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Nexus between Urban Food System and Other Urban Systems: Exploring Opportunities for Improving Food Security in Kisumu, Kenya

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Abstract The world population is growing and shifting in character from to predominantly rural to increasingly urban. It is projected that by 2050, two thirds of the world's population will be living in urban areas. The food system of cities has an impact on the health and wellbeing of residents. This study is a review of data and integration of findings from two projects done in Kisumu from 2016 - 2020: Consuming Urban Poverty (CUP) project and Nourishing Spaces (NS) project. The two projects employed both qualitative and quantitative methods of data collection, which were supplemented by desktop research involving an analysis of published literature. Peri-urban households were found to be more food insecure as compared to residents of core urban areas, attributed to urban sprawl. Municipal markets were located in areas less accessible to poor residents leading to the growth of informal food retail in the city. Distant production sources and poor road network drive up the cost of food in the city. More than 65 per cent of residents live in informal settlements in poor housing units with inadequate food storage and kitchen facilities, promoting consumption of processed foods. Inadequate water, sanitation and energy at both household and market levels was found to hinder food security. Unemployment contributed to food insecurity. Thirty one per cent of residents 20 years and above were unemployed in a city in which 67 per cent bought more than 75 percent of the total food consumed from the market. Most residents have a rural home due to cultural reasons and they occasionally obtain food from their rural homes. The food system of Kisumu city is influenced by other urban systems and it is important to consider the whole system in policy conversations to alleviate food insecurity in the city.

Keywords: *urban food system, urban systems, food security, nutrition transition, urbanization, Kisumu*

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1. Introduction

Food systems (FS) encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal and natural environments in which they are embedded. The food system is composed of sub-systems (e.g. farming system, waste management system, input supply system, etc.) and interacts with other key systems (e.g. transport system, trade system, energy system, etc.) [1]. Therefore, food systems change might originate from a change in another system and changes in other systems might also impact on the food system.

The 1996 World Food Summit defined food security as people's 'physical, social and economic access to sufficient, safe and nutritious food to meet their dietary

needs and food preferences for an active and healthy life'. This widely accepted definition identifies four main dimensions of food security: availability, accessibility, utilization and stability. Food availability addresses the "supply side" of food security and is determined by the level of food production, stock levels and net trade. Accessibility focuses on both economic and physical conditions that guarantee household food security, as adequate supply of food at the national or international level does not in itself guarantee household level food security. Utilization is understood as the way the body makes the most of various nutrients in the food. Stability of the first three dimensions may have an impact on the food security status, as one may have periodic inadequate food intake due to environmental conditions, economic factors or political instability [2].

The challenge of feeding the world's growing population is a critical development issue of the 21st Century. Population is rising but also shifting in character from predominantly rural to increasingly urban, with more

than half of the world's people living in urban areas. By mid-century, two thirds (68 per cent) of the world's population will be living in urban areas [3]. The global urban population is projected to grow by 2.5 billion urban dwellers between 2018 and 2050, with nearly 90 per cent of the increase concentrated in Asia and Africa. In particular, thousands of new towns and cities will emerge in Africa as the population crosses the 50 per cent urban threshold shortly after 2030 [4].

Urbanization is characterized by changes in diets and lifestyles that occur with economic growth and transformation of the food system. As the food system changes, centralized food-processing facilities develop along with large-scale wholesale and logistics companies, supermarkets, and fast-food restaurants. The transformation thus affects the whole system, changing the ways food is produced, harvested, stored, traded, processed, distributed, sold and consumed [5]. The food system of cities has an impact on the health and wellbeing of residents although the measurement of this impact has proved to be difficult [6]. Food systems and the way they are set up to provide healthy diets are key drivers of malnutrition in all its forms (under-nutrition, micronutrient deficiency and overweight and obesity). In order to provide better access to affordable and healthy diets, food systems need to be transformed, particularly to address the rising burden of overweight, obesity and diet-related non-communicable diseases. It is important to consider the food environment - the places and ways in which food is sold and accessed by people - in addressing nutritional outcomes, as it serves as the interface between the food system and an individual's diet [7].

Food systems determine the quantity, quality, diversity and nutritional content of the foods available for consumption. Food systems need to be re-aligned from just supplying food to sustainably providing high-quality foods that support healthy diets. Nutritious foods that constitute a healthy diet are not available or affordable for many people while increased production of processed food, rapid urbanization and changing lifestyles have led to a shift in dietary patterns. Since the 1990s, globally there has been a profound increase in consumption of processed foods, often energy-dense and high in fat, sugar and/or salt relative to the consumption of nutritious foods (e.g. fruits, vegetables, whole grain, seafood) [7].

