



**Investigating factors that influence the sustainability of urban agriculture: A case study
of Kwa-Mashu, eThekweni Municipality**

by

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ABSTRACT

In recent years, the concept of urban agriculture (UA), has been explored as a remedy for urban poverty and deteriorated socio-economic conditions, with numerous studies arguing in favour of UA's benefits. Despite the continuous support provided to UA projects by eThekweni Municipality to overcome challenges such as food insecurity and poverty, these projects are not self-sustaining. Instead, the carbon footprint of food is increasing, thereby threatening sustainability efforts. There have been studies conducted on UA in eThekweni, however, a few have focused on factors that affect the sustainability of these projects. Hence, this study aimed to investigate factors that affect the sustainability of small-scale urban agriculture projects assisted by eThekweni Municipality in Kwa-Mashu and propose a sustainable livelihood framework that could be used to inform the food system strategy in the city. A mixed method approach, employing a descriptive design was used to gather data. Data collection progressed from July to August 2022 using questionnaires through a survey method. Probability sampling was employed, and a total of 36 individuals involved in UA were included in the sample.

Qualitative data was analyzed using thematic analysis method, while quantitative data was analyzed using inferential statistics through SPSS. To this end, results showed that UA is predominantly practiced by women between ages 36 – 60, and that 63% of the respondents involved in UA were unemployed. The most grown crops are spinach, beet, butternut, herbs, peppers, carrots as well as *Colocasia esculenta* (commonly known as Amadumbe). The study also showed that 69% of respondents practice UA for consumption and only sell surplus food to other neighbours. The income generated from selling produce was not significant ($p < 0.005$) between those who claimed to be subsistence, semi-commercial and commercial farmers. Common challenges experienced appeared to be a lack of sufficient arable land to farm, inadequate water for irrigation, as well as lack of market. In addition, findings revealed that factors that affect success of UA can be easily recognized when practices are assessed in relation to the principles of sustainability. Hence this study discovered that food production without any link to socio-economic empowerment and environmental protection, is unsustainable. This study therefore strengthens systems approach and recommends that the municipality offer opportunities for farmers to fully transition to agroecological farming, develop economic skills and engage in farmer-to-farmer knowledge exchange.

Keywords: Agroecology, Food security, Kwa-Mashu, Sustainability, Urban agriculture

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Table of acronyms

Acronym	Definition
BAU	Business As Usual
BSC	Balanced Score Card
CEA	Controlled Environment Agriculture
COGTA	The Department of Cooperative Governance and Traditional Affairs
DMOSS	Durban Municipal Open Space System
ECDs	Early childhood developments
FAO	The Food and Agriculture Organization of the United Nations
IDP	Integrated Development Plan
LocalGAP	Local Good Agricultural Practice
NGOs	Non-Governmental Organisations
SAFL	Southern Africa Food Lab
SDF	Spatial Development Framework
SDGs	Sustainable Development Goals
SSA	Sub-Saharan Africa
UA	Urban Agriculture
UEA	Uncontrolled Environment Agriculture
UHI	Urban Heat Island
UKZN	University of KwaZulu-Natal
UN	United Nations
UPA	Peri-Urban Agriculture
WCED	World Commission on Environment and Development

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CHAPTER 1

INTRODUCTION

1.1 Background

In recent years, the world has been experiencing rapid urbanization as most cities grow into metropolitan regions, becoming more accommodating of unprecedented movement from rural areas for wage labour (Hou, Wang & Murayama 2019). As more people move to cities, urban poverty coupled with deteriorated socio-economic conditions becomes prominent, resulting in a decline of the economy (Nwuneli, 2018). The current population in cities is envisaged to increase by 60% in the year 2030 (Feola, Sahakian & Binder 2020), resulting in an ever-increasing demand for shelter, employment, health, and food. All these requires that future urban development be smart and integrate innovative solutions to keep cities from socioeconomic and environmental impediments (Martellozzo et al. 2014). Some authors posit that a key to a more sustainable and healthier urban development in the future could be localization of the food systems and the reduction of urban food catchment areas (Skar et al. 2019).

Various cities are turning to urban agriculture (UA) as a strategy to increase urban food production, provide healthful sustenance that might otherwise be lacking, create jobs for urban immigrants and in turn protect the environment (Zimmer et al. 2021). Urban agriculture can be explained as the cultivation, processing and distribution of food and products within the city boundary (intra-urban) or areas immediately surrounding the city (peri-urban) (Krishnan et al. 2016). Practices thereof are highly diverse ranging from household gardens, communal-based farming, and rooftop gardens to commercial flagship projects that involve the usage of high-tech products (Opitz et al. 2016). The concept of UA has been receiving considerable attention in recent years, with numerous studies arguing in favour of its benefits, especially regarding economic and food security (Poulsen et al. 2015). Within the context of UA, studies have been able to come up with innovative ideas regarding technical and management approaches to be used and replicated in various regions (Opitz et al. 2016).

Urban Agriculture has even permeated the public sector, influencing the national and municipal policies (Pereira & Drimie, 2016). In South Africa, and particularly the metropolitan municipalities including the City of Cape town, Johannesburg as well as the greater eThekweni Municipality have taken measures to advocate and support UA (Taylor, 2013), albeit the

integrated development plans (IDPs) and spatial development frameworks (SDFs) of these municipalities make limited mention of policies to support UA. The city of Cape Town appears to be the only metropolitan municipality with a food policy in place (Mckenzie, Preston & Gumede 2022). Key policy statements by South African metropolitan municipalities in support of UA, subsistence farmers, and community gardens within their municipal boundaries include:

- Supporting and expanding UA by designating and protecting land that can be used for UA.
- Incorporating green and open spaces into community urban planning efforts.
- Supporting the establishment of community and household gardens and small-scale agricultural initiatives that promote food security.
- Educate and raise awareness about the value of urban agriculture (Mckenzie et al. 2022).

1.2 About eThekweni Municipality

The city of eThekweni, which is in the south of the Kwazulu-Natal province covers an area of about 2 297 km² and comprise of a total of 110 wards with approximately two-thirds being naturally rural (Figure 1). Being the largest city in the province, and the thirteenth largest municipality in the country, eThekweni is a category “A” municipality (Drimie et al. 2022). Owing to its warm, subtropical climate and extensive beaches, eThekweni is a major centre of tourism. As part of the planning process, the municipality was divided into four regions located in the south, west, north, and central where the municipality hosts a wide range of land uses including formal and informal rural settlements, enhanced by economic transportation as well as public and social infrastructure. A vast portion of the area within the municipality is designated as part of the Durban Metropolitan Open Space System (D’MOSS), which covers an area of about 95 000 hectares (Drimie et al. 2022). In addition, there are various agricultural activities taking place within the city that are supported by the municipality. According to the IDP review of 2022, the urban form of eThekweni is characterized by a distinct separation of residential from economic uses. This means that there are limited employment opportunities, resulting in people having to travel long distances to work. Taking this into account, there is a need to present opportunities for local food production especially in areas where there are fewer intensive uses.



Figure 1: Map depicting eThekweni Municipality (Source: <https://municipalities.co.za/map/5/ethekwini-metropolitan-municipality>)

The promotion of agricultural development in eThekweni was therefore necessitated after the amalgamation of local municipalities, which resulted in the inclusion of large peri-urban and rural areas in the city. This was done to ensure that people understand the value of land and the potential to generate income through sustainable agricultural practices (eThekweni Municipality, 2021a). When considering potential agricultural lands that have not been surveyed in the city, particularly those under Ingonyama Trust, it is believed that eThekweni has about 800 to 1 200 ha of such land. Conversely, when looking at small-scale farmers in terms of the confirmed area currently in use, the city is estimated at 560 ha (eThekweni Municipality, 2020). Through its Agroecology Unit, eThekweni Municipality has taken it upon itself to establish communal, household, and institutional gardens. The unit consist of six agricultural hubs that are strategically located across the city to serve all eThekweni residents. These include Northdene, Marrianridge, Umbumbulu, Inchanga, Hambanathi as well as

Newlands Kwa-Mashu agricultural hub. Various projects have been undertaken at these hubs in collaboration with various entities including universities and non-governmental organizations (NGOs) such the Southern Africa Food Lab (SAFL). At Newlands Kwa-Mashu hub, there has been various agroecology initiatives being trialled, including the assessment of various waste products from site sanitation as a fertilizer for crop production even though the findings haven't been adopted (Bisaga et al. 2019).

The agri hubs are used as centres for training farmers on permaculture practices; healthy diet, food safety, soil management, water preservation and nature-based pest management. In addition, these hubs provide support in the form of basic infrastructure such as fencing, storage containers, provision of water storage tank as well as seeds and farming implements. Along with this, the city trains the beneficiaries. In their nature “these hubs are mainly food security coordination centres and thus are not geared for commercialization” (eThekweni Municipality, 2020). The agricultural program of the city encourages the community to consume their own produce and only sell surplus to neighbours. There exist close to 500 established gardens that are benefiting from the Agroecology Unit's initiatives, with some existing for over 10 years and still not self-sustaining. It is thus against this background that the current study intends to explore and critically discuss factors that influence the sustainability of UA, for projects assisted by eThekweni Municipality in Kwa-Mashu Township.

