus to food deficit areas. The need to better plan their development cannot be overemphasized seeing the impact they have on food prices for food deficit areas like cities.

4.4 Significance of gender price gap within the food corridors on food price

This section addressed the third specific objective of the study which was to establish the significance of gender price gap between men and women operating within the food corridors of Kisumu city on food access. The focus was guided by suppositions that men tend to set higher food prices than the women in food trade. Bearing in mind that women dominate food trade,

fostering their presence in food markets could be one way of increasing access to low food prices thus increasing access to food.

Thus, the findings and discussions herein sought to highlight the differences in profit margins between the men and women operating within the food corridors of Kisumu city.

As such, gender of food traders was analyzed vis a vis profit margin. This is because profit margin has a direct impact on food access as higher margins translate to higher food prices for the consumers thus hampering food access. The findings thus led to discussions on possible avenues for increasing food access.

The Table 4-12. shows the distribution of men and women across the different categories of food trade. The findings show that 82.48% of all women in the food corridor represent retailers. Majority of men in the food corridor also operate as retailers at 47.78% as depicted in the Table 4-12. Overall, retail represents the largest percentage of food traders along the food corridor at 68.73% and comprising 50% women and 18.7% men. The findings illustrate that woman in food trade are more than men in food trade. Beyond overall dominance of women in terms of numbers (60%), 62% of sales made per week - 6,932,332 Kenya Shillings - originate from female food traders.

Table 4-12: Distribution of men and women across the different categories of food trade.

Representation of men and women across the different categories of trade.				
Row Labels	Female	Male	Grand Total	Count
Drivers	0.73%	6.67%	3.08%	11
Middleman	0.73%	22.22%	9.25%	33
Retailer	82.48%	47.78%	68.73%	253
Wholesaler	16.06%	23.33%	18.94%	69
	100.00%	100.00%	100.00%	366

Source: Author (2023)

The significance of these findings is highlighted by agencies like UN WOMEN that focuses on women empowerment (UN Women, 2018). The agency holds that women make enormous contributions to economies whether in businesses, on farms, as entrepreneurs or as employees. Investing in women has thus been found to increase inclusive economic growth. The finding resonates with research studies conducted by (UNDP-UNEP PEI, 2016).

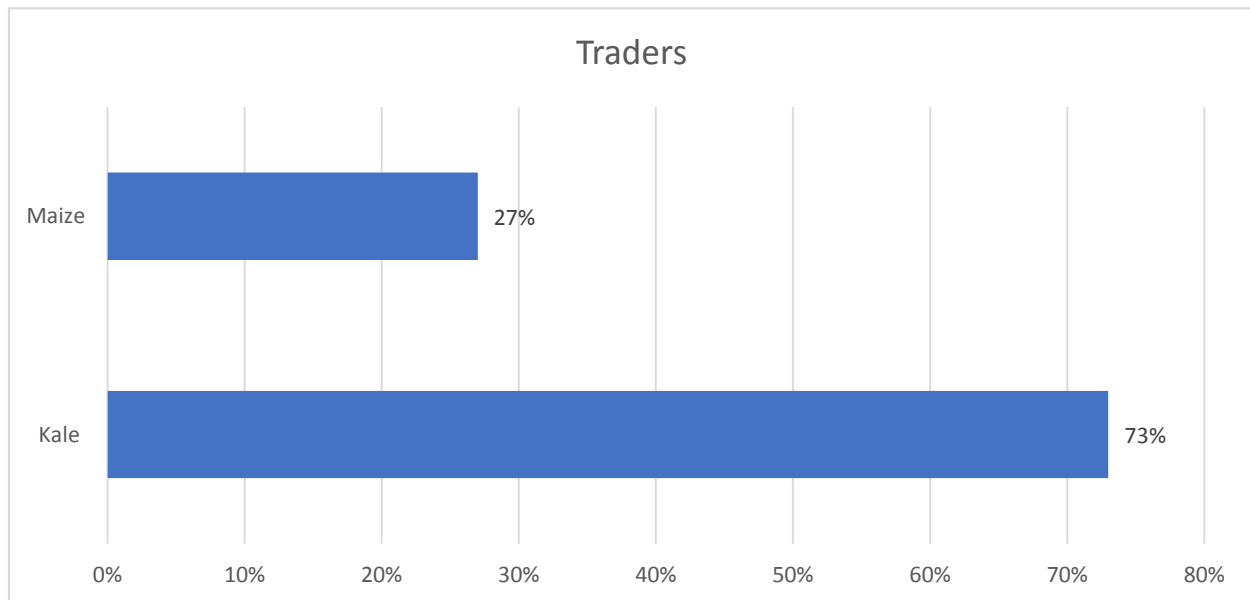
However, Machelett (2019) and Mehra (1997) posit that men in food trade often set higher prices than their female counterparts even when selling the exact same product. This implies existence of a gender price gap between men and women which Machelett (2019) and Mehra (1997) describe as a significant factor to affordability of commodities.

Findings from this study were keen to link the allegation to food trade. This is because women dominate food trade at 60% and the possibility of them setting lower prices than men in food trade would be positive for food access. In order to establish the Gender price gap in the study, profit margins between men and women in food trade were established.

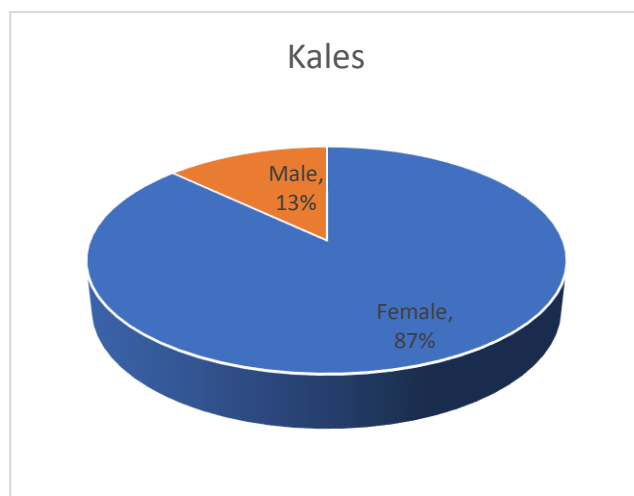
Profit margins

Focus was on the sale of maize and “Sukuma wiki”. According to the study findings displayed in the Figure 4-13. 73% of respondents sell “Sukuma wiki”.