The developments in food systems have yielded some positive results, especially over the past three decades in developing countries. These results include the expansion of off-farm employment opportunities, widening of food

choices, thus satisfying consumers' preferences in terms of taste, form and quality. However, the associated rapid structural transformations have also resulted in increasing and significant challenges, including the many highly processed, high-calorie and low nutritional value food items that are now widely available and consumed; limited access of small-scale producers and agri-enterprises to viable markets; high levels of food loss and waste; increased incidences of food safety, and animal and human health issues; and an increased energy-intensity and ecological footprint associated with the lengthening and industrialization of food supply chains [8]. Food insecurity increases the risk of various forms of malnutrition affecting diet quality in different ways, potentially leading to under-nutrition as well as overweight and obesity [9].

The food system of cities is intricately linked to other urban systems, and it is important to understand these relationships to facilitate conversations on how food systems should be governed to alleviate food insecurity. African cities are characterized by high levels of food insecurity, that is not only driven by high levels of poverty and income variability, but also by the wider lived urban conditions in which inadequate access to urban infrastructure and services all shape household food utilization capacity and therefore their food security situation [10].

This paper discusses the nexus between the urban food system and other urban systems in Kisumu, the third largest city in Kenya. The city is home to 510,408 residents according to the latest census [11]. The city developed from a trading centre for agricultural produce in 1901 to become a sub-national administrative, commercial, industrial, and communication centre [12]. It is located at the confluence of a major transport intersection on the shores of Lake Victoria, making it a communication hub in the Great Lakes Region. Kisumu experiences a high level of food insecurity directly linked to poverty and high levels of unemployment, estimated at 30 per cent [13]. Estimates from the latest census data indicate that more than 65 per cent of the city residents live in informal settlements and sprawling extended suburban areas of the city [11].

This analysis of Kisumu's food system is premised on a framework adapted from the food system concept developed by Ericksen [14] and the FAO conceptual framework of food security [8]. The conceptual framework is presented in Figure 1.

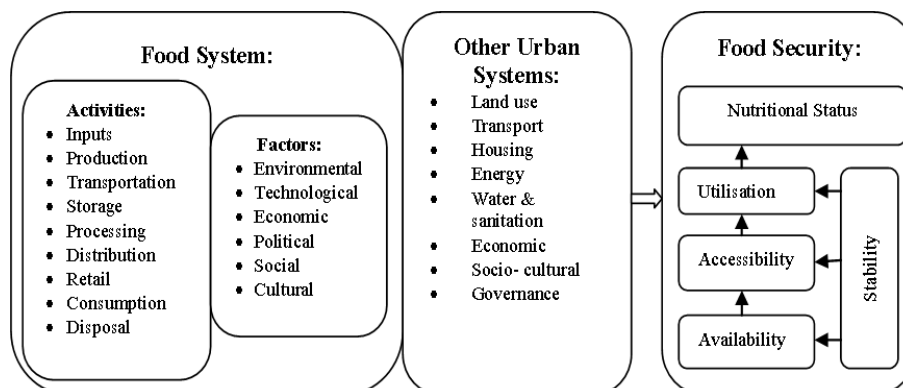


Figure 1. Conceptual framework

This framework indicates that food system activities are embedded in and are influenced by environmental, technological, economic, political and socio-cultural factors. The urban food system is linked to other urban systems including land use, transport, housing, energy, water, sanitation, economic, socio-cultural and governance. This paper discusses these linkages and their implications for urban food security.

2. Materials and Methods

This paper is a review of data and integration of findings from two projects done in Kisumu from 2016 - 2020: Consuming Urban Poverty (CUP) project, formally called 'Governing food systems to alleviate poverty in secondary cities in Africa'; and Nourishing Spaces (NS) project, formally called 'Food systems governance for prevention of non-communicable diseases (NCDs) in Africa'. The two projects employed both qualitative and quantitative methods of data collection, which were supplemented by desktop research involving an analysis of published literature. The study involved mining raw data from the CUP and NS projects, and findings from other studies done in Kisumu under the Mistra Urban Futures program (2010- 2019). These were discussed with the research team to draw linkages between urban food systems and other urban systems and their implications on food security. The two food systems projects are briefly described in the following sections.