1.3 Research gaps and problem statement

High food prices and general food insecurity are challenges that require innovative ways of producing and distributing food. As the world urbanises and society becomes increasingly detached from where food comes from, the carbon footprint of food in cities increases and threatens the environmental sustainability efforts. There are several positive findings and claims about the role of UA's contribution to addressing these challenges (Stewart et al. 2013; Kinver 2014). However, studies by Battersby et al. (2015); Mcdougall, Kristiansen, and Rader (2019) have argued that there is limited evidence to support and justify the feasibility of UA as a strategy to increase household income and reduce poverty. These authors attributed their investigations to little or no attention given to the link between sustainability and agriculture in urban areas.

Conversely, eThekweni is faced with triple challenges of inequality, poverty, and unemployment, with almost 52% of households being indigent – meaning they require

government support to access basic services (eThekwini Municipality, 2021b). Although UA projects in eThekwini Municipality are being provided continuous support to overcome the above-mentioned challenges, these projects are still not self-sustaining. Covid-19 has further exacerbated the existing challenges, causing food systems in eThekwini, as like everywhere else to experience supply chain shock, resulting in a direct impact on agricultural projects and in turn low-income households. Taking this into account, there is a dire need to prepare for disruptions on local food systems by developing an implementable strategy that the municipality can use to ensure the sustainability of UA projects.

1.4 Aim

The study aimed to investigate factors that contribute to the sustainability of UA activities supported by eThekwini Municipality in Kwa-Mashu and propose a sustainable framework that could be used to inform food policy and food system strategy for the Municipality.

1.5 Research questions

Questions underpinning this research were:

- What are factors that contribute to the sustainability of UA in Kwa-Mashu, eThekwini Municipality?
- What are the obstacles to the sustainability of UA in Kwa-Mashu, eThekwini Municipality?
- What aspects can contribute to the development of a framework for sustainable UA in eThekwini Municipality?

1.6 Objectives of the study

To achieve the aim and address the above questions, the below objectives were adopted:

- To evaluate factors that contribute to the sustainability of UA in Kwa-Mashu, eThekwini Municipality,
- To assess the obstacles to UA and provide suggestions to transition to sustainability,
- To propose and recommend a sustainable framework to be used by eThekwini Municipality for the UA projects.

1.7 Research methodology

This study was carried out in Kwa-Mashu, which is a peri-urban area falling within the eThekwini Municipality. Kwa-Mashu has been purposely selected because there exist agricultural projects that are assisted by the municipality through its Newlands Agroecology Hub. A descriptive-cross sectional design was employed to capture the dynamics of UA in

Kwa-Mashu and provide more information when comparing them with other regions where similar data is available. This study thus, adopted probability sampling due to the target population being stratified into various types of gardening, including communal gardens and gardens within school premises. A sample size of 36 respondents was randomly selected from a sample frame of 60 practicing urban farmers in order to highlight differences between specific sub-groups while ensuring greater precision. Data was collected through questionnaires that were translated into isiZulu, and consisted closed questions to capture numeric data and open-ended questions to capture qualitative data.

A mixed-method approach was followed, allowing the researcher to explore various aspects of UA, and in turn describe, analyse and interpret findings using historical and existing research data. Qualitative data was analysed using thematic analysis method, through which data was categorized into key themes and reported as findings. On the other hand, quantitative data was first tested for normality and homogeneity of variance using Kolmogorov–Smirnov and Levene’s tests and then analysed using inferential statistics through SPSS. The questions on Likert scale measure were subject to a reliability testing (Cronbach’ Alpha) to ensure internal consistency in answering questions. A Cronbach’s Alpha reliability test was performed on questions (with a Likert scale response) that related to the sustainability of farming activities in Kwa-Mashu. The proposal of this study along with the questionnaire and the information sheet and consent has been approved by the University of Kwazulu-Natal (UKZN) Human and Social Science Ethical Clearance Committee.

1.8 Significance of the study

Considering the complexity and challenge that come with developing the city food strategy, the practical implications of the findings herein are not only intended to add to the current knowledge regarding UA in eThekweni, but also to assist relevant municipal authorities in developing comprehensive and integrated management practises, and to realize the importance of developing locally-relevant food policy and interventions that lead to a sustainable local food economy. This is relevant especially during the current uncertain periods of high food prices and increased interest rates. In addition, it is envisaged that the findings in this study will help in addressing the shortfalls that were identified from engaging with community members in order to strengthen the practice of agricultural programs, and in turn create awareness amongst the relevant stakeholders who assist these UA projects.

1.9 Dissertation outline

This study consists of five chapters and it is structured as follows:

1.9.1 Chapter 1 – Introduction

This chapter introduces the concept and background of the study, its main objective, motivation and some thoughts on urban agriculture. It also reviews the research questions, significance and limitations of the study.

1.9.2 Chapter 2 – Literature Review

This chapter focuses on defining various trends and drivers of urban agriculture globally and locally, as well as key drivers of the practice and the link to sustainability. It also provides a comprehensive analysis of the various practices and challenges that affect the practices.

1.9.3 Chapter 3 – Research methodology

This chapter provides an overview of the methodology, data collection instrument and the administration that was used to carry out the study. The study design, methodology, and target population.

1.9.4 Chapter – Presentation of results

This chapter presents a detailed analysis of the results including the characteristics of the sample, the analysis and interpretation of the data, and the findings with reference to the relevant literature.

1.9.5 Chapter 5 – Recommendations and conclusion

This chapter provides a general summary, conclusions and recommendations based on the findings of the study in the context of the theoretical framework presented in chapter 1. This chapter also presents suggestions for future research on sustainable agricultural practices using a conceptual framework.

1.10 Chapter Summary

This chapter provided a general overview of the entire study. It introduced the background, basic theoretical approach as well as the aim, research questions and the objectives of the study. It also provided a brief overview of the significance of the study. The following chapter will review the literature that is related to the UA, examining various practices and policies governing the success of the practice.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The previous chapter focused on the background and rationale of the research, outlining the research gaps and problem statement. Therefore, the purpose of this section is to discuss the concept of UA and provide an overview of its development on a global and local scale, its links to sustainable development, and its impact on different communities. It also compares various studies on UA's relation to food security and poverty alleviation. To gain a deeper understanding of these practices, case studies from various selected countries are presented. Case studies are presented from developing and developed countries during the past decade with the objective to provide a well-rounded analysis of the various urban agricultural practices and their links to sustainability.

2.1.1 Theoretical underpinnings

The 2022 IDP review makes a compelling case that "food heritage plays a critical role in strengthening nations and is an important component of our multicultural society." As indicated in the previous chapter, cities serve as hubs of resource extraction, fossil fuel burning, capital accumulation, and sanctuaries for the underprivileged, with a high supply of affordable food causing and resulting in the metabolic divide that is nearing its peak under neoliberal capitalism (Kroll, 2021). The privatization of public space in cities, as well as the industrial food systems that sustain them contribute to the multiple environmental, social, and health crises that urgently require a transition to sustainability (Kroll, 2021). Clearly, there are siloed approaches to urban food governance as officials must pursue different missions and conflicting goals. As evidenced by the overlapping yet conflicting approaches (conventional agriculture versus agroecology), there tends to be tensions between provincial and metropolitan municipalities that complicate multi-level governance (Drimie et al. 2022).

In light of this, it may be opportune to draw on institutional theory and its relevance to food systems. Institutional theory provides a lens through which to examine influences that promote the survival and legitimacy of organizational practices (Janssen & Nonnenman, 2017). These include factors such as culture, social environment, regulations, tradition, history, and economic incentives, while recognizing that resources are also critical. Glover et al. (2014) defines "institutions" as social phenomena that become common foundations of social life because of the interplay of civic or public engagement, business enterprises, social norms, and

traditions. Institutional theory has traditionally been concerned with how groups and organizations can better secure their positions and legitimacy by conforming to the rules and norms of the institutional environment (Scott, 2007). According to institutional theory, external social, political, and economic pressures influence strategies and organizational decisions as firms seek to adopt legitimate practices or legitimize their practices in the eyes of other stakeholders ((Janssen & Nonnenman 2017). For UA practices to be successful in any domain, cooperative relationships must exist among the various stakeholders. Therefore, the application of institutional theory offers the possibility of a holistic approach to creating a multi-organizational environment. An example can be seen in the dairy supply chain, as explained in a study by (Glover et al. 2014), which shows how powerful positions can influence, facilitate, or prevent sustainable practices.