Figure 4-13: Traders selling maize and “Sukuma wiki” by percentage

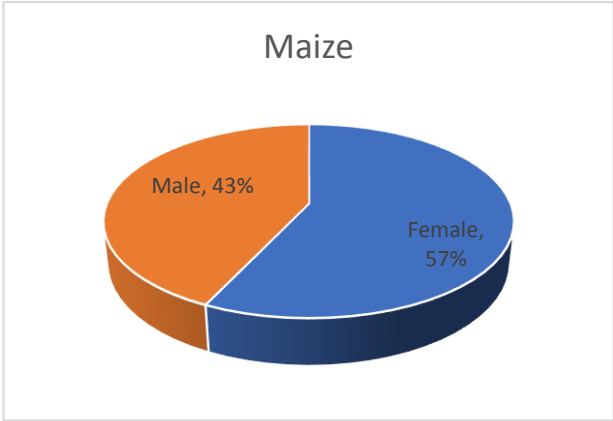


Source: Author (2023)



Further analysis by food type shows that “Sukuma wiki” has 87% and 13% of women and men respectively, trading in it. This is displayed in the Figure 4-14. The Figure 4-15. presents the findings on gender of traders selling maize. According to the findings, women still dominate trade in maize at 57%.

Figure 4-14: Distribution of men and women selling “Sukuma wiki” by percentage



However, the presence of men is higher at 43% as opposed to their presence in “Sukuma wiki” trade at 13% (Figure 4-15). The study went further to analyze average prices of food sold by gender. In order to analyze this, weekly sales were calculated for each gender.

Figure 4-15: Distribution of men and women selling Maize by percentage

Source: Researcher (2023)

This is displayed in Table 4-13. Sales by women in food trade were at KES 4,343,332 while those of men were at KES 2,589,000.

Table 4-13: Table showing total weekly sales of food sold by both men and women

	Female	Male	Grand Total
Total of weekly sales	4,343,332	2,589,000	6,932,332

Source: Author (2023)

The total weekly sales made by men were almost half of what was made by women. This could be due to the fact that women represent 60% of food traders as found by the study. The study was however keen to find the profit margin between sales made by female food traders and sales by

male food traders. This is because lower profit margins are a testament to affordability. Higher margins are synonymous with high prices and can thus hinder access. The Figure 4-16. showcases how profit margins vary between men and women in food trade as found by the study. Profit margin was computed by first establishing the cost of getting food to the market. The selling price was then established. Difference between selling price and cost of getting food to the market was then computed to help investigate variations in the profit margins set by male and female food traders.

As displayed in the Figure 4-16. men tend to set higher profit margins than women. The Figure 4-16. indicates that 84% of women as opposed to 63% of men in food trade set profit margins ranging between 0% - 40%. At the higher end of the profit margins, the Figure 4-16. shows that 26% of men and 13% of women set profit margins of 61% and above.

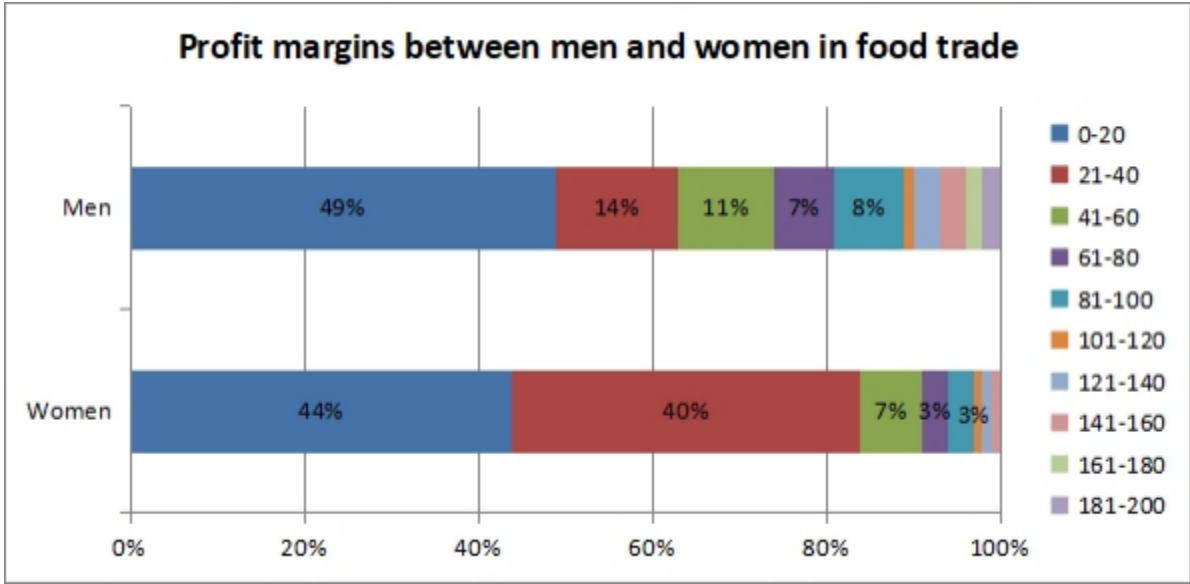


Figure 4-16; Profit margins between men and women in food trade
Source: Researcher (2023)

Further, study findings displayed in the Figure 4-17. show female dominance where profit margins are meagre and a trend reversal where male dominance picks up as profit margins increase.

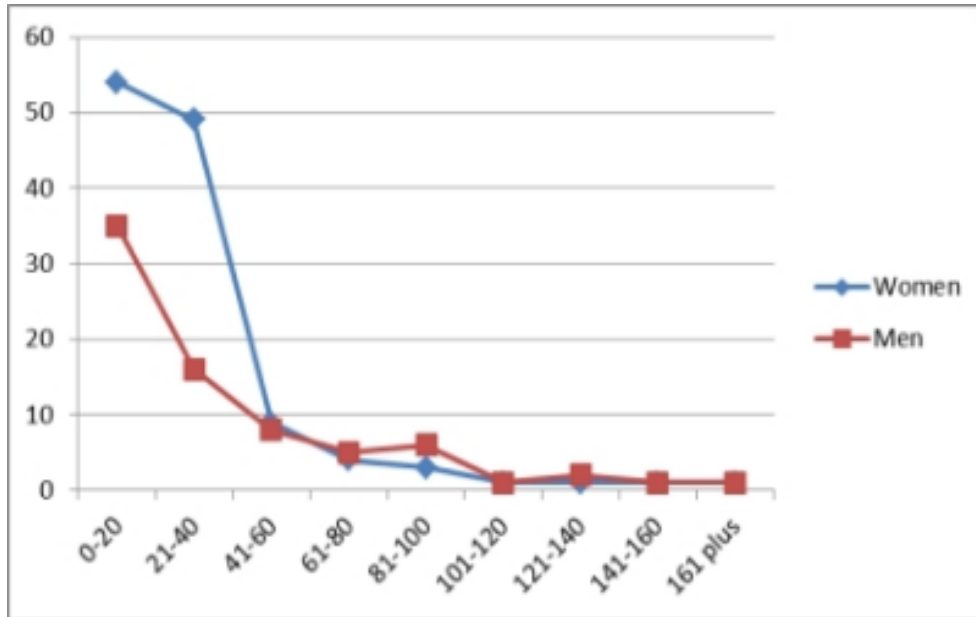


Figure 4-17: Trends in profit margins

Source: Researcher (2023)

The findings intimate that men set higher food prices than their female counterparts despite women dominating in food trade. Cherie Blair Foundation (2012) posits that urban food access is highly dependent on food prices that are determined by profit margins set by traders hence the significance of this finding to food access. Urban populations stand to benefit from the lower profit margins observed amidst women in food trade as they will translate into reduced food prices thereby increasing urban food access (Paul and Steinbrecher, 2013).