2.1. CUP Project

The CUP study involved survey of the urban food retail environment and household food poverty assessment. The food retail enquiry entailed three research activities. First, we did a reverse value chain analysis of five key food items widely consumed in the city; consisting of two primary staples (maize meal and green vegetables), one site specific staple (fish), a processed food (porridge), and a more traditional food item (eggs). The survey adopted purposive sampling, where specific retail points were deliberately selected to ensure variety in terms of the types of the sales outlets. The food item source enquiry was done in October 2016 and involved a deliberate engagement with identified retail outlets to enquire as to the source of the specific product and collection of the contact details of the supplier to that retail outlet. The process continued until either no further information was available or the original source is identified (the farm, the lake, etc.). Similar questions were asked of the different suppliers as the enquiries retreated along the supply chain.

The second activity involved mapping of food retail types and trends whereby 2,167 food retail outlets were mapped in four selected food retail sites across the city. These were: 1) Nyalenda informal settlement (which was chosen because of its position as one of the largest informal settlements in the city, housing residents of mixed income categories); 2) Jubilee Market (which is the main municipal market and includes a fish market and many roadside traders around the main transport terminus); 3) Kibuye Market (which was the largest market in the city); and 4) Oginga Odinga Street (which is the main

street in the Central Business District). The mapping exercise was done at each of the sites in May and June 2016. The data was collected using hand held tablets that also facilitated collection of the geo-coordinates of the retail outlets. The mapping formed a basis for sampling of 551 food retail outlets for a more detailed food retail survey in September and October 2016. Purposive sampling was used to ensure diversity in the types of food retailers and proportional distribution across the study sites.

The third activity was a household food poverty assessment which had two components: Qualitative in-depth household interviews and a quantitative household survey. Fifty in-depth household interviews were conducted across Kisumu city in three sub-areas, eastern, western and southern. Each of these areas was divided into urban and peri-urban segments. Residential areas classified as high, middle, and low-income areas were then randomly selected in each of the sub-areas with 60 per cent of the households selected from the low-income settlements where 60 per cent of the city's population resides. 841 quantitative household surveys applied a similar distribution fashion. The surveys and qualitative interviews were supplemented by observations and interviews with various stakeholders.

2.2. Nourishing Space Project

The Nourishing Spaces project focused on urban food security at a neighbourhood scale. The study was done in Kogony sub location, a residential neighbourhood on the outskirts of the city. The population of Kogony is mainly concentrated in a small informal settlement known as Bandani while the other parts of the settlement is formerly a rural area on the urban fringe which is undergoing rapid transition. Data for the first work package of the study was collected in March - April 2018 and involved household qualitative interviews focused on consumption choices, experience of food system as it influences food choices; and experience of urban system as it influences food choice. It further addressed perceptions of hunger, abundance and scarcity, and health. Purposive sampling was used to choose twenty residents who were involved in sourcing and preparing food for their households for interviews.

The second work package involved analysis of the local food system with focus on formal and informal food retail as an entry point to engage the wider food system. It examined how retailers' stocking and pricing practices were shaped by national and global food systems trends, the local urban environment and consumer demands. Data for this component of the study was collected for several months in 2019 through site observation, citywide mapping of supermarkets in August 2018, mapping of the neighbourhood food system in September 2019 and semi structured interviews with twenty food retailers selected using purposive sampling in June 2019. The household interviews and food retailer interviews were supplemented by field observations and key informant interviews.

3. Results and Discussions

Some of the results of the various work packages in these projects have been published elsewhere. In the

following sections, we draw data and summaries of some of the findings from the three projects to discuss the nexus between the food system and other urban systems and their implications for food security and explore opportunities for improving food security in Kisumu City.

3.1. Urban Food System and Land Use

Urban land use reflects the location and level of spatial accumulation of economic and social activities such as residence, trade, recreation and manufacturing [15]. It involves the management and modification of natural environment into built environment. Urban expansion inevitably covers some agricultural land while changes in land values and land markets around cities often result in land left vacant as the owners anticipate the gains they will make from selling it or using it for non-agricultural uses. In most urban areas in low- and middle-income nations, the absence of any land-use plan or strategic planning framework to guide land-use changes means that urban areas expand haphazardly, and there is little control of conversion of land from agricultural to non-agricultural use [16]. Urbanization results in irrevocable changes to the landscape, a shift in demographic patterns, and economic, social, and environmental impacts. Unplanned development in peri-urban areas leads to towns and cities spreading out and extending the impacts of change of land use over an ever-increasing area.

