



Urban Agriculture's 'Invisible' Short Food Value Chain: How Small-scale Farming Contributes to Johannesburg Food Security

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Abstract

Urbanisation into poverty in cities of the global South gives impetus to urban agriculture (UA) as a strategy to improve food security for low-income residents. This study disputes that UA is a trivial sector by arguing through the invisible short food value chain lens that it contributes to food security in local communities. The study adopted the extended case method that immersed researchers for more than a year to understand the practices of 11 farming entities and 20 of their customers in Johannesburg. Open-ended interview guides were administered to key informants from the city, provincial government, and non-governmental organisations. Findings show that UA increases food availability in local communities through the short food value chain. However, the local economy is undocumented and invisible to city stakeholders, negatively affecting their land use planning decisions for the sector. Though stakeholder consensus on UA is still lacking, the City of Johannesburg recognised UA's potential and allocated both temporary and permanent land access arrangements for farming. Small-scale farmers lack the capacity to supply formal institutions, which can be overcome by intermediaries, such as civil society facilitation. The limitations of UA manifest in its inability to attract labour and keep records which inhibits its potential and support at the city level.

Keywords Short food value chain · Urban agriculture · Food security · Informal economy · Johannesburg

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Introduction

Urban food security is an increasing challenge to towns and cities in the global South that are urbanising in poverty. The then Executive Director for UN-Habitat at the World Urban Forum in 2006 observed that the “urbanisation of poverty [is] the most important urban issue as well as the need to address this as part of the environmental sustainability agenda” (Tibaijuka, 2006:5). A critical component of urban poverty is food insecurity. Tawodzera et al. (2012) and Toriro (2021) observed an increase in food insecurity in low-income areas in different urban areas in Zimbabwe. Studies in the Harare Region show high levels of food insecurity in low-income settlements of Mabvuku, Mbare, and Epworth (Tawodzera et al., 2012). In addition, a study in 11 cities in nine countries of Southern Africa shows that low-income neighbourhoods suffer from chronic food insecurity (Crush & Frayne, 2010). Elsewhere, studies in urban areas in Ghana, West Africa, and Uganda, East Africa show increasing levels of food insecurity as well (Mambo & Grant, 2023). This study argues that the growing level of food insecurity, positions urban agriculture (UA) as a viable short food value chain strategy towards food provision in cities. This paper interrogates the contribution of UA to food security through the distribution of food to local communities.

Studies on UA have focused on diverse areas. Researchers in the USA, Canada, Nigeria, Tanzania, and Zambia focused on the food production and food insecurity nexus (Lynch et al., 2001; Simatele & Binns, 2008; Lovell, 2010; Cabannes, 2012; Halloran & Magid, 2013). In addition, studies in the USA, Germany, and South Africa highlight the social capital benefits of UA that include social inclusion, confidence building, and the creation of safe spaces in cities (Siegner et al., 2018; Matthei, 2017; Battersby and Marshak, 2013; Cabannes, 2012; Van Averbek, 2007). Lovell (2010: 2505) found that UA improved access to healthy and culturally appropriate food; and Cabannes (2012), and De Zeeuw and Drechsel (2015) add that UA contributes to food security and nutritious and fresh food. Studies in the sustainable city discourse in Africa, Europe, and Latin America show how UA was used for greening and beautifying neighbourhoods as well as reducing the urban heat island effect (Mougeot, 2005; Simon, 2016).

In the South African context, studies in Cape Town by Battersby and Marshak (2013) and Johannesburg by Malan (2015b) show that the primary drivers for UA are food security, nutrition, and livelihood opportunities. Studies in Pretoria and Cape Town show that UA contributes to social capital among communities and livelihoods for low-income residents (Kanosvamhira, 2019; Olivier and Heineken, 2017; Battersby & Marshak, 2013; Van Averbek, 2007). Linchpin to our argument in this paper are studies in Johannesburg that have focused on food insecurity levels. The City of Johannesburg (2016c) reports that 14.8% of the population was food insecure and the figure rose to 34% in the latter study by Rudolph et al (2021). Our study expands the debates on the contribution of UA to cities, with selected case study farming entities from Johannesburg. Battersby (2018) and Pottier (2015) observe that food debates have received little attention compared to other needs in city planning and development. In addition, Toriro (2018) argues that planners focus on housing, transport, recreation, and

other sectors neglecting food. Within this UA debate, Battersby (2018) elaborates that the concern about food security in Africa is framed on the productionist debates emphasising the need to increase food production. This paper argues that UA contributes to food security by distributing food within the local urban communities. We call this the short food value chain.

This paper is divided into five sections. Section I presents the introduction and challenges of urban poverty and food insecurity and the need for urban agriculture. Section II presents the theoretical framing for the food value chain, focusing on the short value chain and its weakness that makes it unpopular with the formal economy. Section III presents the extended case method adopted for studying urban farming in Johannesburg. Section IV focuses on the food value chain among small-scale 'urban farmers' and the limitation of the short food chain that makes it unattractive to city stakeholders.

The Global Framing of UA

UA is defined as an industry that grows, rears, processes, markets, and distributes food within the city and peri-urban regions (Mougeot, 2005; United Nations Development Programme, 1996, 2015; American Planning Association, 2011). Though the term 'industry' connotes 'business', UA manifests itself in different forms, characterised as leisure (or recreational), subsistence-oriented, and business farming (Cabannes, 2012). The dominant UA practices are small-scale subsistent farmers that grow crops or keep small livestock for household consumption and sell surpluses (Toriro, 2021). Farmers consume their farm products, significantly improving household food security and nutrition. However, the sale of surpluses is equally a critical contribution to food security at neighbourhood level.

One argument in favour of UA is that the sector contributes to food security by providing fresh food to urban communities (Crush et al., 2012; De Zeeuw & Drechsel, 2015; Redwood, 2012). Staatz et al., (1990:1) define food security as a state where there is "access by all people at all times to enough food for an active and healthy life". Toriro (2021:183) adds that food security refers "to a state in which people have sufficient appropriate food". These readings underscore that food security relates to issues of; (i) access, (ii) sufficient, and (iii) appropriate food provision. In this study, we adopted a framework for measuring food security from Toriro (2021:184) and Battersby (2018:204) who expanded Staatz's work on measuring food security to include: (i) availability – where food is sufficient for people's needs, (ii) accessibility – explains people's physical and economic access to food, and (iii) acceptability – where food is culturally acceptable and obtained in a manner that upholds people's dignity, self-respect, and human rights.