A closer look at the profit margins set by men and women in food trade revealed a trend that could be critical to food access. Consequently, the study cross tabulated gender against profit margins (Table 4-14) and subjected the findings to a chi test. The test was to establish whether the

differences seen in profit margins between men and women were statistically significant or not.

The study found significance at a *P-value* of = .0004 because the figure is lower than = .05

Table 4-14; Chi test results for gender and profit margins

Actual Values				Expected values			
	No. of traders (Maize and “Sukuma wiki”)				No. of traders (Maize and “Sukuma wiki”)		
Percentage profit	Women	Men	Sub-total	Percentage profit	Women	Men	Sub-total
0-20	54	29	83	0-20	51.56061	31.43939	83
21-40	48	14	62	21-40	38.51515	23.48485	62
41-60	9	8	17	41-60	10.56061	6.43939	17
61-80	5	4	9	61-80	5.590909	3.409091	9
81-100	3	7	10	81-100	6.212121	3.787879	10
101-120	1	3	4	101-120	2.484848	1.515152	4
121-140	1	3	4	121-140	2.484848	1.515152	4
141-160	1	4	5	141-160	3.106061	1.893939	5
161 plus	1	3	4	161 plus	2.484848	1.515152	4
	123	75	198		123	75	198
0.0041							
84							

Source: Author (2023)

FAO *et al.* (2021) and Korinek (2005) posit in tune with the study findings that men tend to set higher food prices than women even when selling the exact same produce. African Development Bank Group (2020) and Zakari, Ying and Song (2014) explain this phenomenon by attributing higher food prices by men to availability of resources that can be responsible for prolonging shelf

life thus reducing the pressure of quick sales which often drives the women in food trade to lower their food prices. According to FAO (2017) low food prices among women is also fueled by limitation of access to productive resources, their relative lack of equality, the burdens they carry as caregivers and other responsibilities which expose them to particularly vulnerable situations.

UNDP-UNEP PEI (2016) elaborates on the highlighted inequality stating that women often face gender-specific challenges to full participation in the labor force, which may require policy interventions beyond those aimed at promoting economic growth and the efficiency of rural labor markets.

Consequently, closing the gender price gap in agriculture would produce significant gains for society by increasing agricultural productivity, reducing poverty and hunger and promoting economic growth (Murumba and Mungai, 2018).

Salomon (2015) posits that in lieu of this finding, it is of interest to increase leverage and the bargaining power of women in food trade as a catalyst to urban food access. United Nations Conference on Trade and Development (2019) has made proposals that this can be realized through increasing asset control of the targeted party; which is women for this case. The need for such an effort is emphasized by study findings which show that despite setting lower profit margins than men in food trade women also control assets of less value than men. The Figure 4-18. below illustrate how men in food trade control larger asset values (91%) than their female counterparts (9%).



Figure 4-18: Asset control between male and female business persons

Source: Researcher (2023)

The assets vary as illustrated in Table 4-15. that has been tabulated from study findings. Critical assets to food trade as highlighted by the study include: Baskets, Chairs, Stools, Mobile phones, Display mats, Display stands, Display stalls, Storage, Hand carts, Motorcycles, Pick-Ups, Lorries, Personal Savings and Self-Help Groups. The asset types listed increase value in time with value categories displayed in the first column. Traders with low asset values listed baskets and chairs as part of the assets key to their operations. Those with higher asset values listed high value assets like Lorries as key to their business operations.

Table 4-15: Asset Value between men and women along the food corridor

Categories of asset value	Asset Type	Gender representation (%)
0-5000	Basket, Chair, Display stand, Mobile phone, Personal Savings, Table banking, Self-Help Group,	<p>Female, 58% Male, 42%</p>
5001-10000	Basket, Stool, Display mat, Display stand, Display stall, Storage, Mobile phone, Hand cart, Personal Savings, Self-Help Group,	<p>Female, 83% Male, 17%</p>
10001-15000	Basket, Display stand, Display stall, Storage, Mobile phone, Self-Help Group,	<p>Female, 100%</p>
15001-20000	Motorcycle, Personal Savings, Table banking	NIL
20001-25000	Personal Savings	<p>Female, 50% Male, 50%</p>
25001 onwards	Mobile phone, Motorcycle, Pick-Up, Lorry, Table banking, Personal Savings, Self-Help Group, Farming land	<p>Female, 38% Male, 62%</p>

Source: Author (2023)

However, the last column of Table 4-15. displays the findings by gender. Study found that more women than men in food trade control assets of low values i.e., 15,000 and below (Table 4-15).

On the other hand, more men than women in food trade control assets of higher value i.e., 15,000 and above (Table 4-15). As asset values start to rise, the number of women controlling high value assets reduces in comparison to that of men (Figure 4-19).

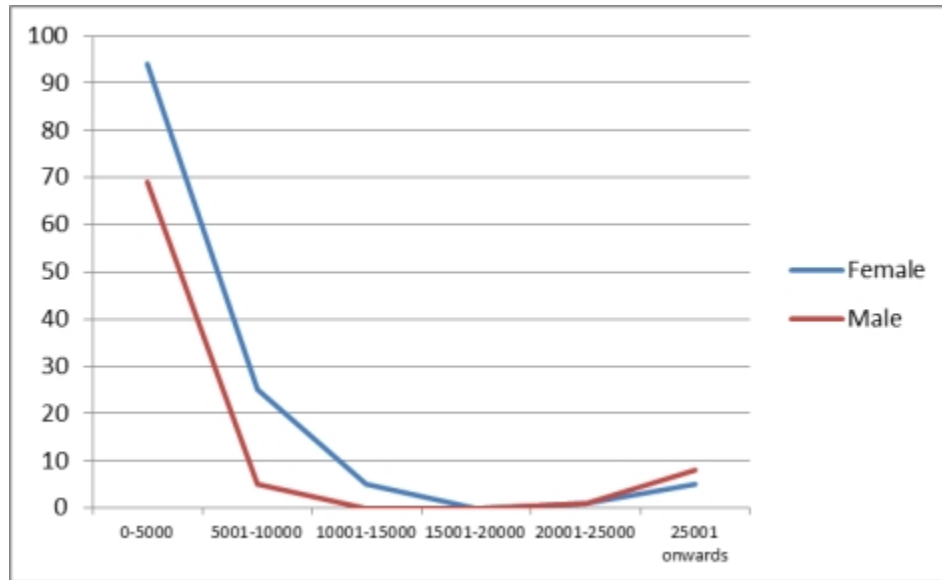


Figure 4-19: Trend showing asset value between men and women in food trade

Source: Researcher (2023)