The CUP study used Household Food Insecurity Access Prevalence Scale (HFIAP) to determine the extent of food insecurity at household level. Peri-urban neighbourhoods had an average HFIAP score of 9.86 while urban neighbourhoods had an average HFIAP score of 7.22; indicating that food insecurity was more severe in peri-urban neighbourhoods than the more urbanized neighbourhoods closer to the urban core. Interviews done in peri-urban settlements of Kisumu in 2016 and 2018 attributed this variation to urban sprawl associated with loss of productive agricultural land to housing. Peri-urban areas also recorded higher Lived Poverty Index (LPI) as compared to core urban areas [17]. Nourishing Space qualitative household interviews done in Bandani found that initial residents have sold most of the land previously used for farming. And with increasing urban poverty, residents sell more of the remaining land to meet basic needs. Poverty and scarcity of food has increased as compared to the earlier years when the residents had land to grow food. Though it can be argued that the city provides opportunities for employment, inadequate skills and a depressed economy lock out many residents of informal settlements from these opportunities.

The location of formal food retail outlets (supermarkets and municipal markets) are planned with little consideration for the convenience of residents due to competing demands for land use. This has an impact on physical access to food. The CUP study established that of the 551 food retail outlets surveyed, almost half (48%) were located in municipality approved markets. However, it should be noted that the survey deliberately targeted two main markets in the city. A significant percentage of food retailers were however located outside the traditional markets. When the outlets at street edges, mobile stores, stand alone shops, house stores and those occupying

unapproved spaces are put together, it emerges that about 50% of food retail outlets exists outside of the formally zoned market space. Reasons for this are twofold: the markets have not developed in response to the increase in demand for food retail outlets and food retailers moving to points of high human traffic who are potential clients.

The CUP study used the location attributes of informal food retail outlets to demonstrate the role played by the informal food retail in promoting food security in urban settings. Proximity to clients' neighbourhood and passing traffic (about 47% each) were cited among the most important reasons why clients patronized informal food retail outlets. Commuting to and from home and public transport terminals was another important reason of clients' patronage of informal food retail outlets. The food needs of the poor are served conveniently by these spatially dotted informal food retail outlets, whose operators are often at loggerheads with city authorities due to land use conflicts [12]. Government efforts to relocate food traders to alternative spaces often ignore the reasons for their current location, leading to disruptions in the food system.

3.2. Urban Food System and Transport

Global urbanization results in the setting of large urban agglomerations where the regional agricultural system is unable to provide enough food to supply the demand. As an economy becomes increasingly urbanized, it needs to rely on food distribution systems beyond its region. This has been facilitated by massive investments in transport infrastructure, technological developments such as refrigeration, containerization and air transport. The quantity, quality, and safety of food rely on the efficiency of food distribution systems [15]. In large cities, access to affordable and nutritious food is characterized by high spatial and socio-economic inequality, as well as by the physical distance between food production areas and consumers and unavailability of transportation options [18]. The overall quality and efficiency of the national road and transportation network is critical in getting produce from the farm gate to markets at reasonable cost. Local and regional food hubs and shorter value chains and more broadly, efficient and functioning agricultural supply chains that link hinterland producers to market systems can contribute to sustainable diets, reduce food waste along the chain and stabilize livelihoods [9].

Recent developments in transportation have led to globalization of food systems. The CUP reverse value chain analysis of five key food items established that fish from China was readily available in markets in Kisumu [19]. Oranges and dates from Egypt, apples from South Africa, and rice from Pakistan were also available in Kisumu [20,21]. These were not only available in supermarkets but were also sold by informal roadside traders. Transport systems facilitate local availability of foods produced in other countries, regions and continents.

Kisumu city (and the wider Kisumu County) is deficient in food production. The food system of the city heavily relies on road transport system to bring food from distant production sources within Kenya and the East Africa region to processing locations and markets [19]. The poor road network in Kenya and the distant

production sources add to the costs incurred by the retailers, which is logically passed on to consumers. Over 80 percent of food retailers interviewed in the CUP study ranked the cost of transportation as accounting for the greatest share of their operating costs after the cost of stock. In-depth household interviews done by the Nourishing Spaces project revealed that residents in the poor peri-urban settlements of the city faced challenges accessing the markets due to transport costs. This promotes informal food retail in residential areas where most food is sold in unhygienic conditions. Informal traders also lacked appropriate food transportation facilities. For example fish was often carried in baskets using public transport, raising food safety concerns.