2.1.2 Urban agriculture: Definition

Initially, UA was defined as the cultivating, processing, and marketing of food, fuel, and other outputs on privately owned and public land in intra and peri-urban areas, primarily to meet consumer demands (Hou et al. 2019). In the process of the fast-growing population in urban areas, UA along with its activities evolved with the emerging focuses and development, resulting in various definitions from various researchers (Yan et al. 2022). Although UA can take many forms in terms of its functionality, management, and market integration, there exists an overlap possibility and thus making it difficult to clearly map UA instances into a single category (Opitz et al. 2016). Despite the lack of a harmonized definition, numerous studies are in one accord with UA being defined as a system of modern agriculture that encompasses a complex and a diverse mix of production activities, including fisheries and forestry with the aim of guaranteeing food security, urban ecosystem maintenance and improved quality of life for urban dwellers (Stewart et al. 2013; Bisaga et al. 2019). It involves animal husbandry, aquaculture, urban beekeeping, and horticulture just to mention a few. What distinguishes UA from rural agriculture is the fact that it integrates urban economic ecosystem (Krishnan et al. 2016).

In addition to contributing to healthy diets, improving household incomes, offsetting food expenses, and creating jobs, UA is considered an alternative movement that advocates for a fundamental shift toward environmentally sustainable agriculture (Ackerman et al. 2014). This assertion is supported by Krishnan et al. (2016), who noted that UA takes into account the values of agriculture and its connection to sustainability, and in turn promotes environmental

protection, enhances economic profitability, and improves the livelihoods of urban residents. Studies conducted worldwide and in certain African countries including Malawi, Kenya, Uganda, Tanzania, and Zambia have emphasized instances where both low-income and high-income households resort to UA for food production and income generation (Foeken & Owuor 2006; Korir, Rotich & Mining 2015; Azunre et al. 2019). Other obvious advantages of UA include poverty alleviation, survival of women and children, social inclusion, economic development and cost-effective waste management (Pedzisai et al. 2014).

2.1.3 Diverse perspective of urban agriculture in the literature

Dating back to 1987, the World Commission on Environment and Development (WCED) mandated governments to start incorporating UA into their development plans, stating that "it could become an important component to provide more food to the urban poor" and additional source of income to supplement budgets (Bisaga et al. 2019; Oliver, 2019). This came because of the increased challenges such as lack of infrastructure and inadequate transportation to purchase produce, leading to increased poverty in urban areas. Incorporation of agricultural activities and food production in urban and peri-urban areas gave rise to the term "urban agriculture" (Orsini et al. 2013). Stewart et al. (2013) argue that UA has existed as a livelihood strategy for as long as people have settled in urban areas, but the sector in general only started receiving attention since the early 1990s.

Urban agriculture is practiced in a variety of systems such as cropland, nomadic agriculture, and mixed farming, to name a few, and is considered a rather complex concept by numerous researchers (Stewart et al. 2013). Although agriculture has been traditionally practiced for more than 10 000 years, it has undergone significant changes in the last five decades (Malan, 2015). This includes a drastic structural change with the three main drivers being industrialization, centralization, and globalization (Kremer & Dliberty, 2011). In addition, the context of the green revolution led to a shift toward an agricultural system that relies heavily on machinery, genetically modified crop varieties, and synthetic chemical inputs to produce high crop yields in a short period (Jarosz, 2014). This in turn has led various researchers to address the question of how the use of machinery affects employment (Kremen, Liles & Bacon 2007).

To date, there has been extensive research on UA such as pollution associated with agriculture, ecosystem services, nutrient management, case studies (including green spaces in schools, household gardens, rooftop gardens as well as peri-urban agriculture), and resorting to UA during the outbreak the COVID-19 pandemic (Challinor, Watson & Lobell 2014; Cederlof,

2016; Lal, 2020; Yoshida, 2020; Marsh et al. 2020). Indeed, most studies concur that UA plays a crucial role in contributing to household food insecurity by supplementing incomes or reducing food expenditures (Orsini et al. 2013; Poulsen et al. 2015). For example, in a study by Walters and Midden, (2018), the sustainability of UA on vegetable production on green roofs was evaluated. The findings showed that UA provides a unique ability to significantly cultivate food for communities in spaces that are typically unused. Likewise, Azunre et al. (2019) assessed the importance of UA towards sustainable cities and concluded that if properly implemented, UA has the potential to enhance the economic, social, and environmental sustainability of cities.

These findings corresponded with those by Novo and Murphy (2000) on rooftop greenhouses in North America; Slater (2001) on 'food gardening' in Cape Town; Hovorka (2005, 2006) on chicken farming in Gaborone, Botswana; Dongus et al. (2009) on subsistence backyard gardening in Harare, Zimbabwe; Gallaher, (2017) on 'bag gardeners' in the slums of Nakuru, Kenya, and Bisaga et al. (2019) on informal settlements in eThekweni, South Africa that showed and supported that economically marginalized communities can be empowered financially, socially, and politically through UA. To elaborate further, UA has proven to contribute to the health and wellbeing of citizens, thereby improving social inclusion (Batitucci et al. 2019). According to Russo and Cirella (2019), UA significantly contribute to the sustainable development goals (SDGs) which will be explained in detail later in this chapter. Its adoption by the public sector and influence on food policies is evidence of the noteworthy role that is played by UA (Pereira & Drimie, 2016).

2.1.4 Trends in urban agriculture: Cases from various countries

The world is in the predicament of urban population growth amidst other challenges. This is especially a major problem for low- and middle-income countries, as increasing urbanization puts pressure on the governance of cities that are already struggling (Ncube & Ncube 2016, Gondo et al. 2017). Ikerd, (2017) postulates that along with the increasing demand in urban food supply, there is a failure of agricultural industrialization. Therefore, UA has found itself where local farming is gaining popularity. This is not only part of the response to urban food supply, but also part of a sustainable food production system that provides the necessary solutions to ensure urban food security. The way in which UA is practiced differs from region to region. Factors that contribute to these differences include but are not limited to levels of education, availability of funds, the general economy, government policies and strategies in

place as well as the identified social need of the practice area (Duchemin, Wegmuller & Legault 2008).

It should be noted that UA contributes to food security for impoverished families, be it in a developed or developing country. In essence, the common goal of practicing UA is poverty alleviation before anything else. Although there are not many studies that have focused on the UA benefits in terms of the role it plays on the nutritional value and generation of income, UA is continually explored in many countries (Peng et al. 2015; Walsh, 2017). The claim that UA serves as an important contribution in addressing urban poverty and generating income seem to attract the attention of both farmers, planners as well as government officials in countries such as Cuba and Uganda (Onyango et al. 2017). Globally, interest in UA is expanding both in research and in practice, which is indicative of the potential UA has towards ending the era of intensified global urbanization.

Although it has been practiced for decades in Sub-Saharan Africa (SSA), the acceptance of UA seems to be insignificant when compared with other regions. As discussed in more detail later in this chapter and subsequent chapters, the progress of this sector is hindered primarily by unfavourable policies in the face of increasing urbanization, ongoing conflicts, climate change as well as poor urban governance, insufficient information, and inadequate support from government officials (Parnell & Walawege, 2011). When looking at UA in countries such as North America, it is noted that this country has made substantial progress over the years. Although still not progressed far, education and social aspects of UA have been prioritized. On the other hand, UA activities in Canadian cities are directed more towards conservation, recreation, and education and less towards food security (Smit et al. 2001). Even though the practice is growing, most gardens are more communal when compared to the ones in Asian Cities. In Europe and North America, agriculture has been a culture practice for decades (Smit et al. 2001). However, the decline in farming activities experienced by both regions during World War I and II led to the practice being downscaled to private, self-sufficient practices (Smit et al. 2001).

In developed East Asian countries such as China, Japan and Singapore and those in North America and Europe, UA practices are predominantly high-tech and ecologically oriented agricultural activities. On the contrary, most practices in developing countries aren't as sophisticated. This is because in most developing countries such as Africa, there is limited support from the government and it appears to be difficult to get a buy in from the national

governments to support food systems. In most cases, food systems in local governments of most African countries flourish because of the involvement of NGOs. Taking the aforementioned into account, it can be argued that indeed UA plays a remarkable role and certainly contributes towards the socio-economic and ecological needs of urban dwellers amid the challenges. However, there has to be favourable food systems strategies and policies in place (Saburema, 2019).

2.1.5 Participants in urban agriculture

Even though various authors argue that UA practices are dominated by impoverished people who are trying to alleviate their household food insecurity while trying to secure jobs, this has been changing as UA is now a norm even to the middle and upper class. Practicing UA is necessitated by its contribution to nutrition. Unlike in the past when people considered eating vegetables to be bad, the attitude of many people seems to be changing as they begin to realise the value of consuming vegetables. Urban agricultural activities can range from food, livestock, non-food products (for example selling of compost, seeds, flours) or a combination of these, with first preference given to edible crops. Generally, middle-class farmers tend to engage in activities that give room to being commercial. In addition, some UA participants comprise of communities that form cooperatives as well as associations and NGOs. Generally, women are dominant participants in UA, while young people's involvement is limited (Mougeot, 2005).