International Trade Centre (2017) states that assets are critical to participation of business persons. Women's marginalization from these assets has served to see them selling paltry produce to local markets (Lipinski *et al.*, 2016) and concentrating in nodes where profits are limited (Ragasa and Lambrecht, 2020). On the contrary, men in food trade dominate external trade and nodes of high profit margins due to access to assets like land, capital and time (Cherie Blair Foundation, 2012). Since women in food trade set lower profit margins than their male counterparts, increasing their asset control would be critical to urban food access. Fiankor, Curzi and Olper (2021) reiterate that leveraging the bargaining power of women in food trade through increased access to high value assets results in production of better-quality products thus resulting in steady consumer prices in comparison to one who does not have access to high value assets.

According to (Rio, 2017), proper storage, display areas and permanence in the food market are some of the leverages that men have over women in food trade.

Their rich asset base enables them to negotiate prices to their satisfaction without fear of perishability or destruction due to poor display and storage areas (Nogales, 2014). It also enables them to purchase in bulk and sell meagre quantities to retailers who buy less due to less asset values and mostly women.

It is therefore important to increase presence of women in food trade and not just in number but in optimal participation within the market (Fiankor, Curzi and Olper, 2021). Rio (2017) proposes that such a venture can best be achieved via affirmative action to increase access to assets by women in food trade.

Nevertheless, Reynolds and Keahey (2008) champion engendered development that affirmatively elevates participation of women in food trade from labor source to entrepreneurial status. However due to women's limited access to training and the rapid technological changes in the sector, coupled with the devastating effects of climate change, natural disasters, or violent conflicts an even greater challenge with respect to leveling the playing field for women in agriculture is created (Kabubo-mariara, 2003). Nonetheless FAO (2012) reiterates the significance of engendering trade in favor of women as this is crucial to efficiency and equity in trade. Efficiency can be realized by eliminating inequalities in control of and access to resources between men and women which generate massive inefficiencies in trade. If resolved, could improve food access on a worldwide level (Cherie Blair Foundation, 2012).

According to Kiptot, Franzel and Degrande (2014), if women had the same access to resources as men, their production levels would increase by 20% - 30%. In food trade this would translate to 12% increase in urban food access (Unnevehr, 2014). In addition, gender inequality with respect to control and access to productive resources also needs to be eliminated to ensure enormous boost in food trade which is a key determinant of urban food access (Fiankor, Curzi and Olper, 2021). As highlighted by Zezza *et al.* (2008) assets and their quality are significant in price setting and can therefore influence food access positively or negatively. Control of the asset among women in food trade should thus be promoted affirmatively to increase sustainability of their participation in food trade.

Significance of assets to business stability and thriving can thus not be overemphasized. The assets can be used to fortify presence and participation of women in food markets via affirmative action. More so because asset control is significant to quantities sold and stability in participation at the market place (Kuhlmann, Sechler and Guinan, 2015). Affirmative action can be realized via Gender-Inclusive Urban Planning and Design (Ragasa and Lambrecht, 2020).

The approach requires clear, specific design guidelines, appropriate for and adaptable to all regions, for a range of planning and project typologies e.g. design of food markets for increased food access (World Bank, 2020). This can be a very critical approach in engendering asset control and urban planning of markets for the benefit of women retailers and if resolved, could improve food access especially with regard to steadiness in food prices. More so, women in food markets sell food at lower prices than their male counterparts even when selling the exact same food due to lower profit margins. The phenomenon (lower price setting by women) is a matter of perception and will thus not be lost by increased stability of women in food trade. Rather, stability of women

in food trade will see to continued and consistent supply of food at lower food prices which is critical for food access.

Overall, the study confirms the assumption that female traders dominate food trade and set lower prices than male traders. However, the reason for continued high and volatile food prices that hamper food access is explained by study findings which show that women continue to control assets of much lower value than their male counterparts even in the food trade. As such, their participation in the food market is marked by inconsistency and sale of paltry amounts of food. Their high numbers and low food prices thus fail to effectively foster food access in urban areas. Consumers benefit from the low profit margins because they translate to lower food prices thus increasing food access. Increasing the presence and stability of women in food trade via increased asset control is therefore critical to urban food access.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary

In summary, the study found that regulations governing trade and often put in place to foster flows of goods and services exist within the food corridors serving Kisumu city. However, the regulations are numerous (seven) and hamper food flows. Access to food is thus reduced due to increases in food prices arising from ad hoc administration of regulations within the food corridors. The regulations highlighted by the study include; Cess, Transport operation business permit, Driving license, Health test, Trading license, Market entry fee and Municipal tax.

They are administered in silos and could benefit from the concept of one stop shop thus reducing time utilized in meeting them as practiced in South Africa where there is a well-established centralized legislative system that protects the operations of traders and workers with regard to wages, working environment, health and safety statutes. The autonomous nature of county governments may however make the concept of one stop shop challenging across counties. Further to this, another key factor leading to inefficiency in the food corridors is that the regulations are not up to date with the existing food trade dynamics as some of them were enacted in 1998 with no revision yet.

In other matters, time taken to meet regulations averages 20 minutes but ranges from 1 minute to 2 hours. In total, the seven regulations can thus lead to increased journey time up to 14 hours due to uncertainty in the time required to meet regulations. The increase in journey time ultimately, increases food prices significantly as highlighted by 70% of respondents that have been affected by this, more so for maize and “Sukuma wiki” consumers. Through regression analysis, the study

found a positive relationship between time taken to meet regulations and food price expressed as a regression line of $y = 1641.9x + 12011$.

This implies that every extra minute spent in meeting regulations results in a 0.01% increase in food price. Regulations are thus uncertain, with no fixed cost and administered haphazardly as time and cost vary and are not checked against standard measures.

Overall, the study found that inefficiencies in the administration of regulations hampers food access through increases in food price. The findings offer an explanation as to why food prices remain volatile and high despite existence of numerous regulations aimed at fostering the flow of goods and services.