The location of food retail outlets is often linked to the transport system of cities. A study done in Cape Town, noted the location of supermarkets and highest concentration of informal traders near the main transport intersections [22,23]. A similar trend was noted in Kisumu where there were 3 supermarkets in the CBD in 1980s. The number has grown to 18 in 2020, with new ones coming up next to main transport interchanges. The growth and expansion of supermarkets is linked to nutrition transition as residents easily access processed foods. Small scale informal traders also target passersby along the main bus terminal in the city and public transport termini in the residential areas. The linkage between the transport system and food retail is a possible explanation for the underutilization of three municipal markets - Migosi, Manyatta and Kowino - that remained underutilised as traders moved to roadside spaces.

3.3. Urban Food System and Housing

Urbanization in developing countries is characterized by poor housing quality and lack of supporting infrastructure and services. Housing is important in the food system both at the household scale and city scale. The demand for decent and affordable housing in urban areas in developing countries far outstrips supply. With the population of cities increasing, more residents are pushed into informal settlements. The CUP household survey found that housing is a frequent and significant proportion of expenditure of most poor households. A similar study in Cape Town noted that payment for shelter of some kind is a necessity and in poor households it is an expense that is often traded off against food purchase [23].

The lack of available space in central urban areas also results in people building insecure homes in informal settlements. In Kisumu, the CUP household survey established that the most common dwelling structure for households is room-in a-house (39%). In the informal settlements, most households lived in single rooms in a row (locally called *landi*), usually without electricity and water and did not also have storage space or facilities to preserve foods. These households purchase food for daily consumption, hence cannot benefit from economies of scale. The lack of or inadequate kitchen spaces at home also promotes consumption of street food and unhealthy processed foods, poor in essential nutrients but rich in salt, sugar and fat. Nourishing Spaces qualitative interviews confirmed that food consumption choices were determined by availability of household infrastructure for food storage and preservation. Those who were deprived of such

infrastructure preferred to buy fresh foods on a daily basis while stocking processed foods.

3.4. Urban Food System and Energy

Energy is used in the entire food system - production, transportation, preservation, processing, distribution and preparation of food for final consumption. More than one fourth of energy used worldwide is an input for food production, distribution, and use. In addition, food production and supply chain simultaneously utilize approximately 30% of the total energy that is used globally [24]. Availability of reliable sources of energy makes a big difference in achieving food security. The vast majority of people in food insecure places use firewood (an increasingly scarce and often unaffordable resource) to cook forcing households to buy less food, or less nutritious food and skip or undercook meals.

In Kisumu, electricity is available in most middle to high income households. In low-income households in informal settlements, charcoal is used for cooking. Firewood, wood pellets and saw dust are also used as fuel for cooking. Liquid Petroleum Gas (LPG) is used for cooking in some homes [21]. The high proportion of urban households without electricity implies far more households without refrigeration. This means such households prefer processed foods and consume less fresh foods or alternatively have to buy fresh foods on a daily basis. The CUP household survey revealed that about 11% of household experienced food shortages in the six months preceding the survey due to increased cost of energy, lack of preservation facilities, increased cost of water and pests combined.

Energy is used in food preservation and food retailers interviewed in the CUP study mentioned spoilage (51% of cases) as the second highest cost after transport. The retail survey found that majority of traders lacked basic infrastructure to prevent food spoilage. Fifty four per cent of cases did not have electricity, 75% of cases did not have refrigeration facilities, and 94% of cases did not have air conditioning facilities [12]. Inadequate access to energy therefore has a negative effect on the food security and nutritional status of households. Kisumu city food system has losses in the chain occasioned by lack of or inadequate preservation and storage facilities, both at the market and household levels.

3.5. Urban Food System, Water and Sanitation

Agriculture is the largest user of freshwater, making it responsible for 70 per cent of total global withdrawal [24]. Crops and livestock need water to grow and agriculture requires large quantities of water for irrigation and of good quality for various production processes. Water scarcity has a huge impact on food production. Without water people do not have a means of watering their crops and, therefore, to provide food for the fast growing population.