2.1.6 Types of urban agriculture

There is no all-encompassing term for agricultural plots in urban settings. Within UA, creative ways for new approaches to UA are being developed and trialled. Numerous recently published studies described and evaluated examples of best UA practices with the aim of replicating these practices in other regions (Krige, 2017). In order to address various challenges such as deteriorated soil and water resources, waste recycling, as well as economic agriculture approaches UA in cities are encouraged to be practiced in such a way that allows gardens to be removed in case changes in land ownership occur (Krige, 2017). There exist two main types of UA, i.e., gardens and farms. Numerous communities utilize communal gardens and form cooperatives to participate in these gardens. This provides them an opportunity to learn and get a better understanding of food production. Conversely, city farms are more incorporative of all various types of animals and crops, and they provide an opportunity for people to learn from them through voluntary programs (Ikerd, 2017).

In eThekweni, there are four main types of gardens: home gardens, school gardens, community gardens, and smaller gardens associated with clinics and early childhood development (ECDs) facilities. When discussing UA, it is essential to differentiate between practices in peri-urban and intra urban and the objective of farmers or institutions involved. Urban agricultural production can therefore be divided into the following:

- **Small-scale gardening** in and around the home: this can be exemplified by low cost, low-tech creative gardens including old containers, pellets, tower gardens, tyre gardens and so on.
- **Meso gardening** such as communal gardens using plots of land that are not necessarily located to the farmers' residence used for growing food.
- **Institutional gardens:** include ECDs, tertiary, community halls, clinics, churches and any other institution that grows food.
- **Small commercial farms:** include large farms that grow plant products, as well as small commercial farms farming edible animals (e.g., chickens, goats, bees, fish), and those specializing in certain products (e.g. mushrooms).
- **Large-scale agro-business:** Common agricultural activities that produce vast amounts of food to dense urban populations.
- **Multifunctional farms:** Just as the name suggests, this type of farms incorporate a variety of products including edible and non-edible as well as ornamental products grown on the same plot.

Figure 2 summarizes the above information with pictures for better understanding (Krishnan et al. 2016; Walsh, 2018).

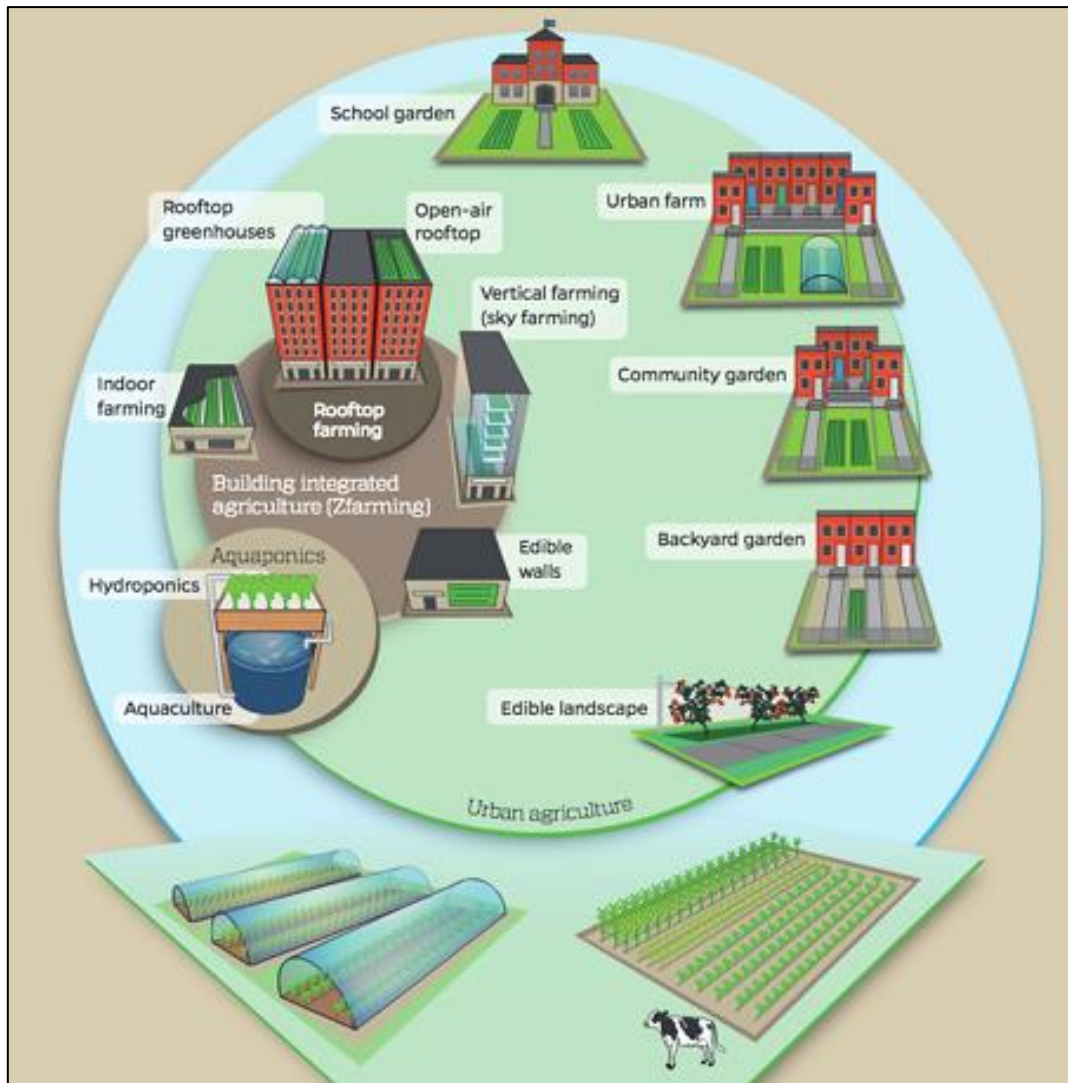


Figure 2: Scope of Urban Agriculture (Source: Walsh 2018)

2.1.7 Impact of UA on food security

The concept of food security dates to the early 1970s, when the world was experiencing a food crisis. Regardless of the availability of nutritious food, it is important to understand the distribution and access barriers of communities to nutritious food in order to find a better path to household food security (Berry et al. 2015). During this period, the instability of the agricultural commodities market and the various other factors affected the price stability of basic food. The concept of food security then evolved as the world's food economy became more integrated into the global food system. This concept became more relevant to the needs of the people (Berry et al. 2015). During the 1974 World Food Conference, the international community defined food security as the availability of basic foodstuffs, always. Due to the fundamental role it plays in human development, food security is documented to be a global human right (Banik, 2019). Food security arguably remains a challenge for billions of people

the whole world (FAO, 2019). According to FAO (2019), more than 820 million people go to bed hungry on a daily basis, and this figure has been rising steadily over the past years. Walters and Midden (2018) argued that close to 2 billion are experiencing food insecurity, meaning they do not have access to safe, nutritious, and sufficient food. It is said that due to challenges such lack of employment as alluded earlier in this chapter, people opt to buy cheaper unhealthy food for eating rather than healthy food. SAFL through its “woza-nami” project showed that there is a limited number of people who prioritize daily consumption of fruits and vegetables.

Food security can therefore be defined as the availability of nutritious food for all members of the human family. This means that everyone can eat healthy and lead an active lifestyle (Perez-Escamallia, 2017). On the other hand, Warren, Hwkesworth, and Knai (2015) described food security as the physical, economic, and socio-cultural accessibility to enough, safe, and nutritious food that satisfies the need in people’s diets. Looking at these definitions, FAO derived various dimensions of food security, which includes food availability, accessibility, adequate utilization which is dependent on the body’s ability to consume, process and utilize the nutrients contained in food, thereby improving the quality and wellbeing of their lives (Perez- Escamillia, 2017). Following are dimensions of food security explained in detail:

- **Food Availability** – This dimension addresses physical availability from food taking into account the value chain aspects such as production, processing, reserves, markets as well as transportation
- **Food Access** – Once availability has been established, the next step is determining the possibility of accessing the food considering the physical and economic means.
- **Utilisation** – After accessing food it is important to determine if households are maximising the consumption of nutrients and energy. This includes various aspects such as the way food is prepared, served, inclusion of various diets, good hygiene practice, clean water, sanitation as well minimization of food wastage.
- **Stability** – When the above dimensions have been met, it is important to ensure long term stability, thereby ensuring that safe and nutritious food is available and accessible by households. (FAO et al. 2021)

Urban agriculture is thus a solution to ensure that all these dimensions are in place as it become an enabler for urban areas to be more resource-efficient and to contribute to the development of food security for local communities (Walters & Midden, 2018). To achieve food security, especially in terms of nutritious and preferred foods, people should have ambition, passion,

drive, and the ability to engage in practices that help produce products that replenish household pantries (Mcata & Obi, 2015; Uzokwe, Giweze & Ofuoko 2016). According to Khan, Azid and Toseef (2012), there is a strong link between food security vulnerability and long-term poverty. That is, "poverty undermines people's ability to develop livelihood strategies, adaptive behaviours, and coping strategies that help ensure long-term food security." There exist two marginalized groups that have been identified to be at risk of food insecurity and they can broadly be defined as:

(a) the economically constrained group, i.e., those who lack land, tools and capital, livestock, literacy, and other formal skills. This group of people are the underemployed or the working poor (Banik, 2019);

(b) the other group is the socially bound group of people who are food insecure because of their age (children and the elderly), gender (women and girls), or illness or disability.