In addition, availability of infrastructure like roads and good storage is often linked to increased food production. In this wise, the study found that infrastructure within the food corridors was characterized by storage and display areas. However, they were established without standardization in their structure. Display areas for example were susceptible to weather changes like rain and extreme heat failing to keep food items fresh at optimal temperatures. On the other hand, road networks within the food corridors of western Kenya were characterized by both well maintained and run-down road sections more so at the end of the corridors i.e., at the retail markets. Inaccessibility of market core due to overcrowding hampered transition from larger means of transport like pickups and Lorries to head loads and carts thus increasing commodity costs.

Further, an explicit analysis of the influence of transport on food price showed a positive relationship between cost of transport and food price. Through regression analysis, the study showed that for every additional cost in transport the food prices went up by 0.01%. The potential of regulating food prices through infrastructure cost for increased urban food access was thus

outlined. Over and above availability of infrastructure, the study found that transition from major roads to minor road as well as quality of roads and storage facilities highly influence urban food access through food price.

Finally, there is a supposition that the gender of a business person can actually determine how affordable or not a good is. Study findings showed that in the study area, women in food trade (60%) exceed men in food trade (40%) thus generating 62% of market sales every week amounting to 6,932,332 Kenya Shillings. The dominance of women in food trade benefits consumers due to the tendency of women in setting lower food prices than the men in food trade. As such 84% of women as opposed to 63% of men in food trade set profit margins ranging between 0% - 40%. On the other end 26% of men and 9% of women set profit margins of 61% and above thereby implying that men set higher food prices than their female counterparts.

Yet, men who are less in number than women have access to assets of higher value stabilizing their participation in food trade. Participation of women in food trade though critical is hampered by inadequate access to assets, which are significant in price setting and can therefore influence food access positively or negatively.

6.2 Conclusion

The study concludes that the regulations required for operation within food corridors are numerous and are administered in a manner that is not coordinated. The lack of coordination results in increase of journey time which ultimately translates to additional transaction costs. The other conclusion is that lack of a clear structure for coordination e.g., for collection of revenue leads to double collection or unsupervised collection at the whim of the authorities. The cost increments due to increased journey time and unregulated collection of revenue are ultimately transferred to food prices thus hampering food access.

In terms of infrastructure the study concludes that storage areas, display areas and transportation routes present in the food corridors serving Kisumu City are inadequate in their provisions. The storage areas though located closer to production areas as recommended; are characterized by poor aeration, poor lighting, inadequate space for shelling maize, parking, loading and offloading thus hampering effective distribution and marketing of food. Overall, establishment of the infrastructural facilities e.g., storage is unregulated, resulting in ad hoc provision of infrastructure. Unmet demand for infrastructure results in private sector supply which results in additional costs. These additional costs coupled with transportation costs together increase food prices thus reducing access to food.

The study further concludes that gender influences the profit margins set by male and female business persons in food trade ultimately influencing access to food. To this effect, lower profit margins are synonymous with women in food trade even when they are selling the exact same commodity as the men in food trade. Attempts at explaining the disparity have highlighted factors like poor asset control as key to increasing participation and stability in operations which the women lack.

Considering that women dominate food trade, their characteristic of setting lower food prices than men does not benefit the food corridors because poor asset control leaves their participation and stability in the market unpredictable. As such, despite the evidence that they set lower prices, price hikes and volatility continue to plague urban food access. Overall, the study finds that regulations, infrastructure and gender all affect urban food access making them key areas of focus in the fight against food insecurity.

With the aid of access theory, the study has been enabled to make a contribution to the debate on urban food access from a planning perspective. The tenets of access theory have enabled the study establish concrete findings that are comparable to other studies by the UN WOMEN, FAO and IFAD among others. Urban planning matters like designation of transport infrastructure and development of one stop shops as initiatives towards increased urban food access have been highlighted in the study, thus setting a basis for urban planning in the food security debate. Planning theories have so far stopped at designating locations for agriculture in the peri-urban areas while urban farmers operate without the structural support of proper municipal policies and legislation (Fujita and Krugman, 1995); (Kamwele *et al.*, 2014). Urban planning can thus find ground from which it can actively engage in the food security debate.

In addition, access theory though successful in conducting the study, can benefit from study deductions holding that existence of regulations, infrastructure and gender are not the only prerequisites for access. Rather, regulations have to be revised regularly and executed efficiently; infrastructure needs to be guided by appropriate standards and affirmative action's needs to be ensured among the men and women participating in different economies for access to be realized.

Finally, through the study, it is possible to take a stand on the opposing schools of thought as to what determines food access: food price or interactions within food corridors? The study shows that whereas the two thoughts were posed as different determinants of food access, they are nonetheless mutually inclusive. This means that the food corridor interactions affect food price and by so doing influence food access. The two need not be posed as different determinants of food access.

Further, relationships drawn from the study are instrumental in illustrating the connection between the food corridor interactions and food price as opposed to just hypothesizing it. The study thus holds that the influence of food corridor interactions on food prices determines food access.

6.3 Recommendation

In light of the conclusions drawn herein, the study makes recommendations regarding regulations, infrastructure and gender which have been established as mechanism of food access. The study recommends coordination in administration of the regulations to save on time lost and to reduce double payments by traders within the food corridors. Automation alone which has been tried in other revenue collection platforms cannot be sufficient to cater for this but rather a review of the horizontal and vertical operations within the regulatory structure of the food corridors. This can be instrumental in mainstreaming efficiency within the food corridors for increased urban food access through lowering of food prices.

Studies in planning further need to factor in that distance is not the only influence on food prices rather; other variables come into play that need to be addressed in theory and practice. Different forms of infrastructure critical to urban food access as highlighted in the study should thus be intentionally developed. More so better access and circulation roads are needed within and without the retail markets. Planning regulations can take this up and provide standards for markets that cater for drop off and maneuvering within the markets for better access. There is also need for the development of standards for storage and display areas if food prices are to be reduced for increased urban food access.

As such, the study recommends development of policy directive directing County Government's and City Managers to establish guidelines that are multidisciplinary in nature for provision of

infrastructure within food corridors. The approach would ensure that development of guidelines is area specific and in direct response to the food demands of the people. As an example, the approach would lead to proposals on shorter routes for food flows, or upgrading of roads as priority or development of guidelines to support provision of storage/display areas for different types of food in the bid to increase urban food access.

Nevertheless, there are best practices where the Kenyan National Government has provided state of the art storage and processing facilities from which guidelines can be informed.