Food security and nutrition are affected by the safety of the food eaten and the related ability of the consumer to make use of the nutrients and energy contained in the food. In urban contexts, health concerns increase due to lack of

adequate water, sanitation and hygiene facilities. In many low and middle income countries, a significant share of the food consumed in urban areas runs through informal systems (in production, postharvest handling, trade, processing, distribution, retailing and preparation) that often carry major risks and problems of safety at source, in storage and in cooking capacities [18]. Inadequate water and sanitation facilities reduce accessibility to food and also raise food safety concerns. The CUP food retail survey established that only about 30 percent of food retailers had access to piped running water, 37 per cent had waste disposal facilities, and 43 per cent had sanitation facilities.

Both CUP and Nourishing Spaces household interviews in informal settlements identified the cost of water as hindrances to food security. For example, an average household in informal settlements who bought water from informal vendors paid more per unit of water (US\$ 5 per cubic metre), as compared to residents of middle and high income residential areas who had metered supply from public water service provider who paid about US\$ 0.68 per cubic metre. This implies provision of affordable water may release a proportion of the poor households' income to be spent on food.

3.6. Urban Food System and Socio - economic System

As the world population increases and shifts in character from rural to predominantly urban by 2050, less developed regions will account for most of the population growth expected in urban areas [3]. The world is becoming more urban because cities are disproportionately wealthy. However, the economies of cities in developing countries have a fast growing proportion of poor people. This growth in urban poverty is accompanied by unemployment, growth of slums, food insecurity and malnutrition.

The population of Kisumu is largely youthful, (73.6 per cent are 30 years old and below) , and is challenged by poverty and low skill levels, confining majority to unemployment or low paying jobs in the informal sector. The CUP survey revealed that 31.3% of the residents 20 years old and above were unemployed; and 66% of adult members of households attained high school education and below; and were confined to low skilled, lower paying jobs or unemployment. Households spend a big proportion of their incomes investing in education with the hope of alleviating future poverty. However, the rationale of this investment is negated by high levels of youth unemployment. Development interventions should therefore target the youth, with opportunities for skill development and employment creation in the formal sector. Agro-processing and agribusiness are possible areas of investment that can have a double effect in the food economy of Kisumu. The Kenyan government has in the last one and a half decades been implementing a free primary education program to relieve parents of the burden of school fees. The government also started free day secondary education in 2018. These programs should hopefully free some household funds for expenditure on food. Other possible areas of intervention include school feeding programs.

The 2015/16 Kenya Integrated Household Budget Survey (KIHBS) indicated that residents of the wider Kisumu County purchased 83 per cent of the food consumed [25]. The figure for Kisumu city is expected to be higher as city dwellers mainly depend on food purchased from the market [18,23]. The CUP household survey established that 67 per cent of respondents purchased more than 75per cent of the total food consumed. Cash income is therefore central for achieving food security in urban areas. In Kisumu, the high rate on unemployment at about 30 per cent [13] is a hindrance to achieving food security. Even for those who are employed, majority work in the informal sector which is precarious and does not generate significant returns [17].

Food retail in Kisumu is mainly informal. The CUP food retail survey established that 32% of retailers trade on the street edge, and a further 3% are mobile, moving from street to street with their merchandise. In the CUP household survey, it was established that 69% of households sampled obtain food from street vendors at least five days in a week and 82% of households obtain food from kiosks and home shops at least five days a week. It was further revealed that 55% of sampled households purchased less than 25% of their food from supermarkets. Informal food traders were found to offer food on credit, a combined total of 65% of respondents in the CUP study indicated they give credit as part of their operational strategies. They also sold food in smaller measures that would ordinarily not be sold by formal traders. Offering food on credit and bulk breaking practices make food accessible to daily wage earners who have to divide their income to cater for various daily household needs. These business practices further lead to development of social relationships. However, informal food vendors, though playing a significant part in food availability and access are seen as a nuisance by the city authorities. There are concerted efforts by city authorities to remove or relocate informal food vendors with adverse effects on food accessibility.

Mapping of supermarkets done by the CUP and Nourishing Spaces projects demonstrate the growth of supermarkets in Kisumu in the last twenty years. In the year 2000, there were only three supermarkets in Kisumu, and all were in the city centre. By 2010, the number grew to seven supermarkets (five in the city centre and two strategically located along the main transport routes, leading to the north and east of the city). By 2020 there were eighteen supermarkets in Kisumu located in the city centre, near the main bus station and major transport nodes in the city. The growth of supermarkets has enabled easier physical access to ready-made meals and processed foods high in fat, sugar and salt, transforming food habits in the city. Traditional markets and informal traders were the main source of the fresh fruits and vegetables whereas supermarkets and convenience stores primarily provided customers with processed and ultra-processed foods. The growth and expansion of supermarkets is therefore associated with nutrition transition.