Being food insecure in some instances means choosing between rent and food and people eating less or unhealthy food as shown in Figure 3. Food insecurity is thus caused by the confluence of a variety of different problems, including poverty, climate variability and extremes (droughts, floods, etc.), conflict, economic downturns and crises, population growth, urbanisation, biodiversity decline and loss of ecosystem services, changing diets, low stocks of staple foods, and reliance on food imports rather than local production (FAO et al. 2021). Deteriorating food security can in turn lead to higher food prices, political and economic instability, unrest, and insurgency (Ziervogel & Ericksen, 2010). There are various factors that contribute to food insecurity such as poor socioeconomic status, physical inability, impartial access, ecological access, as well as cultural suitability also (Kent et al. 2020).

Therefore, in order to understand the importance of UA in alleviating poverty, it is imperative to identify how cities discourage or support growers to maximize the benefits of this practice and ensure sustainability (Chihambakwe, Mafongoya & Jiri 2019). It is thus worth noting that food security and sustainability are interrelated and often used by different scientific disciplines and governments to define their respective goals. Food security is recognised as an important element in the SDGs from the United Nations (UN). Sustainable development Goal 2 is to "End hunger, achieve food security and improved nutrition, and promote sustainable agriculture" (or "zero hunger" for short) (UN, 2015). In addition, because the SDGs are interlinked, reducing hunger through food security can help achieve other SDGs, including SDG 1 "No Poverty,"

SDG 3 "Health and Well-Being," SDG 5 "Gender Equality," SDG 6 "Clean Water and Sanitation," SDG 13 "Climate Action," and SDG 15 "Life in Rural Areas" (UN, 2015).

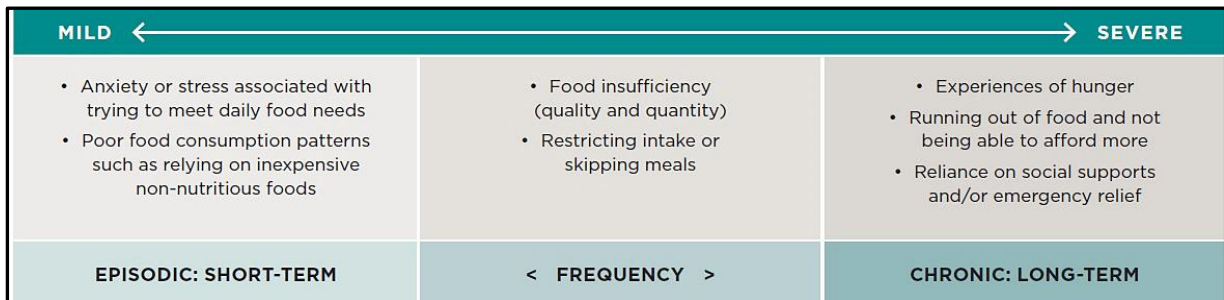


Figure 3: Food insecurity continuum (Source: Burns 2014).

2.2 Challenges affecting UA

Although UA has proven to be an effective approach to achieving food security and improving household income, some studies have revealed certain undesired effects and externalities. A study by Pfeiffer, Silva, and Colquhoun (2014) outlined challenges such as inaccessibility to credit and investment, land use rights limitations, high cost of water, and/or subjection to theft and vandalism as the most prevalent among most farmers. Some challenges are related to environmental risks linked to gardening practices such as irrigation, fertilization, weeding, and pest control (Tapia et al. 2021). Several studies have found that organic toxins such as microbial contamination, as well as inorganic pollutants like pesticides and heavy metals and metalloids, have deleterious effects on the soil, plants and irrigation, resulting in food safety concerns (Graefe, Buerkert & Schlecht 2019). These poor agricultural practices are due to limited expertise and lack of knowledge regarding appropriate gardening practices and proper crop management (Lee-Smith, 2010). It is argued that when the cultivator is poor and less skilled, they are less likely to produce in volumes and thus remain food insecure.

The challenge of UA is further exacerbated by environmental resource scarcity, population growth, as well as diminishing land and water resources (Donnenfeld, Crookes & Hedden 2018). As it is foreseen that the population in cities will increase, the development of urban land to include industries, malls, parks and pools for example, will lead to further shrinkage of arable land (Li et al. 2020). FAO (2019) also noted that climate change is threatening the UA, which is also one of the major sources of greenhouse gas emissions. Impacts from climate-related hazards may include heat stress and loss of livestock; damage to, and loss of crops; reduced rain-fed agriculture (and related increases in demand for irrigation); reduced food quality and food safety; and damaged and disrupted food supply chains. Lastly, it has been

observed that investment in sustainable agriculture is not enough. Reuther & Dewar (2006) claim that UA can only be economically viable and sustainable if it has a high level of start-up capital, considering that the success of UA tends to be directly proportional to the wealth and the skills and knowledge of the farmer (Rezai et al. 2016).

Some observed challenges from a social perspective include conflict among community members as well as lack of ownership especially for projects being assisted by government. Some studies have also pointed out theft and vandalism as a social challenge, while others raised concerns regarding 'green gentrification' which is defined as systems initiated by the execution of a green space land use planning initiative that result in the exclusion and displacement of politically disenfranchised citizens (Lee et al. 2019). Taking these challenges into account, FAO pointed out that new solutions and innovative technologies for sustainable intensification, efficient use of resources such as land and water, energy, and greenhouse gas reduction are needed to shift UA practices away from "business as usual" (BAU) and toward sustainability (FAO, 2019).

2.3 Contribution of UA to sustainability

Since the introduction of the concept of sustainable development in the 1980s, various metrics and indicators have been developed and used to assess the sustainability of food systems (Tapia et al. 2021). In this context, sustainability is thus the ability to preserve food systems and their long-term survival (Hallett, Hoagland & Toner 2017). Krishnan et al. (2016) stated that for UA to be sustainable, its physical environment, the society in which it operates as well as the economy must be sustained. If any of these areas fail, the whole food system would collapse. Hence, these areas are from time to time referred to as main pillars of sustainability as shown in Figure 4 (Hallett et al. 2017). As alluded in chapter 1, one of the goals that can be considered is the reduction of food insecurity in urban areas, which can be achieved using various strategies and measures, such as the reduction of food production costs and the promotion of local food production (Bisaga et al. 2019).

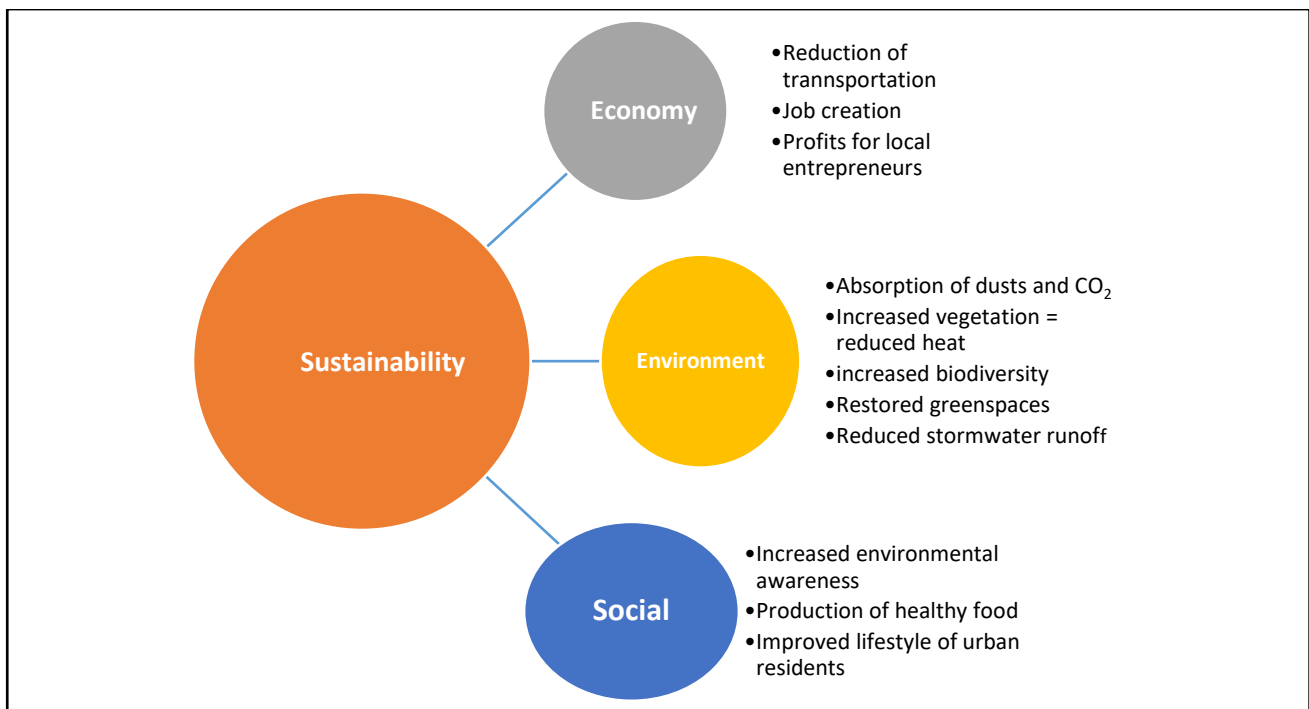


Figure 4: Benefits of UA interns of sustainable development (Modified from Jasionkowski & Lewandowska-Czarnecka 2016).