Having established that urban food access benefits from the low food prices set by women in food trade, the study recommends strengthening their presence and participation in food trade. Affirmative action to increase asset control is one avenue through which this can be achieved as it ultimately stabilizes food prices thus increasing urban food access. According to Kiptot, Franzel and Degrande (2014), if women had the same access to resources as men, their production levels would increase by 20% - 30%. In food trade this would translate to 12% increase in urban food access (Unnevehr, 2014). The Kenyan government policy objective is to increase the quantity and quality of food available and accessible in order to ensure that all Kenyans have an adequate, diverse and healthy diet (FAO, 2017).

6.4 Areas for further research

The study has highlighted key mechanism of access that can be instrumental in increasing food access. However, the scope is limited to three major food corridors serving Kisumu City. There is potential to benefit from extending the research to other food deficit areas thereby mapping critical infrastructure for food in the country as a whole, to inform policy formulation. Further, the National Cereals and Produce Board has embarked on an exercise to certify private warehousing

yet their supply is skewed. A study outlining existing warehouses and proposing location of new ones based on research findings could be one way to benefit from extending this study.

Regarding transport infrastructure, the study has highlighted the need for improved transition from main roads to feeder roads within the markets. Further research on possible ways of bridging the gap could result in the compilation of handbooks or guidelines that could be used by the Planning and Transport departments in provision of market infrastructure. Finally, the study found that regulations governing food flows are numerous and haphazardly executed. As such, an area for further research could be exploring the possibility of designating food corridors as special economic areas. The point of departure would however be that EPZ and SEZ areas are usually plots and not corridors thereby introducing an interesting element worth exploring in further research. This will entail the possibilities of redefining the geographical reach of what an SEZ or EPZ could be.

It could provide an avenue for regularizing the manner in which regulations are administered within the food corridor for efficiency and optimal use of time in the flow of food from hinterland to food deficit areas.

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APPENDICES

APPENDIX 1; QUESTIONNAIRES

Questionnaires designed for business persons within food transit corridors

Maseno University

School Planning and Architecture

Department of Urban and Regional Planning

Study: INFLUENCE OF REGULATIONS, INFRASTRUCTURE AND GENDER ON
FOOD ACCESS ALONG THE FOOD CORRIDORS SERVING KISUMU CITY, KENYA

Questionnaire for business persons who operate within the food transit corridors serving Kisumu city. It is aimed at collecting information to guide the study in drawing credible conclusions.

Section 1: Introduction

Date	
Questionnaire number	
Name of interviewer	

1. What category of traders/business persons do you belong to?
 - i) Retailer
 - ii) Wholesaler
 - iii) Broker
 - iv) Middleman
 - v) Driver
 - vi) Farmer
2. What foods do you trade in? (*Give up to a limit of three top food types that the business person deals with*)
 - i) Food (a)
 - a) Give quantities sold per week
 - b) Where does it come from? (*Give name of county*),
 - i. *Sub-county*
 - ii. *Constituency*.
 - c) What route does the food follow? (*e.g. names of class A, B and C roads*).
 - ii) Food (b)
 - a) Give quantities sold per week
 - b) Where does it come from? (*Give name of county*),
 - i. *sub-county*
 - ii. *constituency*.
 - c) What route does the food follow? (*e.g. names of class A, B and C roads*).
e.g. Kisumu – Nairobi route
 - iii) Food (c)
 - d) Give quantities sold per week
 - e) Where does it come from? (*Give name of county*),
 - i. *sub-county*
 - ii. *constituency*.
 - f) What route does the food follow? (*e.g. names of class A, B and C roads*).
e.g. Kisumu – Nairobi route

3) If you are a driver, how many trips do you make in a week? (*Question should only be available if the category selected in Question 1 was driver.*)

e.g. 3

4) What quantities do you ferry per trip?

e.g. 9 sacks, 90 kgs etc.,

5) What is the unit cost of the food you purchase from your supplier?

6) What is the unit cost of the food you sell to your consumer?

Section 2: Regulations critical for access to food

1) Which regulations do you have to meet in order for you to operate in food trade along the food corridor? (Response should be limited to five but only restricted to one compulsory response)

i. Name the regulation

ii. Cost of meeting regulation

iii. Time taken to meet regulation

2) In your opinion, do you find the cost of regulation to be high or Low? High Low

3) Do the costs of regulation affect food price? Yes No

4) In your opinion, do you find the time taken to meet regulations to be a lot of time or little time? A lot Little

5) Does the time taken to meet regulations affect food prices? Yes No

Section 3: Infrastructure influencing access to food

1) If you have to transport food from the supplier what means of transportation do you use?

i) Lorry

ii) Pick-up

iii) Matatu

iv) Motorbike

v) Other (Specify)

2) What distance do you travel in kilometers?

3) How long does it take to cover the distance?

4) What is your unit cost of transportation?

5) Along the FTC, what forms of infrastructure that are critical to your operations do you have access to?

i) *e.g., coolers*

ii) *Storage*

iii) *Display stands*

iv) *Other (specify)*

- 6) Location of listed infrastructure. (*Map should be provided where the specified forms of infrastructure can be geospatially located. Dots with different colors will be placed on the maps*).
- i) *e.g., coolers (Blue)*
 - ii) *Storage (Green)*
 - iii) *Display stands (Red)*
 - iv) *Other (specify)(Yellow)*
- 7) Time taken to make a trip from the trading site to the location of infrastructure.
- i) *e.g. travel time to coolers*
 - ii) *travel time to Storage*
 - iii) *travel time to Other (specify)*
- 8) Means of transport used to make a trip from the trading site to the location of infrastructure.
- i) *e.g. 8) Means of transport to coolers*
 - i) Lorry
 - i. cost
 - ii) Pick-up
 - i. cost
 - iii) Matatu
 - i. cost
 - iv) Motorbike
 - i. cost
 - v) Other (Specify)
 - i. cost
 - ii) *Means of transport to Storage*
 - i) Lorry
 - i. cost
 - ii) Pick-up
 - i. cost
 - iii) Matatu
 - i. cost
 - iv) Motorbike
 - i. cost
 - v) Other (Specify)
 - i. Cost

Section 4: Engendering market access for food security

- 1) What are some of the assets you as a business person owns and controls. (The assets have to be related to the respondent's business. List the top 5 most important assets according to the respondent.)
- i) *e.g. Tractor*
 - Monetary value
 - ii) *Display stand (owned not hired)*
 - Monetary value

- iii) SACCOS/Microfinance Institutions/ Saving Groups etc. where loans and saving services can be accessed
 - Monetary value
 - iv) Pick up
 - Monetary value
 - v) Title deed
 - Monetary value
 - vi) Storage facility e.g. Container
 - Monetary value
 - vii) Other (specify).
 - Monetary value
- 2) Based on your ability to access/or not the assets highlighted above, what would you say is the average daily cost in running your business?
- 3) What would you say is your average daily income?
-
- 4) What therefore, would you say is the subsequent daily profit? (To be auto generated by ODK by calculating the results of Question 4 and 3 in this section.)
-
-
- 5) What is your daily expense on food for your household? (Should only capture how much the respondent contributes even if the overall is large as a result of combined family effort.)
-
- 6)