Municipal markets are specially built and designated as such by government authorities and vary in size, supply and formality. The CUP household survey established that 64% of households obtain food from the markets at least once a week. Two main markets - Jubilee and

Kibuye - held great significance to food retail as they were the main source of supplies for the smaller markets and informal traders in the city as well as sub-urban markets. There were other markets serving the residential neighbourhoods in the city. While these markets play a major role in food access, their location and management have implications on food security. The existence of hawkers on the streets is a direct response to the needs of their clients, who purchase merchandise conveniently along the roads or next to public transport termini. The food system has the potential to create employment opportunities for residents of the city, particularly women due to their traditional role in food provisioning. Investment in food production, agro-processing and food retail has huge potential for creating jobs and enabling access to food.

3.7. Urban Food System and Socio-cultural System

Urban food system is closely linked to socio-cultural system. People eat what is socially and culturally acceptable to them; and food plays a major role in the culture, traditions and daily life of communities. In Kisumu, birthdays, weddings, funerals, and religious celebrations which are important events are always accompanied by food specifically prepared for the occasion [26]. Household interviews in Kisumu pointed to increasing consumption of fizzy and sugared drinks in parties, weddings, sports and religious ceremonies. These drinks together with processed and fast foods such as noodles and fries are also promoted and advertised as trendy. Increasing consumption of these foods is associated with increasing NCDs.

The food retail environment in Kisumu not only enables food access, but also promotes socio-cultural relations in the community. Nourishing Spaces project interviews with food retailers revealed that majority of market traders and informal traders belonged to social support groups involved in social welfare and group savings and loans. They supported one another in times of difficulty such as raising funds for their children's education and assisting with medical bills and funeral arrangements for members and their immediate families. They also extended loans to members to expand their businesses. Additionally, some business strategies employed by the informal food retailers such as bulk breaking and extending credit to clients do not only impact positively on the access and stability dimensions of food security status of the urban poor, but also cements social relations far beyond business sense. Thus, informal food retail might have far more positive contribution to the food security status of the urban poor.

Due to cultural reasons, most urban dwellers in Kenya also have rural homes in which they do farming, and bring the food into the city to supplement food purchased from the market. It is common for people to get food from their rural homes whenever they visit or food is sent to them by their relatives in rural areas. This was well documented in Kenya during the partial lockdowns necessitated by covid19 pandemic when passenger service vehicles turned to carrying food sent by people living in rural areas to their relatives in urban areas [27]. Household interviews for the Nourishing Spaces project in Kisumu also revealed

that most households with rural roots get food from their rural homes whenever they travel to visit. The food is either from their own farms or gifted by their rural relatives.

Urban agriculture has often been promoted as a strategy to enable food access but is relatively insignificant in Kisumu. The CUP survey established that only 15 per cent of respondents grew any of their food in the city. Some of the reasons given for non-engagement in urban farming were socio-cultural including the belief that farming is for rural people and the fear that the food would be stolen. Qualitative household interviews done by both the CUP and Nourishing Spaces projects found that many households would wish to grow their own food but were limited by the type of dwelling units or neighbourhoods in which they lived. Urban agriculture was more pronounced among residents who lived in more affluent and secure neighbourhoods who in reality are more food secure than residents of informal settlements. Social inequalities constrain the capacity of the poorest to participate in and reap the benefits of urban farming.

Majority of the residents of Kisumu city are of the Luo ethnicity, culturally associated with fishing and fish consumption. Fishing stocks in Lake Victoria have been dwindling in recent years and the situation has been made worse by the invasive water hyacinth that limits fishing activities. Cultural beliefs among the Luo restrict women from engaging in actual fish-catching, although the fishing industry is a major component of the local economy. The desperation of women fishmongers to acquire fish to trade makes them vulnerable to the sexual demands of fishermen [28]. This has led to the spread of HIV among the fishing communities in the city and social challenges associated with it, including many orphaned children and deteriorating health status, further contributing to food insecurity.