The Theoretical Framing for the Short Food Value Chain

The food value chain constitutes an array of integrated activities required to produce a product (from inputs to the final consumption) that enhances the value of the product to stakeholders along the chain (Kaplinsky & Morris, 2000; Lambert & Cooper,

2000; Nyamah et al., 2022). In this study, we expanded this food value chain definition to include, the interrelationships between the actors in the value chain itself (Sanchez-Hernandez, 2011). The interrelationships between producers and consumers are critical as customers are side-lined by the long food value chain that is 'non-personal' (Aubry & Kebir, 2013) and does not provide feedback to the farmer. Geographically, Kaplinsky and Morris (2000) and Sanchez-Hernandez (2011) categorise the food value chain into short (local community) and long (national and international) food value chains. However, in this study, we further break the short value chain into local (local community or neighbourhood) and intermediate (city-wide) value chains. Contrary to literature that treats the citywide value chain as local (Sanchez-Hernandez, 2011), we feel that actors within a neighbourhood (that we classify as the short food value chain), know each other better and have stronger linkages and interrelationships that inform food production and distribution within the community. In this study, we use the food value chain lens to move our UA debates from the productionist to the food systems; a term that explains the management and distribution of food from production, processing, distribution, and consumption (Toriro, 2021). It's important to note that this local food value chain approach also becomes a window into further understanding UA's contribution to individual and neighbourhood scale.

Food Value Chain and Urban Agriculture

From the three food value chains elaborated earlier, the short food value chains closely identify with the low food miles movement. The low food miles explain how UA supplies fresh food, reduces transport costs and carbon footprints in delivering food to city residents (Crush et al., 2012; De Zeeuw & Drechsel, 2015; Morgan, 2010; Redwood, 2012). Aubry and Kebir (2013) elaborate that the food crisis of the late twentieth century and the mistrust in the global food systems promoted the development of the short food supply chain. Notwithstanding these arguments, the short food value chain is both controversial and unattractive to city stakeholders as it is linked to the undocumented informal economy (Malan, 2015b).

The conceptual framing of this study analyses the interrelationship between farmers (producers) and residents (consumers) in the short food value chain and how this promotes food security. Aubry and Kebir (2013) argue that the short food value chain is characterised by the absence of intermediaries as well as the short distance between producers and consumers. The proximity between producers and consumers is facilitated by; (i) direct farmer selling on farmgate or through farmer's markets; and (ii) selling as a farmers' collective (ibid.) as shown in Fig. 1.

Study Methodology

The Study Context

Johannesburg faces increasing incidences of poverty and food security, despite its huge contribution to the South African economy. The city emerged from the

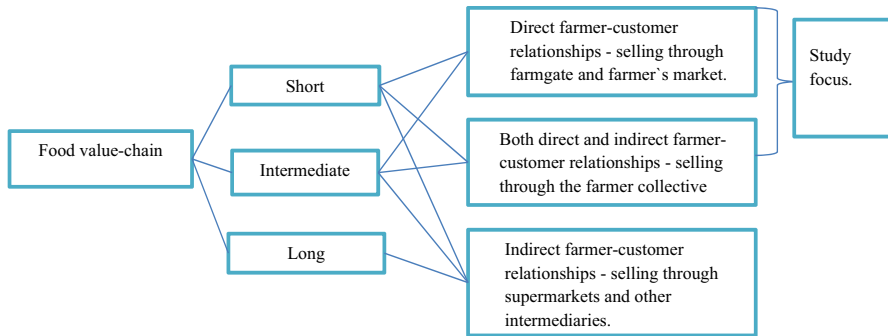


Fig. 1 The food value chain and the food distribution mechanism to consumers. Source: adapted from Sanchez-Hernandez (2011) and Aubry and Kebir (2013)

discovery of gold to become the largest municipality in Gauteng Province with a population of 4.9 million in 2016, and an annual growth rate of 2.3% (City of Johannesburg, 2016a). Johannesburg was proclaimed a mining settlement in 1886, producing 80% of the national gold output in 1911; however, this output declined to 3% in 1980, and no production at present (Harrison & Zack, 2012). Propelled by the mining activities, the manufacturing industry emerged and overtook the mining sector between the 1960s and 70 s but also declined after the 1980s (Boadou, 2017). Though the mining and manufacturing industries started declining, the dawn of democracy in 1994 lifted travel restrictions, creating a huge influx of migrant labour to Johannesburg (Boadou, 2017). As a result of low employment opportunities, urban poverty and food insecurity rose in Johannesburg. An economic survey estimates that 15.6% of the city lived below the food poverty line in 2014 (City of Johannesburg, 2014), an income requirement by an individual for their minimum daily energy intake (Statistics South Africa, 2018). As a result, unemployed and low-income residents turned to informal trading and UA. Literature on South Africa and Johannesburg has shown the uptake of UA in response to increasing food insecurity (Malan, 2015a, b; Rogerson, 1998). Our study focuses on this knowledge gap, that is, how the short food value chain contributes to food security in Johannesburg.

Research Design

We adopted the extended case design by Michael Burawoy for the empirical study of UA practices in Johannesburg. In this method, researchers undertake long-term ethnographic immersion into the daily practices of the participants (Burawoy, 1998; Samuels, 2009; Wadham & Warren, 2014). Burawoy worked for the Anglo-American Corporation to study the Zambian Copperbelt after the country's independence (Burawoy, 1998). Similarly, the lead author was employed by United Way South Africa, an NPO, as an intern and Urban Agriculture Programme Coordinator for one year 10 months from August 2015 to April 2017. The NPO

collaborated with the City of Johannesburg (CoJ) on the capacity building of urban farmers. This platform empowered the author to interface closely with urban farmers and city stakeholders. As part of the United Way South Africa team, the author participated in farmer training workshops and seminars, review meetings, farmer exhibitions, and observed farmers sorting and delivering products to the market. After leaving United Way South Africa, the author undertook week-long participant observations and interviewed farming entities, their networking partners, and customers. The process tracked farmers' inputs, production processes, marketing processes, and the final consumers to establish the food value chain (Table 1). Based on this extended farmer engagement, we adopted the term 'farming entity' rather than 'urban farmer' for this study. Our discussions with an array of 'urban farmers' that included a student association and NPOs showed that some farmers did not regard themselves nor wanted to be called farmers though they practiced farming. Thus 'farming entity' in this study implies full-time urban farmers, professionals who practice UA for research and training, and students who practice UA for leisure and advocacy.

The study adopted a non-probabilistic sampling approach where respondents were selected to reflect features of the group within the sample population (Sproull, 1995; Ritchie & Lewis, 2003). We purposefully sampled 11 farming entities and their 20 customers with different attributes as specific cases within the case study of Johannesburg (Table 1). Our sample analysis was further informed by Creswell and Creswell's (2023) recent argument that the sample size for qualitative research depended on the research design, for instance, ethnography may examine a single culture group, case studies could explore five cases and phenomenology may involve a range of 3 – 10 individuals. The participants (farming entities and their customers) are not statistically represented; however, their characteristics were the basis for selection for detailed exploration (Ritchie & Lewis, 2003; Creswell & Clark, 2017; Moser & Kalton, 2017). The interviews and personal observations from the farming entities were triangulated by key informant interviews from the CoJ, the Gauteng Department of Agriculture and Rural Development (GDARD), and NPOs working on urban farming such as Izindaba Zokudla and United Way South Africa.