Household size	<input type="text"/>
Gender of respondent	1.Male <input type="checkbox"/> 2.Female <input type="checkbox"/>
Year of birth	ODK to automatically calculate age from this entry and display it.
GPS Location	<input type="text"/>

APPENDIX 2: KEY INFORMANT INTERVIEW SCHEDULE

Maseno University

School Planning and Architecture

Department of Urban and Regional Planning

Study: Influence of regulations, infrastructure and gender interactions within food corridors on Kisumu city's food access

Key informant schedule for Markets superintendents, Transport associations / SACCOs, Public health officials in Kisumu and surplus areas as well as traffic police. The questionnaire is aimed at collecting information to guide the study in drawing credible conclusions.

1. What kind of services do you provide for business persons within the food corridors?

2. Do you have an office/location from which you operate? (Please specify location)

3. If yes, what activities are conducted in this office/location?

4. What is the population of people involved in food transportation or trade that you serve within a day (give a breakdown in terms of gender)

5. What forms of revenue do you collect from the different actors along the food corridors?

6. How do you keep track of payment records for services rendered?

7. What initiatives have you put in place to improve the movement of food along the food corridor?

8. What policies have you put in place to address the issues of high transport costs, access to infrastructure and gender issues along the food corridors?

9. How many of your employees are: Male _____
 Female _____

APPENDIX 3: SEMI STRUCTURED INTERVIEW SCHEDULES

Food flows can be affected by the time and cost it takes to meet trade regulations consequently altering food prices. Below is a list of issues to be reviewed to this effect.

- Tracking the regulations required to move food from the farm to the urban consumer
- Recording actors' narratives about the formal requirements for moving food
- Highlighting the processes involved
- Highlighting the cost of each process
- Highlighting the time it takes to complete the process
- Tracking the location where the processes occur within the food corridor
- Describe the process you follow to restock once you are out of stock.
- How do you contact your supplier? (*means of communication*)
- What locations do you use for transaction between you and your supplier?

Infrastructure can also influence the price of food for end users

- Describe the roads you navigate from supplier to market place and vice versa.(outline ion from one road type to another, specify the time spent traveling on each road type) *e.g. 1 km marram road, 15 km tarmac road with pot holes, 38 km of good tarmac road.*
- Who maintains the roads especially after heavy rains have damaged it? (*specify for each road type highlighted above*)
- Map the location of other infrastructural services of value to you as a business person
- Coolers,
- Storage and display,
- Their condition
- Distance from user
- Cost in relation to usage
- Implication on food price
- Highlight key challenges related to accessing required infrastructure
- Highlight key innovations related to poor access of infrastructure
- What are your actual infrastructural needs
- What is the gap that needs to be filled?

APPENDIX 4: FOCUS GROUP DISCUSSION

List of issues

- Mapping routes and quantities of maize/”Sukuma wiki” flowing to Kisumu city (tones and kilograms.)
- List different actors along food corridors; their roles; distribution by gender; the challenges /opportunities for male and female actors.
- List five top regulations critical for successful transaction
- For each regulation mentioned specify
 - Cost of meeting regulation
 - Location for regulation
 - Time taken to meet regulation
 - Brief description of the process involved in meeting the regulation
 - Actors involved
 - e.g. market superintendent
 - County Govt. trade department officers
 - e.t.c
- Strategies undertaken to overcome challenges encountered when meeting regulations.

Infrastructure section

- Highlight infrastructural services available along the food corridors: condition of roads, means of transportation, travel time and per unit cost of transportation.
- Location of other forms of infrastructure critical for operation of business person along the food corridor. (Map should be provided where the specified forms of infrastructure can be geospatially located. Dots with different colors will be placed on the maps).
 - e.g. coolers (Blue)
 - Storage (Green)
 - Other (specify)(Yellow)
- Map roads connecting trading site to locations of infrastructure. (*Map should be provided where the specified roads connecting trading site to locations of infrastructure can be geospatially located. lines with different colors will be placed on the maps.*)
- e.g. coolers (Blue)
- Storage (Green)
- Other (specify)(Yellow)
- Condition of roads connecting trading site to locations of infrastructure. (*Picture should be taken later.*)
 - e.g. coolers (Blue), Storage (Green) and Other (specify)(Yellow)
 - Tarmac
 - Marram
 - Less than 3m wide
 - Between 3m to 6m wide
 - Above 6 m wide
 - Other (Specify)

APPENDIX 5: DATA NEEDS MATRIX

Objectives	Source of data	Data needs	Methods	Analysis
To establish how regulations governing the movement of food within food corridors affect the flow of food to Kisumu city.	<ul style="list-style-type: none"> Policy documents Traffic police Public health officials in Kisumu and surplus area Drivers ferrying food to Kisumu Business persons Markets superintendents Transport associations or SACCOs. 	<ul style="list-style-type: none"> Actual manifestation of regulations on the ground e.g. taxation instruments (geographical distribution), check points (geographical distribution) What is done at the stops Duration of time taken Cost of meeting regulations Consequent food prices 	<ul style="list-style-type: none"> Key informant interviews Semi structured interviews Surveys 	<ul style="list-style-type: none"> Odds ratio
To examine the influence of infrastructure within food corridors on Kisumu city's food prices.	<ul style="list-style-type: none"> Secondary data Business persons Markets superintendents Transport associations or SACCOs. 	<ul style="list-style-type: none"> Infrastructural requirements Existing infrastructural services (routes, storage, display and coolers,) means of transportation, travel time per unit cost of transportation Subsequent food prices 	<ul style="list-style-type: none"> Literature review Semi structured interviews Surveys Observations 	<ul style="list-style-type: none"> GIS Chi square analysis
To establish the significance of gender on profit margins for the men and women operating within the food corridors of Kisumu city.	<ul style="list-style-type: none"> Business persons Markets superintendents Transport associations or SACCOs. Drivers ferrying food to Kisumu 	<ul style="list-style-type: none"> Mapping by gender the different actors and their assets along the food corridor Tabulating asset value by gender Profit margins between male and female business persons 	<ul style="list-style-type: none"> Focus group discussion Surveys 	<ul style="list-style-type: none"> Content analysis Cross tabulation Chi square analysis