2.3.1 Economic benefits of UA

The economic aspect of UA is associated with profitable practices, which includes small-scale farms like family market gardens and large farms. The most vital benefit of UA is that it provides skills and employment to people in numerous cities and has thus become an important source of livelihood (Darkey et al. 2014). When looking at literature, International Labour Organization (2013) estimated that 2100 agricultural workers in Morogoro and 6400 in Mbeya, Tanzania engage in UA either as unskilled labour or as forage collectors, and then gain skills from these practices. Similarly, in Manila, Philippines, about 120,000 impoverished households make a living from jasmine production. The conventional literature is replete with examples of the role of urban agriculture in job creation (Sinclair, 2010; Carr, Potter & Nortcliff 2011; Amponsah et al. 2015). Urban agriculture does not only serve as a source of employment for those involved in it, but also for those in the value chain such as street vendors, bakers, chefs etc. From these examples, it can be inferred that UA and peri-urban agriculture (UPA) has the potential to expand economies of the cities not only through production, but also through processing, packaging and marketing of consumer products.

This is exemplified in a study by Amponsah et al. (2015) who demonstrated how most vegetable farmers in urban and peri-urban areas supply their produce to wholesalers. As shown

in Figure 5, Drechsel and Keraita, (2014) demonstrated the whole value chain and how each of the actors benefit economically. In the same way, farmer’s markets and crafts that take place from time to time, as well as door to door sales by community farmers help them generate an income. This has been observed in various countries including South Africa. There are many examples of jobs created through the practice of UA in the commercial sector such as Argentina, Brazil, and Uruguay as mentioned in (International Labour Organisation, 2013). This thus results in increased entrepreneurial activities, while reducing food costs and in turn improving the quality of life in cities. Also, this means that cities have emergency food supplies and more affordable food. Lastly, UA helps people become less dependant on the governments for handouts, and since the UA practices are profitable in their nature, maximising them need not to be overemphasized.

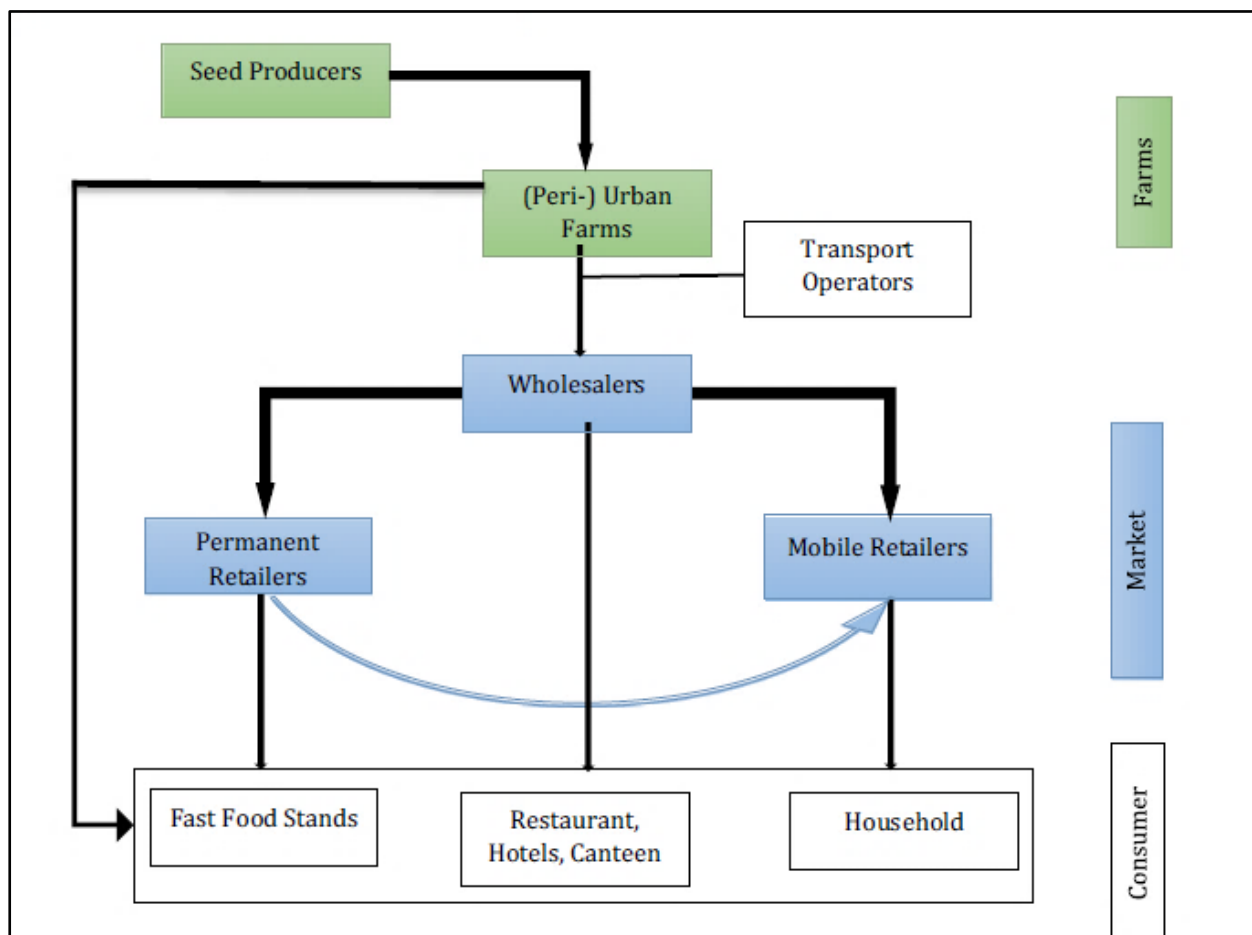


Figure 5: Flow chart of vegetable supply chain in urban and peri-urban Ghana (Source: in Drechsel & Keraita, 2014).

2.3.2 Environmental benefits of UA

In addition to food production, UA considers environmental concerns such as the re-use of organic waste. According to Azunre et al. (2019), urban areas are often found to have large

amounts of greenhouse gases as a result of emissions from industrial activities. Studies such as Olsson et al. (2016) asserts that UA can restore the environment that has been degraded by pesticides. Urban agriculture can serve as “green infrastructure” to mitigate heat island, and impacts associated with storm water as well as reduction in energy required to transport food. In other words, the environmental benefits of UA can include but are not limited to energy efficiency, carbon footprint, as well as soil decontamination, locally grown food means that there will be a reduction in the use of fossil fuels that would come from transporting food from various regions. To add to this, the energy-efficient nature of UA means that carbon footprint in urban areas can be reduced. Vegetation covering does not only prevent solar radiation which would potentially be re-radiated from urban surfaces as sensible heat, but it also prevents the atmospheric carbon dioxide as more oxygen is released (Ackerman et al. 2014).

Vacant lands in urban areas are often susceptible to illegal dumping of foreign material that may cause deleterious effects on the quality of the soil, which may in turn be eroded into natural water systems such as rivers and dams. However, if these spaces are utilized for UA practices, cities save costs of removing these chemicals while the environment is being protected (Olsson et al. 2016). In addition, UA provides recreational spaces in cities, thereby contributing to socio-psychological needs (Van veenhuizen & Danso, 2007). Sustainable agricultural practices can also serve as climate mitigation strategies. For example, crops such as ground covers can regulate soil erosion in cases of floods, while rainwater harvesting into various water storage containers can serve as irrigation during drought periods. In addition, UA reduce runoff, lessens urban temperature extremes, and minimizes waste by using waste to make compost for crop production (Padgham, Jabbour & Dietrich 2015). Moreover, UA practices positively impact biodiversity by providing suitable environments for various organisms, especially when combined with organic farming practices. Finally, UA provides mechanisms to condense and enhance food supply chain as the need for transporting food becomes minimized, while accessibility of fresh food becomes maximized (UN Habitat, 2011).