We adopted the case study research design and follow up analysis strategy that allowed an in-depth understanding of programs, events, and activities within a specific time and place (Creswell & Creswell, 2023; MacCallum et al., 2019; Yin, 2018). The farming entities were chosen from the list and categories developed by the CoJ, Food Resilience Unit, and its partner United Way South Africa which capacitated urban farmers. The farming entities from this list ranged from backyard, university, church and rooftop gardens, public parks, plots in open spaces, and planned city farms (Fig. 2). These farming entities operated as businesses, farming cooperatives, NPOs, and student associations. The study upheld ethical considerations that included the respect for participant's privacy and confidentiality (Ritchie & Lewis, 2003:66 and 67).

Table 1 Typology of urban farming entities in Johannesburg

Farming entity	Location	History and mission	Operating philosophy and objective	Product description
Planner Bee Plant Care	Kyalami	Operate on residential property with formal land access since 1982. The company produces odourless organic fertiliser from cow dung for use in gardens, flowerbeds, lawns, and crop farming. Its mission is to sustainably improve soil fertility	Individual business and profit oriented	Produce organic manure (Fertilis), and vermiculture equipment (earth buddies) sold in Johannesburg and the whole of South Africa
Rydawi Aquaculture	Muldersdrift	The company started in 2014 and practices aquaculture with land access arrangements. The company markets fish and fish-keeping equipment and offers training to fish farmers	Individual business and profit oriented	Produces fish plus fish-keeping equipment (farm-in-box) sold in Johannesburg, South Africa, and the region
Growing Healthy Farms	Kyalami	The NPO was registered in 2016 and produces food for feeding orphans and sells surpluses to restaurants with formal land access arrangements. The NPO capacity-builds emerging farmers through skills training	NPO – training, recreation, and feeding an orphanage	Produces vegetables, offers training and agro-ecological tours
Wits Siyakhana Initiative	Bezuidenhout Park	The NPO was established in 2005 and has formal land access arrangements. The NPO uses gardening as a multi-functional centre to promote healthy and resilient environments for research, training, advocacy, and internship for students	NPO – research and training as well as raise awareness on UA	Produces vegetables and sells locally. Offers training throughout South Africa

Table 1 (continued)

Farming entity	Location	History and mission	Operating philosophy and objective	Product description
Wits Inala Forum	University of Witwatersrand	The student forum was formed by students supported by staff in 2015. The forum cultivates the University of Witwatersrand land with an informal agreement and donates vegetables to the Wits Community and Citizens Organisation Foodbank. It also trains fellow students on growing food and healthy eating	Student association – farming for recreation, awareness, lobby, and advocacy	Produces vegetables for hungry students, and lobbies for pro-poor university food policies such as planning fruit trees
Eikenhof Farm	Eikenhof	The is a formally designed city farm that settled 35 farming cooperatives in 2013. The farmers cultivate vegetables for sale and consumption	The city farm supports cooperatives that are business and profit-oriented (subsidised by city)	Produce vegetables for consumption and sell in southern Johannesburg
Devine Farming	Ivory Park	Is an individual farmer practicing poultry and vegetable production with an informal arrangement with a church since 2012. The farmer produces poultry and vegetables for sell and consumption	Individual business and profit oriented	Keeps poultry and produces vegetables for consumption and sells in Ivory Park
3 Kotze Rooftop Garden	City Centre – on the rooftop of the City of Johannesburg; Food Resilience Unit	The cooperative received equipment and training from the City of Johannesburg and has practiced hydroponics since 2013. The cooperative produces food for sell and consumption	Cooperative subsistence-oriented (subsidised by the city)	Produces vegetables for consumption and sell in Hillbrow

Table 1 (continued)

Farming entity	Location	History and mission	Operating philosophy and objective	Product description
Tshwane Food and Energy Centre	Ekandustria Estate (bordering Johannesburg and Pretoria)	This is a formally designed city farm by the City of Tshwane that settled 25 farmers since 2016. The farmers keep poultry and cultivate vegetables and produce food for sale and consumption	Cooperative business-oriented (subsidised by the city)	Keeps chickens, produce vegetables for consumption and sells in Ekandustria
Serapeng Sa Basadi Cooperative	Joubert Park, City Centre	This is a cooperative farming on the Green House Project land in Joubert Park since 2005. The cooperative produces vegetables and herbs for sale and consumption	Cooperative subsistence-oriented	Produces vegetables and ointment and sells surpluses in the city centre
Bambanani Food and Herb Cooperative	Betrams	This is cooperative farming on the city land with a formal agreement since 2006. The cooperative produces food for sale and consumption	Cooperative subsistence-oriented (subsidised by the city)	Produces vegetables for consumption and sale in Betrams

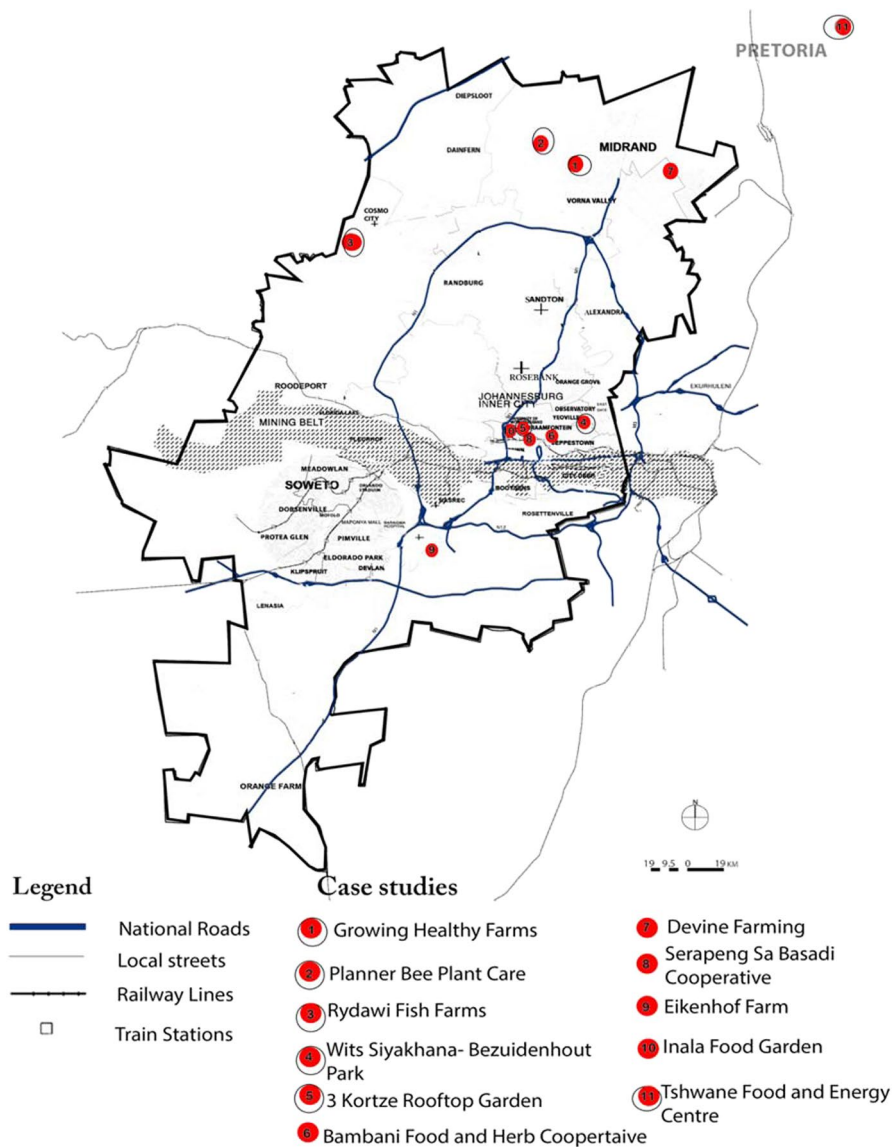


Fig. 2 Farming case study sites in Johannesburg and their value chains. Source: adapted from the City of Johannesburg (2018)

Results – Food Distribution through the UA Value Chain

The farming entities in Johannesburg sold their products through multiple value chains, from short to long value chains. These value chains are summarised in Table 2.