APPENDIX 7: STAKEHOLDER ANALYSIS

Actors	Sub-categories	Information needs	Exploratory research Desk reviews/interviews/study visits	In-depth research
Macro-Level				
International organizations	Food and Agriculture Organization	Regulations on movement of food	Desk Reviews	X
National Institutions	Horticultural Crops Development Authority (HCDA)..	Rules and regulations on moving	Desk Reviews Interviews	X
	Ministry of trade		Desk Reviews	X
	Ministry of Health		Desk Reviews	X
	Kenya Bureau of Standards		Desk Reviews	X
	Food and Agriculture Department		Desk Reviews	X
	Department of Public Health	Guidelines in the movement of food	Desk Reviews Interviews	X
	Services and standards department	Guideline in the movement of food	Desk Reviews	X
	Standards information and resource section??	Guideline and standards in the movement of food	Desk Reviews	X
	Kenya Revenue Authority (KRA)	Road license Transport Business License (TBL)	Desk Reviews	X
MESO LEVEL				
Actors	Sub-categories	Information needs	Exploratory research Desk reviews/interviews/study visits	In-depth research
County Authorities	Ministry of agriculture	Permit for dealing in food trade??	Desk Reviews	Key informant Interviews

	Ministry of trade and industry	Trade license License to use premises for food trade	Desk Reviews	Key informant Interviews
	Ministry of transport	Transport business license Public carriers license	Desk Reviews	Key informant Interviews
		MICRO LEVEL		
Actors	Sub-categories	Information needs	Exploratory research Desk reviews/interviews/study visits	In-depth research
Agro-transporters (male/female)	Lorry drivers, pick ups	Routes, costs, time	Desk Reviews	Key informant Interviews surveys
Traders (male/female)	Middle men	Provide linkages Determine/dictate prices Sell on behalf of farmer Determine market entry	Desk Reviews	Key informant Interviews Focus group discussions surveys
	Wholesalers	Source, transport, assets	Desk Reviews	Key informant Interviews surveys
	Retailers	Source, transport, assets	Desk Reviews	Key informant Interviews surveys
SACCOS (male/female)	Transport SACCOS	Bargain for prices and facilitate market entry	Desk Reviews	Key informant Interviews
	Traders SACCOS		Desk Reviews	Key informant Interviews
Market managers	Superintendent	<ul style="list-style-type: none"> • Tax • Cleaning market • Law and order 		Key informant Interviews

APPENDIX 8: INFORMED CONSENT FORM



PRIVATE BAG, MASENO - KENYA

**MASENO UNIVERSITY
SCHOOL OF PLANNING AND ARCHITECTURE
DEPARTMENT OF URBAN AND REGIONAL PLANNING**

Informed Consent form for **Onyango Loice Loo – PhD Candidate
Doctor of Philosophy in Planning**

This informed consent form has been prepared on behalf of the respondents that will be approached during questionnaire administration at Kibuye market (Corona Market) and Jubilee market regarding food access. These will include retailers, wholesalers, middlemen and drivers trading in kale and maize within the Food Corridors serving Kisumu City.

(The title of our research project is "ASSESSING THE INFLUENCE OF FOOD CORRIDORS INTERACTIONS ON ACCESSIBILITY OF FOOD IN KISUMU CITY, KENYA ")

You may provide the following information either as a running paragraph or under headings as shown below.

Name of Principal Investigator	[Onyango Loice Loo]
Name of Organization	[Maseno University]
Name of 1st supervisor	[Dr. G.G. Wagah]
Name of 2nd supervisor	[Dr. Noora-Lisa Aberman]

This Informed Consent Form has two parts:

- **Information Sheet (to share information about the research with you)**
- **Certificate of Consent (for signatures if you agree to take part)**

You will be given a copy of the full Informed Consent Form

PART I: Information Sheet

Introduction

My name is Loice Loo and I am a PhD candidate in the School of Planning and Architecture Maseno University. My academic research is on urban food access which is slowly becoming a challenge in the ever growing cities. I will therefore kindly require your contribution regarding the flow of food along the food corridors that serve Kisumu City with maize and vegetable. You do not have to decide today whether or not you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with about the research. There may be some words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them of me.

Purpose of the research

Access to food in urban areas is steadily becoming a challenge in cities like Kisumu which are increasing in size daily. The study intends to establish the key contributors to this phenomenon. Regulation infrastructure and gender have thus been highlighted as key variables that influence access to food in urban areas. The study will therefore focus on establishing how these three variables influence urban food access.

Type of Research Intervention

This research will involve a short interview that will take less than an hour. Information will be collected with the aid of software that will be installed in the enumerators' mobile phones.

Participant selection

We are specifically targeting business persons who trade in the sale of maize and kale (sukuma wiki) as retailers, wholesalers, middlemen and drivers in Kibuye and Jubilee market. That is why we are reaching out to you for assistance.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. Whether you choose to participate or not, all the services you receive in the market will continue as usual. You may also stop participating in the research at any time you choose. It is your choice and all of your rights will still be respected.

Procedures and Protocol

Questionnaires will be administered at your location of preference though your work place would be the most ideal. During the study we may request to take pictures of your working premises and would thus appreciate your cooperation where possible.

Reimbursements

Kindly note that this being an academic exercise; the capacity to remunerate participants will not be possible. However, we trust that any matters of concern which you think will be beneficial to you can be raised and captured in the study to be shared with policy makers through policy briefs.

Confidentiality

The information that we collect from this study will be kept confidential. Information about you that will be collected during the research will be put away and no-one but the researchers will be able to see it. Any information about you will have a number on it instead of your name.

Sharing the Results

The knowledge that we get from doing this research will be shared with you through reports that will be given to the market superintendent. Policy briefs and academic publications will also be developed as outputs of this study. Access to all the reports will be availed to you.

Who to Contact

If you have any questions you may ask them now or later, even after the study has started. If you wish to ask questions later, you may contact: [Loice Loo, 0723552341/loiceloo@gmail.com]

This proposal has been reviewed and approved by [Maseno University Ethics Review Committee], which is a committee whose task it is to make sure that research participants are protected from harm. If you wish to find out more about the MUERC, contact [Dr. Bonuke Anyona, sanyona@maseno.ac.ke.]

PART II: Certificate of Consent

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research.

Print Name of Participant _____

Signature of Participant _____

Date _____
Day/month/year

If illiterate

A literate witness must sign (if possible, this person should be selected by the participant and should have no connection to the research team). Participants who are illiterate should include their thumb-print as well.

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

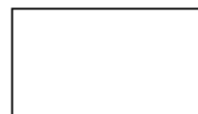
Print name of witness _____

AND/OR

Thumb print of participant

Signature of witness _____

Date _____
Day/month/year



Statement by the researcher/person taking consent

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Print Name of Researcher/person taking the consent _____

Signature of Researcher /person taking the consent _____

Date _____
Day/month/year