2.3.3 Social benefits of UA

Urban agriculture plays a vital role in the social and emotional well-being of many people. Although this concept is seldom studied by many, a few studies have indeed agreed that UA promotes ownership and social inclusion especially in underserved areas. The thought of directly being involved in food production and procurement gives many people a sense of belonging, and thus has been viewed as a social justice issue (Mees & Stone, 2012). Many large urban farms in cities are involved in local enrichment programs whereby they empower

underserved communities through skills development programs. Some of these programs are geared to feeding the underserved populations within cities, whereby surplus produce or those that failed to meet the market criteria are used to prepare meals in soup kitchen programs that are feeding communities. A prime example can be seen in a study by Mees and Stone, (2012) whereby rooftop garden farmers in Brooklyn farmed seeds to feed their “growing chefs program” which offered educational programs and skills development in agriculture, gardening and cooking to various underserved communities. Another example is that of CORE /El Centro in Milwaukee, which uses UA as part of its healing therapies agenda and to reconnect immigrant communities to their cultural roots, who value access to fresh, locally grown produce (Fredrich, 2013). In many instances, it has been observed that it delights people to know how their food was produced. Moreover, within eThekweni it has been observed that the co-operatives in communal gardens has helped many individuals build relationships, be able to work in a team and enhance their problem-solving skills.

2.4 Chapter Summary

In this chapter, various cases relating to UA were reviewed. It appears that there is a consensus among authors that UA indeed plays a pivotal role in alleviating food insecurity, generating income and improving livelihoods. Moreover, this chapter also looked at challenges affecting the success of UA, the benefits of UA and its contribution to sustainability. Conversely, it was reviewed that researchers and policymakers have focused primarily on the multifunctional dimensions of sustainability, ignoring the corresponding and contradictory roles of these functions. This requires a systems approach; whereby various stakeholders are involved to assist urban farmers at various levels. The following chapter will focus on the methodology used to undertake the study, and provide detailed explanation of the data collection methods, study site as well as data collection and analysis.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The preceding two chapters reviewed existing literature on the concept of UA and sustainability, considering the findings, recommendations and gaps from various sources. As important as data collection is to better comprehend the research topic, the description of the data collection and analysis methodology is central to a research project. Hence this chapter presents an outline of the study area, research purpose, design, target population, approach as well as the data collection methods used to undertake the study. Because of the nature of the research topic, where human cognitions, attitudes, and views must be examined and interpreted to answer the research questions, the interpretive method under the three dimensions of epistemology was used in this study (Scotland, 2012). It is in this chapter that the ethical considerations and data quality control and analysis are also covered.

3.2 Description of the study Area

The current study was carried out in Kwa-Mashu peri-urban area within eThekweni Metropolitan Municipality, KwaZulu-Natal Province in South Africa. This township was selected because there exists UPA activities that are supported by the Newlands Agroecology Unit Hub of the eThekweni Municipality in the form of infrastructure, implements, seeds, gardens kits, compost, ploughing as well as training and mentorship. Kwamashu is located about 12 km north of Durban and covers an area of about 21,47 km² and comprises of a population size of 175 665 (Magidimisha, Chipungu & Awuorh-Hayangah 2013). Kwa-Mashu was established between 1955 and 1966 to accommodate black Africans forcibly removed from Cato Manor (Umkhumbane). It is composed of 14 sections and various informal settlements, from which participants were selected. In addition to vast agricultural activities taking place in this township, Kwa-Mashu is known for its vibrant arts scene, which includes theatre and football. Figure 6 is a map showing the location of the study area which lies within the eThekweni Municipality.

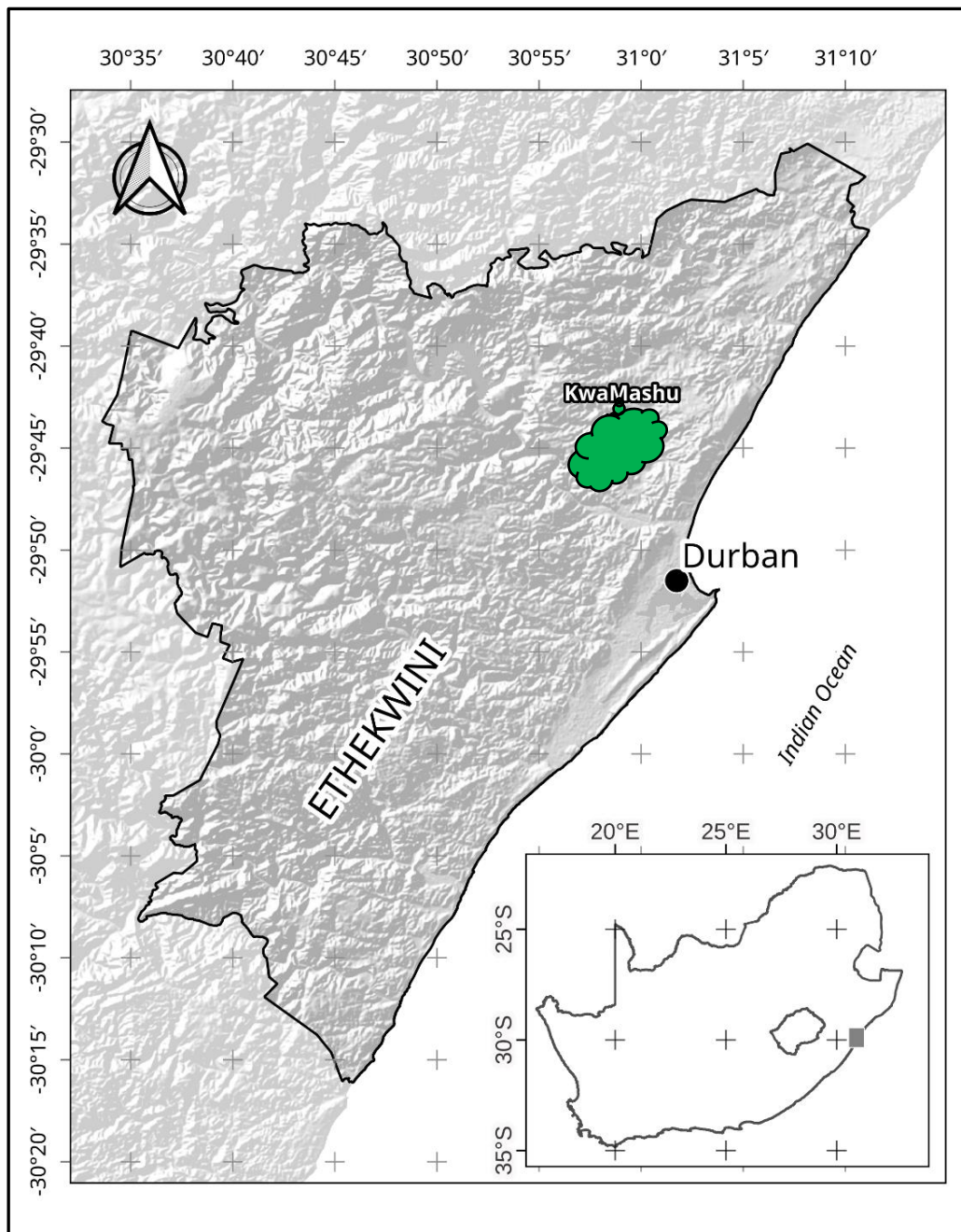


Figure 6: A map indicating the location of Kwa-Mashu within eThekweni Municipality

3.3 Research Design and data collection

3.3.1 Research design

Research design can be described as a procedure that outlines the conditions for the collection and analysis of data in order to determine its relevance to the study (Rahi, 2017). A research study can either be exploratory, descriptive, or basic applied research. This study used a descriptive research design, which is defined by Siedlecki, (2020) as an investigation aimed at accurately showing the characteristics of a specific group such as community. This type of research design is useful when addressing the “how, what, who, when and where” questions.

This design was adapted to capture the dynamics of UA in Kwa-Mashu and provide more information when comparing them with other regions where similar data is available.

3.3.2 Target population and selection of respondents

Target population refers to a group of participants identified with a similar essential characteristic from which a conclusion can be drawn by the researcher (Lavrakas, 2008). In this study, the target population was the beneficiaries (farmers) from UA projects currently supported by the eThekweni Municipality. The approach taken was collected from various individuals participating in agricultural activities within eThekweni Municipality. This study employed probability sampling due to the target population being stratified into various types of gardening, including communal and school gardens. A sample size of 36 respondents randomly selected from a sample frame of 60 practicing urban farmers. The sample size was deemed to be enough to represent Kwa-Mashu Township, and generate a meaningful statistical analysis, yet at the same time small enough to represent the whole of eThekweni Municipality. The researcher used a random sampling technique in order to highlight differences between specific sub-groups while ensuring greater precision.

3.3.3 Methodology

In order to be able to determine the purpose of the research, it is imperative for the researcher to identify the approach which the study must undertake. According to Ngulube and Ngulube (2015), there exist two main methods in social science research: namely quantitative and qualitative. Quantitative research is numerical and involves testing of a hypothesis, and thus it predicts and controls, while qualitative research aims to apprehend a certain aspect and then predict through description and distinction between data sets. It has been argued that an exploratory study is preferable and more useful, especially when there is not enough information on the research aspect. It can be used to develop a theoretical view with the initial data, in cases where the researcher has an opinion about something and wants to understand it better. In the researcher's opinion, UA can be sustainable if it is practiced well, and thus examined various case studies that would allow for a comparative analysis. This research therefore followed a mixed-method approach, allowing the researcher to explore various aspects of UA, and in turn describe, analyse and interpret findings using historical and existing research data. Research with mixed methods is considered an eclecticism of the two methods and has been shown to be a way to improve the research results (Ngulube & Ngulube, 2015).