Table 2 Farming entities' food value chain

Farming entity	Food value chain	Impact on food security
Planner Bee Plant Care	Short, intermediate, and long	Distributed organic manure (impacted food indirect)
Rydawi Aquaculture	Short, intermediate, and long	Increased fish availability in Muldersdrift
Growing Healthy Farms	Short and intermediate	Increased availability to organic fruit and vegetables in Kyalami
Wits Siyakhana Initiative	Short, intermediate, and long	Increased vegetable availability in Bezuïdonhout Park
Wits Inala Forum	Short	Intermittently supplied vegetables to Wits Community and Organisation Foodbank
Eikenhof Farm	Short and intermediate	Increased vegetable availability to surrounding communities
Devine Farming	Short	Increased poultry and vegetable availability to Ivory Park
3 Kotze Rooftop Garden	Short	Intermittently supplied vegetables to Hillbrow Vegetable Market
Tshwane Food and Energy Centre	Short	Increased poultry and vegetable availability in Ekandustria
Serapeng Sa Basadi Cooperative	Short	Intermittently supplied vegetables and herbs to residents around Joubert Park
Bambanani Food and Herb Cooperative	Short	Increased vegetables availability to Betrams

All farming entities in the study sold their farm products directly to customers through the short food value chain. Five sold farm products through the intermediate value chain, and three sold their output through the long value chain across South Africa as elaborated in subsequent sections.

Urban Agriculture Short Food Value Chain

The 11 farming entities produced and consumed or sold leaf vegetables, tomatoes, onions, cucumbers and herbs, poultry, eggs, rabbits, ducks, fruit, fish, and compost directly to surrounding communities (Table 3). In total farming entities sold over half of their products through the short food value chain. Besides selling food at farmgate, Bambanani Food and Herb Cooperative (BFHC), and Wits Siyakhana sold an assortment of vegetables through boxes to customers around Betrams and Bezuidenhout Park respectively (Table 3). Besides buying farm products at farmgate, customers from the Betrams Community used telephone calls and text messages to order boxes. The telephone orders were convenient as BFHC prepared the vegetables in advance allowing customers to pick them up on their way from work or request home deliveries. Among all the 11 farming entities, the Wits Inala Forum had the shortest food value chain. The Student Forum grew vegetables at the University of Witwatersrand campus and delivered vegetables to the Wits Community and Citizenship Organisation Food Bank that distributed food hampers to hungry students. The Wits Community and Citizenship Organisation Foodbank Officer reported that “our normal food hampers contain largely beans and rice; however, when we get vegetables from Wits Inala Forum, we include them in our package, which improve the quality of the food that we distribute”.

The direct sales by all the farming entities through the short food value chain created a platform for close liaison with customers. This influenced product quality, quantity, and volumes of sales. The interaction between the Betrams community and the Bambanani Food and Herb Cooperative influenced the cultivation of Covo and Chinese cabbage which were popularly with the customers. A Betrams resident noted:

“I buy Chinese cabbage and Covo from Bambanani, the cooperative knows these are our favourite greens and plant them throughout the year. This has increased the consumption of these vegetables in the community”.

The Bambanani Food and Herb Cooperative (BFHC) food value chain is shown in Fig. 3.

Table 3 Categorisation of short food value chain in Johannesburg

Short food value chain selling methods	Number of farming entities selling through this method	Proportion of volumes of food sold by each farming entity [large, medium, small]
Direct sales at farmgate	11	Large
Food box deliveries	3	Small
Online or Internet selling	4	Small

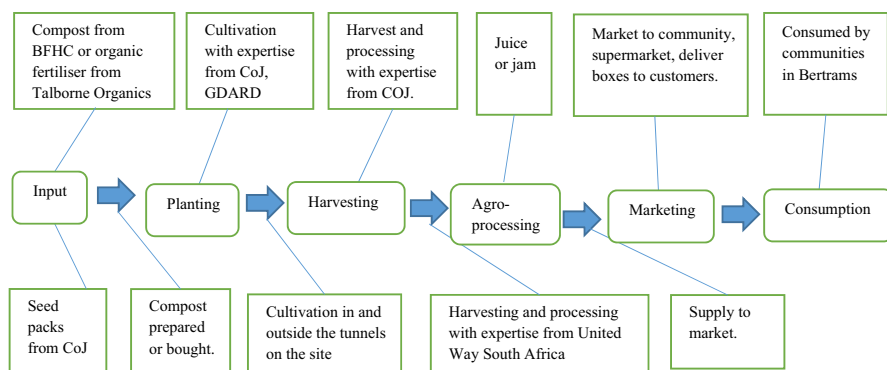


Fig. 3 The Bambanani Food and Herb Cooperative short food value chain

Urban Agriculture Intermediate Food Value Chain

Some farming entities sold their products through the intermediate food value chain to more than one neighbourhood or the whole city (Table 4). Less than half the farm products were distributed through the intermediate value chain. Four farming entities that sold their products this way are: (i) Planner Bee Plant Care, (ii) Rydwai Aquaculture, (iii) Growing Healthy Farms, and (iv) the Eikenhof Farm. The farming entities also sold their products through the farmers' markets organised monthly or by-monthly and advertised throughout the city.

The 25-member Tshwane Food and Energy Centre collectively procured chicken feeds, day-old chicks, and seedlings; and jointly marketed the farm outputs for the whole collective. However, the Eikenhof Farm was not successful in the joint procurement. The Chairman of Eikenhof Farm explained:

“We secured the market to supply the Johannesburg Fresh Produce Market, Boxer, and Pick ‘n Pay Supermarkets, however, our farmers failed to jointly plant, harvest, and deliver the farm products in the quantities and quality required. We lost these customers and now members sell individually to surrounding communities”.