3.8. Urban Food System, Politics and Governance

Multiple governance stakeholders are involved in the urban food system ranging from informal food traders' associations, formal federations or cooperative societies, non-governmental organizations and both local and national government. All these have varying degrees of influence on the food system. Their actions can affect the food security situation either positively or negatively. Trader associations both formal and informal exist in Kisumu. Most of them are formed to lobby for the interest of their members. They also act as the link between traders and local authorities. Inadequate capacity of the municipal authorities has created room for some of the groups to turn into cartels, controlling food prices and allocating space in the municipal markets and charging illegal levies on traders [12]. This cost is passed on to consumers, driving up the cost of food. Formal federations and cooperative societies enable food access as they offer opportunities for linkage between food producers and consumers.

The local government is involved in making and enforcing regulations on food production, processing, trade, and in providing local infrastructure including transport, water, sanitation, and market space. Government policies have

the power, either directly or indirectly, to influence availability, access, utilization, and stability dimensions of food security. Policies affect agricultural production, food distribution, and pricing. The government affects pricing through taxation and subsidies. For example, the CUP study established that eggs imported from Uganda were much cheaper than locally produced eggs in Kisumu because Uganda subsidizes chicken feeds. Subsidy and taxation levels in the food and agriculture sectors can be applied to encourage consumption of healthy foods and discourage consumption of unhealthy foods. Government should promote investment in food preservation facilities and urban infrastructure to support the food system.

Kisumu has remained a centre of political activity with political factors affecting its socio-economic development. Opposition politics often pits the local political leadership against the central government and the city is prone to politically motivated violence [29]. The high numbers of unemployed youths are vulnerable to political manipulation and violence negating stability of food access. This has been witnessed in almost every electoral cycle, but was more pronounced during the 2007/2008 post election violence, and the 2017 disputed presidential elections. Employment opportunities in the food system can engage the youthful population and contribute to food security in the city.

4. Conclusions and Recommendations

The food system of Kisumu city is intricately linked to other urban systems. Inadequacies and inefficient functioning of these urban systems negatively impact of food security. Land use planning, transport, housing, energy, water and sanitation, socio-economic, socio-cultural and governance systems provides both challenges and opportunities for improving food and nutritional security in the city. Proper land use planning encouraging local food production, and taking into account distribution and marketing systems may help reduce the length of the value chain and contribute to food security. Investments in more efficient transport system to link food production sources and the city and intra city transport system may help improve both economic and physical access to food. The location of markets should also take into account the convenience of both traders and consumers to reduce conflict between informal traders and city authorities. Informal food retailers should also be supported through provision of decent working environments near the transport nodes and residential areas in the city.

Decent housing plays a key role in food security of households. Inadequate food preservation and storage facilities at household level hinder households from benefiting from economies of scale. Additionally, house rent takes a large proportion of recurrent expenditure of low income households. Provision of decent and affordable housing can therefore contribute to improving food security situation of households. Availability of adequate clean water and sanitation facilities for hygiene both at food retail outlets and household level is important in improving urban food security. Water is used in food production, food preparation and hygiene and inadequate water and sanitation system is often linked to diseases. Households

living in informal settlement pay more per unit of water as compared to wealthier households. Provision of adequate and affordable water and sanitation facilities may help improve the food security situation of households. Energy is required for food production, preservation and distribution, both at the city and household level. Lack of energy to cook food implies households may not be able to cook meals of their preference, and resort less nutritious ready to eat processed foods. Lack of energy also hinders food preservation leading to food losses through spoilage in the value chain. An urban system that provides affordable clean energy sources can therefore play a big role in improving urban food security.

Unemployment levels are high in Kisumu and the city economy provides inadequate opportunities for the growing youthful population. And since majority of urban dwellers buy food from the market, the food system has a huge potential for creating employment opportunities for both youth and women in food production, processing, distribution and retail. Additionally, the social and economic capital noted in traders associations and community self help groups can be harnessed and nurtured to make the food system more vibrant and sustainable. Policy should support the trader associations to invest in production and distribution of healthy and nutritious foods.

The growing consumption of processed foods rich in sugar, salt and fat and sugared drinks promoted by advertising and cultural activities and the higher cost of fresh nutritious foods needs to be checked. Apart from nutrition education, policy should focus on bringing down the cost of healthy foods. Producers and retailers of healthy foods may be encouraged through subsidies and provision of supporting infrastructure while taxation measures can be instituted on dealers in unhealthy foods associated with rising incidences of NCDs. A holistic view of the urban system is therefore recommended to improve food security in Kisumu city.

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Statement of Competing Interests

The authors have no competing interests.

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