Table 4 Categorisation of intermediate food value chain in Johannesburg

Intermediate food value chain selling methods	Number of farming entities selling through this method	Proportion of volumes of food sold by each farming entity [large, medium, small]
Farmer's market	5	Medium
Farming collective	5	Small
Online or Internet selling	4	Small
Supermarkets (or local distributors)	4	Small

The cooperatives at Eikenhof Farm lacked group cohesion to enforce joint planting and harvesting, which are critical for bulk production and delivery to markets. Selling through the collective required strong organisational skills, which Eikenhof Farm lacked. The failure is not an isolated incidence. The BFHC struggled to meet conditions set by Spar Supermarket such as product packaging, timely delivery, and supplying specific quantities. On the one hand, the supermarket complained that “the cooperative charged higher prices than the Johannesburg Fresh Produce Market (an international farm produce market in the city)”. On the other hand, BFHC lamented that “the supermarket paid lower prices than the local Betrums community”. This disjuncture underscored the disconnect between the formal (supermarket) and informal (small-scale farming entities) economy pricing systems. This mirrors the small-scale farming failure to meet food security access requirements in the formal economy.

Urban Agriculture Long Food Value Chain

Two farming entities; Planner Bee Plant Care, and Rydawi Aquaculture distributed their farm products through the long food value chains that extended beyond Johannesburg (Table 5).

Rydawi Aquaculture imported fish generics (the raw materials for fishkeeping) from the Netherlands. In addition, the company sold fish keeping equipment (the Farm-in-a-boxes) to the whole of South Africa and Southern Africa (Fig. 4). The international food value chain is part of the formal economy that is guided by formal business agreements, national policies, and trade agreements. Rydawi Aquaculture secured an import license from the Government of South Africa, Department of Agriculture for the importation of fish generics from the Netherlands.

Another farming entity with a long food value chain is Planner Bee Plant Care which breaks down cow dung into odourless organic fertiliser called Fertilis. The company marketed Fertilis through its supply agreement with another private company, Talborne Organics Private Limited, across South Africa.

Promoting Food Security through the Short, Intermediate and Long Food Value Chain

Findings show that UA is effective in distributing food, mainly through the short value chain. This raised the question, how effective are these food distribution approaches

Table 5 Categorisation of long food value chain in Johannesburg

Long food value chain selling method	Number of farming entities selling through this method	Proportion of volumes of food sold by each farming entity [large, medium, small]
Online or Internet selling	2	Small
Long supply chains (national and international)	2	Small

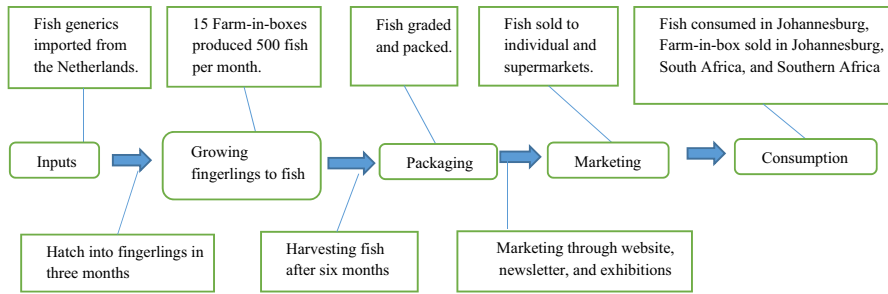


Fig. 4 The Rydawi Aquaculture long food value chain

towards addressing food security? The short food value chain is most effective in ensuring food availability, accessibility, and acceptability to local communities. The customers interviewed in Betrams, Bezuidonhout Park, Eikenhof, Kyalami and Ekandustria observed that the availability of vegetables increased among communities close to the farming entities. A customer in Betrams explained:

“We have access to green vegetables and tomatoes from Bambanani. They are always fresh. Over and above that we discuss with the farmers, the type of tomato we require that makes a better soup. We therefore influence the vegetable that we eat”.

However, some farming entities face productivity challenges, affecting food availability to customers. A postgraduate student who received food parcels from the Wits Community and Citizens Organisation Foodbank argued that:

“Our food parcels provide better variety when we get greens as well. Unfortunately, the foodbank gets green vegetables from Inala Forum that has limited capacity, and so the vegetables are not enough”.

Customers and retailers within the intermediate food value chain expressed satisfaction with the food distributed by “urban farmers. The Jackson Food Market and the Bryanston Organic Food Market bought vegetables and fruit from Growing Healthy Farms that practiced organic farming (Fig. 5). Customers interviewed at Bryanston Organic Food Market were satisfied with the quality of organic fruit and vegetables produced by Growing Healthy Farms which met their health needs.

Discussions

The farming entities in Johannesburg have multiple food value chains that impact food distribution and its contribution to the food security of the city as elaborated in this section.



Fig. 5 Organic vegetables and fruit produced by Growing Healthy Farms

The ‘Invisible’ Urban Agriculture Value Chain and Land Use Planning

Farming entities sold half of their output through the short food value chain using direct sales to the local economy. The practice fosters mutually beneficial interrelationships between farmers and consumers. However, the local economy is informal with no recorded outputs and sales. We should clarify that two business-oriented farming entities kept records on their production and sales, and this data focused on the formal sales to supermarkets, and national and international customers. The remaining nine farming entities had incomplete data that could not be computed for comparisons on productivity and profitability. For instance, Wits Inala estimated the vegetable bundles supplied to the Wits Community and Citizens Organisation Foodbank but had no records. One critical finding of this study is that as a result of the lack of evidence, UA is sidelined by policymakers and planners (Mbiba, 1994; Pothukuchi and Kaufman, 2000; Simatele & Binns, 2008; Toriro, 2018, 2021). Due to the lack of evidence, there was no stakeholder consensus regarding strategies for integrating UA in Johannesburg. The Urban Development Boundary that zoned a greenbelt for UA (City of Johannesburg, 2016a) was threatened by housing development plans from the Gauteng Provincial Housing Department. We, however, argue that the contestations of the short food value chain do not nullify UA. Instead, we point to the limitations of the productionist UA discourse that centres on volumes (Battersby, 2018) and call for the food system approach that explores the processing and distribution element of UA (Toriro, 2021). In support of this view, Siegner et al. (2018) argue that the viability of UA should not be limited to sales but also how urban farmers foster equity and inclusion in the food access debate. Our findings show that communities surrounding urban farms in Betrains, Bezuidenhout Park, Eikenhof and Ivory Park had improved access to fresh vegetables and fruit. We argue that City of Johannesburg land use planning initiatives that established the Urban Development Boundary around the city and zoned UA initiatives (City of Johannesburg, 2016a), and the temporary arrangements that secured vacant plots and open spaces for farming are clear indications for planning initiatives that recognise UA. Despite the differing views on the concept, our findings show that such endeavours should be scaled up and replicated across the city.

The dominant argument that UA makes a small contribution to food security to warrant priority in land use planning contradicts viewpoints by NPOs that support urban farming in Johannesburg. The Director of Izindaba Zokudla argued that “the Southwest Townships (SOWETO) has about a million residents and its vegetable markets are worthy millions of Rands for farmers”. In support of the above, the United Way South Africa Programme Coordinator observed that its supported low-income farmers are food secure compared to non-farming households in the same neighbourhoods. The treasurer of Bamabanani Food and Herb Cooperative argued that her family was healthier than her neighbours in Betrains who cannot afford to continuously buy fresh fruit, juice, and vegetables from supermarkets. These premises form the backbone of our argument for the short food value chain. We argue that UA thrives, though its operations are informal and incompatible with mainstream economics. Within the food security debates, the short food value increases food availability, and accessibility (Battersby, 2018; Toriro, 2021) and addresses food deserts, which are ‘areas with no food’ (Battersby & Crush, 2014) in local communities.

Introducing Networks to the Invisible Value Chain

To further explore how small-scale farmers can supply the formal economy, we turn to De Man's (2004) quasi-integration network. In this system, small-scale actors join efforts to supply large customers. The quasi-integration network provides a platform for urban farmers to supply big customers. This would provide answers to the uncoordinated nature of farming entities in Johannesburg. Both the Eikenhof Farm and Bamabanani Food and Herb Cooperative failed to supply supermarkets and the Johannesburg Fresh Produce Market which required complex logistical arrangements. Small-scale farmers require an intermediary to coordinate the production, processing, and delivery of farm products to the market. In Cape Town, the NPO, Abalimi Bezekhaya supplied big customers such as Mount Nelson Hotel by collecting farm products, packaging, and delivery from its network of small-scale farmers (Abalimi Bezekhaya, 2014). Again, Macupe (2016) documents a small-scale farmer in Pretoria who supplied the formal market through an intermediary NPO. The Cape Town and Pretoria cases show that small-scale farmers can supply large buyers through the support of intermediaries. These arguments, according to Haysom and Battersby (2016), Siegner et al. (2018), and Toriro (2021) show that UA does not single-handedly result in food security for the city but contributes towards local food. We should underscore that rather than improve food distribution and food security, intermediaries lift the food value chain from an invisible local to a formal value chain.

Macro–micro Level Relationships in Food Security Debates

UA's invisible short food value chain should be understood within the broad food security continuum, which spans from the individual farmer availing food and promoting food access (Battersby, 2018; Toriro, 2021) to the local community and

complex food systems (Toriro, 2021) supporting the whole city. Burawoy (1998), and Wadham and Warren (2014) argue that micro-level issues are located within the broad context of the macro environment. In this context, this study locates the unique experiences of individual farming entities (in neighbourhoods) within the broad debates on food security at the city (Johannesburg) and regional levels (Gauteng). When food security arguments are limited to broad citywide and regional levels (assessed based on quantities), admittedly the short food value chain makes a small impact on the whole urban food system (Haysom and Battersby, 2016; Siegner et al., 2018; Toriro, 2021). However, the broad arguments gloss over the city sustainability and resilience debates that value the contribution of local [household] initiatives (Harrison et al., 2014). With this growing appreciation of UA, the City of Johannesburg Integrated Development Plan makes provisions for grassroots initiatives such as UA towards addressing urban food security at the household level (City of Johannesburg, 2016b).

Within the macro–micro food security discourse, Malan (2015b:62) argues that “if UA aims to relieve food insecurity, it has to develop enterprises that supply fresh locally produced food to those in the informal or almost-formal sector”. Our findings confirm the above argument that UA contributes to household food security as all farming entities consume their farm products and sell surpluses to local communities. While acknowledging that UA’s contribution is limited by the small plots that are cultivated (Haysom & Battersby, 2016), [farming plots in Ivory Park and Betrains are small]; we value its capacity to distribute food to nearby communities and address ‘food deserts’ (Battersby & Crush, 2014), as well as provide informal channels through which low-income residents access food (Tawodzera et al., 2019).

Governance of the Short Food Value Chain

The experiences of Bambanani Food and Herb Cooperative, Eikenhof Farm, and Tshwane Food and Energy Centre show the need for institutional support to aid small-scale farmers in distributing food through the value chain. The Izindaba Zokudla facilitated the development of the SOWETO Imvelo Market which brought together farmers and consumers with mutual benefits. Through direct sales, farmers bypassed intermediaries and got improved prices, and SOWETO residents got fresh farm products directly from producers.

At the city level, both the CoJ Food Resilience Unit Manager and the GDARD Officer noted that their two institutions collaborated in providing skills training, inputs, and tools and secured land for urban farming. The city also established the Mayoral Expert Panel on Food Resilience which advised the mayor and promoted food security. Though the panel was later discontinued when the leadership changed at the city level, it brought UA to the forefront of the food security debate in the city. Despite these efforts, a citywide stakeholder platform to promote UA is missing in Johannesburg. Elsewhere, the Association of *Kliengatern* was useful in bargaining with the city, NPOs and universities in the capacity building of urban farmers in Berlin (Matthei, 2017). The lack of a farmer stakeholder platform, (and indeed an association championing urban farming) weakens advocacy initiatives and

marketing of farm products in Johannesburg and could explain the lack of consensus on a permanent greenbelt for UA. Such a platform would also assist in upscaling farmer success stories.

Limitations of the Urban Agriculture Short Food Value Chain in Promoting Food Distribution and Food Security

This study does not romanticise UA but acknowledges its shortcomings. The challenges of UA are not limited to the lack of documentation of the short food value chain alone. Studies in Paris by Aubry and Kebir (2013) and the US municipalities by Meenar et al. (2017) concede that UA initiatives were not self-sustaining and failed not attract the youth. More so, unlike industrial jobs, UA offers low salaries, is labour intensive, and requires full-time commitments, which discourages 'farmers' from engaging in multiple jobs which is common in cities (Meenar et al., 2017). The low wages are mirrored in our findings as well. The youngest member and secretary to Bambanani Food and Herb Cooperative returned to his rural village in 2017 after consistently failing to pay rentals in Johannesburg from the farming business. In 2018, the chairperson of the same project secured an alternative job and worked on the cooperative on a part-time basis. Similarly, only two out of the five women who started the 3 Kotze Street Rooftop Garden in 2016 were active during fieldwork in 2017. The inability of UA to pay labour affects its productivity and potential to contribute towards food security. Again, the lack of records by most of the farming entities limits the evidence required by city stakeholders to present UA initiatives as a strategy to promote food resilience. This study calls for further research on the viability of UA as well as the most appropriate governance structure to promote small-scale UA in Johannesburg.

Conclusion

Despite arguments to the contrary, the study provides evidence that UA contributes to food security in Johannesburg. Farming entities distribute food to households, local communities, and city residents through the short, intermediate, and long food value chains. The short food value chain improves food access and availability through direct sales with mutual benefits of improved sales for farmers and fresh food for residents. Most transactions in the short food value chain follow the informal economy that is undocumented, and invisible to city stakeholders, yet providing food to the low-income residents and addressing food deserts. The lack of records by urban farmers frustrates city stakeholders who require tangible evidence for their land use planning decisions in favour of UA. The City of Johannesburg somewhat recognises the potential of UA as evidenced by the establishment of temporary and permanent land access arrangements within the city and the peri-urban areas. The UA 'invisible' food value chain exists and is 'viable' to small-scale farmers and attractive to low-income residents, though unconventional. The short food value chain suits small-scale farming entities that are unable to meet the requirements of

the formal economy. This weakness can be overcome when small-scale farmers supply the formal economy through an intermediary. The limitation of UA in Johannesburg is its inability to pay living wages, which threatens the sustainability of the sector. A study's limitations of this study was the failure to quantify the outputs and sales by individual farming entities and thus limiting cross-sectoral comparison amongst different farming entities. This limitation points to the need for a reimagining of the binary of formal/informal economic lens, which would in turn support a more nuanced understanding of the complexities of UA's role in food security.

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Data Availability We have narratives, recordings, transcriptions and pictures of the 11 farming entities, and responses from the 20 customers, and five key informants plus progress reports from the City of Johannesburg and non-profit organisations that work with the farming entities. These completed datasets also include respondent meta data. We promised our respondents to adhere to ethical standards of strict confidentiality and that we will not share the meta data on ethical grounds. However, where required, we will share this information on the grounds of strict confidentiality.

Declarations

Ethics Clearance This study is compliant with the ethics standards set by the University of the Witwatersrand (Human Research Ethics Committee Clearance number H16/07/40).

Conflict of Interest No potential conflict of interest was reported by the authors.

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References

- Abalimi, B. (2014). *Farmers of Hope*, Abalimi Bezekhaya Newsletter 42, 2014/15. Abalimi Bezekhaya, Cape Town.
- American Planning Association. (2011). *Food Policy Councils: Helping Local, Regional, and State Governments Address Food System Challenges*. American Planning Association.
- Aubry, S., & Kebir, L. (2013). Shortening food supply chains. A means for maintaining agriculture close to urban areas? The case of the French metropolitan area of case of Paris. *Food Policy*, 41, 85–93.
- Battersby, J., & Crush, J. (2014). Africa's urban food deserts. *Urban Forum*, 25, 143–151.
- Battersby, J., & Marshak, M. (2013). Growing communities: Integrating the social and economic benefits of UA in Cape Town. *Urban Forum*, 24, 447–461.

- Battersby, J. (2018). *Cities and urban food poverty in Africa*. In G. Bhan et al. (eds) The Routledge Companion to Planning in the Global South. Routledge, New York.
- Boadou, A.P. (2017). Towards economic development in the gold mining areas of South Africa and Ghana. MSc Research Report. Faculty of Engineering and the Built Environment. University of Witwatersrand. Johannesburg.
- Burawoy, M. (1998). The extended case method. *Sociological Theory*, 16, 4–33.
- Cabannes, Y. (2012). *Pro-poor legal and institutional framework for urban and peri-urban agriculture*. Legal Office, Food and Agriculture Organisation, United Nations, Rome: Development of Law Service.
- City of Johannesburg. (2014). *Integrated Annual Report 2014/2015*. Johannesburg: City of Johannesburg.
- City of Johannesburg. (2016a). *2016/21 Integrated Development Plan*. Johannesburg: City of Johannesburg.
- City of Johannesburg. (2016b). *Spatial Development Framework, 2040*. Department of Development Planning, In collaboration with: Iyer Urban Design, UN Habitat, Urban Morphology and Complex Systems Institute and the French Development Agency, City of Johannesburg, Johannesburg.
- City of Johannesburg. (2016c). *City of Johannesburg at a glance*. Issue 1, December 2016. Group Strategy, Policy Coordination, and Relations, Johannesburg.
- City of Johannesburg. (2018). *Welcome to the corporate GIS online maps*, <https://eservices.joburg.org.za/online/maps>, City of Johannesburg, Johannesburg (Accessed 16 December 2018).
- Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*. Sage publications.
- Creswell, J.W., & Creswell, J. D. (2023). *Research design. Qualitative, quantitative, and mixed methods approaches*. 6th Edition. Sage. California.
- Crush, J., & Frayne, B. (2010). *Pathways to insecurity: urban food supply and access in Southern African cities*. Cape Town: Africa Food Security Urban Network.
- Crush, J., Frayne, B., & Pendleton, W. (2012). The crisis of food insecurity in African cities. *J Hunger Environ Nutr*, 7, 271–292. <https://doi.org/10.1080/19320248.2012.702448>
- De Man, A. (2004). *The network economy. Strategy, structure, and management*. Edward Elgar, Cheltenham.
- De Zeeuw, H., & Drechsel, P. (2015). *Cities and agriculture: Developing resilient urban food system*. Routledge Taylor and Francis Group.
- Halloran, A., & Magid, J. (2013). Planning the unplanned: incorporating agriculture as an urban land use into the Dar es Salaam master plan and beyond. *Environment & Urbanization*, 25(2), 541–558. <https://doi.org/10.1177/0956247813500903>
- Harrison, P., K. Bobbins., C. Culwick., T.-L. Humby, C. La Mantia, A. Todes., et al. (2014). *Introduction and Chapter 1: Resilience Thinking*. In P. Harrison, K. Bobbins, C. Culwick, T.-L. Humby, C. La Mantia, A. Todes, et al., *Urban Resilience Thinking for Municipalities*. University of the Witwatersrand, Gauteng City Region Observatory, Johannesburg.
- Harrison, P., & Zack, T. (2012). The power of mining: The fall of gold and rise of Johannesburg. *Journal of Contemporary African Studies*, 30(4), 551–570.
- Haysom, G., & Battersby, J. (2016). *Why urban agriculture isn't a panacea for Africa's food crisis*. The Conversation, <https://theconversation.com/why-urban-agriculture-isnt-a-panacea-for-africas-food-crisis-57680> (Accessed 30 August 2023)
- Kanosvamaha, T. P. (2019). The organisation of urban agriculture in Cape Town, South Africa: A social capital perspective. *Development Southern Africa*, 36(3), 283–294. <https://doi.org/10.1080/0376835X.2018.1456910>
- Kaplinsky, R., & Morris, M. (2000). *A handbook for value chain research*. Brighton and IDS: Prepared for the IDRC.
- Lambert, D. M., & Cooper, M. C. (2000). Issues in supply chain management. *Industrial Marketing Management*, 29, 65–83. [https://doi.org/10.1016/S0019-8501\(99\)00113-3](https://doi.org/10.1016/S0019-8501(99)00113-3)
- Lovell, S. T. (2010). Multifunctional urban agriculture for sustainable land-use planning in the United States. *Sustainability*, 2, 2499–2522. <https://doi.org/10.3390/su2082499>
- Lynch, K., Binns, T., & Olofin, E. (2001). Urban agriculture under threat: The land security question in Kano, Nigeria. *Cities*, 18, 159–171. [https://doi.org/10.1016/S0264-2751\(01\)00008-7](https://doi.org/10.1016/S0264-2751(01)00008-7)
- MacCallum, D., Babb, C., & Curtis, C. (2019). *Doing research in urban and regional planning: Lessons in practical methods*. Routledge.
- Macupe, B. (2016). *Zanele was born to farm*, The SOWETAN, Tuesday, June 28, 2016, Johannesburg.

- Malan, N. (2015a). Design and social innovation for systemic change: Creating social capital for a farmers market. Proceedings of the Cumulus Conference. The Virtuous Circle Design Culture and experimentation, 3–7 June 2015, Milano.
- Malan, N. (2015b). Urban farmers and urban agriculture in Johannesburg: Responding to the food resilience strategy. *Agrekon*, 54(2), 51–75. <https://doi.org/10.1080/03031853.2015.1072997>
- Mambo, T., & Grant, M. (2023). Money has the final say in the market: the situational geography of urban food security in Lilongwe, Malawi. *Urban Forum*. <https://doi.org/10.1007/s12132-023-09498-8>
- Matthei, M. (2017). *Berliner Landesverband der Gartenfreunde, Berlin, Deutschland*. Paper presented at the International Urban Farming Conference, 11 – 12 September 2017, Berliner Landesverband der Gartenfreunde, Berlin.
- Mbiba, B. (1994). Institutional responses to uncontrolled urban cultivation in Harare: Prohibitive or accommodative? *Environment and Urbanisation*, 6(1), 188–202. <https://doi.org/10.1177/095624789400600116>
- Meenar, M., Morales, A., & Bonarek, L. (2017). Regulatory practices of urban agriculture. A connection to planning and policy. *Journal of the American Planning Association*, 83(4), 389–403. <https://doi.org/10.1080/01944363.2017.1369359>
- Morgan, K. (2010). Local and green, global, and fair: The ethnical foodscape and the politics of care. *Environment and Planning*, 42, 1852–1867. <https://doi.org/10.1068/a42364>
- Moser, C. A., & Kalton, G. (2017). Survey methods in social investigation. Taylor and Francis.
- Mougeot, L.J.A. (2005). (Ed) *AGROPOLIS. The social, political and environmental dimensions of urban agriculture*. International Development Research Centre, Earthscan, London.
- Nyamah, E. Y., Attatsi, P. B., Nyamah, E. Y., & Opoku, R. K. (2022). Agri-food value chain transparency and firm performance: The role of institutional quality. *Production and Manufacturing Research*, 10(1), 62–88. <https://doi.org/10.1080/21693277.2022.2062477>
- Olivier, D. W., & Heinecken, L. (2017). The personal and social benefits of urban agriculture experienced by cultivators on the Cape Flats. *Development Southern Africa*, 34(2), 168–181. <https://doi.org/10.1080/0376835X.2016.125998>
- Pothukuchi, K., & Kaufman, J. L. (2000). The food system: A stranger to the planning field. *Journal of American Planning Association*, 66(2), 113–124. <https://doi.org/10.1080/01944360008976093>
- Pottier, J. (2015). Coping with urban food insecurity: Findings from Kampala, Uganda. *Journal of Modern African Studies*, 53(2), 217–241. <https://doi.org/10.1017/S0022278X1500018X>
- Redwood, M. (Ed.). (2012). *Agriculture in urban planning: Generating livelihoods and food security*. Routledge.
- Ritchie, J., & Lewis, J. (Eds.). (2003). Qualitative research practice: A guide for social science students and researchers. Sage Publications.
- Rogerson, C. M. (1998). Urban Agriculture and poverty alleviation: South African debates. *Agrekon*, 37(2), 171–188.
- Rudolph, M., Kroll, F., Muchesa, E., Paiker, M., & Fatti, P. (2021). Food security in urban cities: A case study conducted in Johannesburg, South Africa. *Journal of Food Security*, 9(2), 46–55. <https://doi.org/10.12691/jfs-9-2-2>
- Samuels, G. M. (2009). Using the extended case method to explore identity in a multiracial context. *Ethnic and Racial Studies*, 32(9), 1599–1618. <https://doi.org/10.1080/01419870902749117>
- Sanchez-Hernandez, J. L. (2011). The food value chain as a locus for (dis)agreement: Conventions and qualities in the Spanish Wine and Norwegian Salted Cod Industries. *Geografiska Annaler: Series B, Human Geography*, 93(2), 105–119. <https://doi.org/10.1111/j.1468-0467.2011.00364.x>
- Siegner, A., Sowerwine, J., & Acey, C. (2018). Does UA improve food security? examining the nexus of food access and distribution of urban-produced foods in the united states. a systematic review. *Sustainability*, 10, 1–27. <https://doi.org/10.3390/su10092988>
- Simatele, D. M., & Binns, T. (2008). Motivation and marginalisation in Africa urban agriculture: The case of Lusaka, Zambia. *Urban Forum*, 19, 1–21.
- Simon, D. (2016). (Ed) *Rethinking Sustainable Cities*. Policy Press, Bristol.
- Sproull, N. (1995). *Handbook of Research Methods. A guide for practitioners and students in the Social Sciences*. Second Edition. Metuchen and London, The Scarecrow Press.
- Staatz, J. M., D’Agostino, V. C., & Sunberg, S. (1990). Measuring food security in Africa: Conceptual, empirical and policy issues. *American Journal of Agriculture Economics*, 72(5), 1311–1317. <https://doi.org/10.2307/1242553>
- Statistics South Africa. (2018). *National Poverty Lines 2018*. Statistical Release, P0310.1. Pretoria.

- Tawodzera, G., Zanamwe, L., & Crush, J. (2012). *The state of food insecurity in Harare, Zimbabwe*. Africa Food Security Urban Network, Food Security Series 13, Cape Town.
- Tawodzera, G., Chigumira, E., Mbengo, I., & Musangaya, S. (2019). *Characteristics of the urban food system in Epworth, Zimbabwe* pg 208 - 220. In Battersby, J and Watson, V (eds) *Urban food systems governance and poverty in African cities*. Routledge, Taylor and Francis, London and New York.
- Tibaijuka, A. (2006). *The importance of urban planning in urban poverty reduction and sustainable development*. World Planners Congress, June 19 – 23. Vancouver.
- Toriro, P. (2018). *Food production processing and retailing through the lens of spatial planning legislation and regulations in Zimbabwe*. PhD thesis, Department of Environmental and Geographical Sciences, University of Cape Town. Cape Town.
- Toriro, P. (2021). More than urban agriculture: *A case for planning for urban food security in Harare, Zimbabwe* pg 181 - 195. In A.R. Matamanda, V. Nel and I. Chirisa (eds) *Urban geography in post-colonial Zimbabwe. Paradigms and perspectives for sustainable urban planning and governance*. The Urban Book Series, Springer Nature Switzerland AG. Cham.
- United Nations Development Programme. (1996). *Urban agriculture. Food, jobs and sustainable cities*. Publication Series for Habitat II, Volume One, One UN Plaza, New York.
- United Nations Development Programme. (2015). *Urban Agriculture. The Global Sustainable Development Report 2015 Brief*. UN online Publication.
- Van Averebeke, W. (2007). Urban farming in the informal settlements of Atteridgeville, Pretoria, South Africa. *Water South Africa*, 33(3), 337–342. <https://doi.org/10.4314/wsa.v33i3.49112>
- Wadham, H., & Warren, R. C. (2014). Telling organisational tales: The extended case method in practice. *Organisational Research Methods*, 17(1), 5–22. <https://doi.org/10.1177/1094428113513619>
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). California, Sage: Thousand Oaks.

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