3.3.4 Data collection

Data was collected using questionnaires through a survey method. As already indicated, respondents were selected from various UA projects in Kwamashu Township to allow for a comparative analysis of the dynamics at play concerning UA. Data collection progressed from July to August 2022. The questionnaire contained closed questions to capture numeric data, as well as open-ended questions (to capture qualitative data), and thus was divided into various sections which included Socio-demographic profile of respondents, characteristics of urban agricultural farmers, household income of respondents, the nature of land and management for urban agriculture in eThekweni, emerging challenges as well as the physical and social capital of sustainable UA (Table 1). List of gardens was obtained from Kwa-Mashu farmer's database kept by the Newlands Agri Hub. Prior to data collection, participants were recruited by making appointments telephonically with the liaison person of each garden, where the research, the aim and contribution of the study towards their farming was explained in detail.

Table 1: *Structure of the questionnaire*

No.	Question	Question no.
1	Socio demographic profiles	1 - 11
2	Land tenure and land management	1 - 6
3	Economic sustainability	1 - 14
4	Social sustainability	1 - 4
5	Environmental sustainability	1 - 4

3.3.4 Pilot study

According to Sekaran and Bougie (2013), it is important to pre-test the data collection instrument to ensure that the questions are clearly understood by the respondents, and that there are no ambiguities in the questions, as well as no problems with the general wording or measurement. A pilot study was conducted for pretesting and validation. A sub-sample of 10% of the sample size was selected to complete the questionnaire to test the appropriateness of the questions and to determine how long, on average it took respondents to complete the survey. This also helped to correct any errors before the questionnaire was given to the participants, thus minimizing any potential bias.

3.3.5 Validity and reliability

According to Heale and Twycross (2015), a quantitative study considers not only the results, but also the rigour of the research, i.e., the extent to which a researcher has worked to improve the quality of the study, and this is usually accomplished by measuring validity and reliability. The validity and reliability of the questionnaire was improved based on feedback from the pilot test conducted with a 10% sample of respondents, principal component analysis results, and SPSS-generated Cronbach's alpha. Tavakol and Dennick, (2011) stated that Cronbach Alpha provides a measure of internal consistency and is expressed as a number between 0 and 1. Internal consistency describes the degree to which all items in a test measure the same concept, and it should be determined before a test can be used for research or testing purposes to ensure validity. Heale and Twycross (2015) propose that the Cronbach's alpha should be 0.7 or higher to be acceptable.

3.4 Data quality control and analysis

Triangulation (testing) strategies were used to improve the validity and reliability of research or outcome evaluation. Raw data was captured on Microsoft excel in the form of spreadsheets and then imported to Statistical Package for Social Sciences (SPSS) version 25. Data was tested for normality and homogeneity of variance using Kolmogorov–Smirnov and Levene's tests, respectively. Where data was found to be non-parametric, a two way-ANOVA or Freidman's test with their associated post-hoc tests was used to investigate the differences between various responses, with significant differences ascertained at $p < 0.05$. For the first objective (i), to evaluate factors that contribute to the sustainability of UA in Kwa-Mashu, A-two-way Anova was used to compare, determine significant differences and see which is a contributing factor of sustainability. A descriptive statistic was applied, whereby frequencies and percentages were used by distinguishing responses of the respondents to achieve the second objective (ii). Thematic analysis method was used to explore conditions under which the UA would be sustainable in Kwa-Mashu, eThekweni Municipality and lastly a conceptual framework was proposed to achieve objective (iii). Results were presented in the form of tables and graphs.

3.5 Ethical considerations

Ethical standards of this study were approved by the University of Kwazulu-Natal (UKZN) Human and Social Science Ethical Clearance Committee. The proposal of this study has been approved by the ethics committee along with the questionnaire and the information sheet and consent. To guarantee confidentiality and human dignity, the informed consent of the respondents was sought. Discretion and confidentiality were maintained by ensuring that

participants remain anonymous and use only pseudonyms. Prior to handing out the questionnaires, the aim of the study was explained to the respondent and a gate keeper's letter was obtained from eThekweni Municipality (Agro Ecology Unit).

3.6 Chapter Summary

This chapter outlined the research methodology used to carry out the research. It covered various aspects including the study site, design, approach, target population, sampling instrument used as well as data analysis applied. Details of the pilot study conducted were also outlined. The following chapter will focus on the results and apply the analysis described herein in order to provide clear discussion and then recommendations.

CHAPTER 4

PRESENTATION OF RESULTS, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter seeks to analyse the results and discuss the findings according to research questions and objectives as previously defined and presented. Data collected through questionnaires is categorized into key themes, reported and then discussed linking the findings with relevant literature on UA practices. Firstly, the socio-demographic profiles of respondents, land tenure and management, economic, social and environmental sustainability are discussed in this chapter. In addition, an attempt is made to provide an explicit understanding of the description and types of gardening practiced in various households, schools, and the community at large. The final part of the chapter, however, is concerned with analysing and interpreting the data in terms of the importance and value of UA's contribution to sustainability.

4.2 Socio-demographic profiles

Demographic characteristics in this study included age, gender, marital status, education, dependants, employment status, and total monthly income.

4.2.1 Gender of respondents

Table 3 shows the gender distribution of the respondents in the study. The 36 respondents consisted of 16 (44%) males and 20 (56%) females. The breakdown of the respondents seemed to concur with the research by Grabbe et al. (2013), where women were the predominant gender among participants of UA. This can be attributed to the fact that men usually leave their female counterparts at home to look after their families while they migrate to other cities for employment opportunities (Grabbe et al. 2013). Therefore, it can be inferred that although no question was asked regarding their partners, one can assume that from the female respondents surveyed, their partners had other economic activities outside of Kwa-Mashu. In addition, it has been noted that poverty and inequality disproportionately affect women and children in most households. Hence, women bear the responsibility of providing food for their households and actively participate in household planning and decision making. Through participation in UA, they are able to generate income by selling excess produce to neighbours, supplement food baskets, and improve the nutritional value of household food.

According to Ogbonna and Okoroafor (2014), in SSA, women account for 70 -80% of household food production. It is estimated that approximately 43% of the agricultural labour

force in developing countries consists of women (Gautam et al. 2013). Gamhewage et al. (2015), revealed three main reasons that women are more active in UA practices than men according to various authors. The main reason is that UA is associated with women's daily household activities. For example, if the crop gardens and/or animal units such as poultry are located in their home gardens, they can take care of UA activities such as providing kitchen waste as feed for animals or fertilizer, irrigation, etc. when they have a break from household chores. Women become the economic lifeline for their families by finding ways to earn income to support themselves. According to Kutiwa et al. (2010), most urban men do not consider UA as a source of income, but only as a marginal activity. This is considered a secondary reason for the dominance of women in UA. The last reason is that society expects women to take on the responsibility of providing nutritious food for the family. Hence, women's participation in UA is very critical.

Table 2: *Gender distribution of respondents in Kwa-Mashu*

Gender	Frequency (n=36)	Percentage (%)
Females	20	56%
Males	16	44%

Source: Survey data (2022)

4.2.2 Age distribution of respondents

Age influences participation in agricultural activities in various African regions including cities (Agbadi et al. 2017). The highest percentage of 50% of respondents constituted those aged 36 to 60, followed by the second highest percentage of 28% being those aged 18 to 35, and the lowest percentage of 22% of those aged 18 to 35 (Figure 7). High participation of the elderly in this study complemented a study by Mwamakamba, (2013) who argued that most farmers in SSA tend to be elderly and often lack physical strength and technical knowledge. On the contrary, Pedzisai et al. (2014) indicated that the elderly has an obligation of fending for their families by ensuring that there is food on the table daily. This may explain the reason for a higher number of older people. On the other hand, young people often view agriculture as having an image problem, characterized by mundane work that does not generate income, and not in line with their perceptions or offering an attractive future (Guillaume-Gentil, 2014). Even a handful that participate in UA often use it as a temporary measure as opposed to recognizing it as a source of income. Thus, this reason may explain the lowest percentage in youth participants.

Tiraieyari and Krauss (2018) revealed that policy makers have encountered challenges in trying to awaken interest of youth in community-based volunteer programs involving UA. Youth unemployment continues to be a major problem worldwide and eThekweni is no exception. This issue is forecasted to increase as more youth graduate and move from rural areas for the perceived green pastures of the city (Tiraieyan & Krauss, 2018). This therefore strengthens the need for more structured UA activities by youth in order to avoid the dangers of large populations of disengaged and unemployed youth. Due to unemployment, young people are more attracted to program that have incentives.

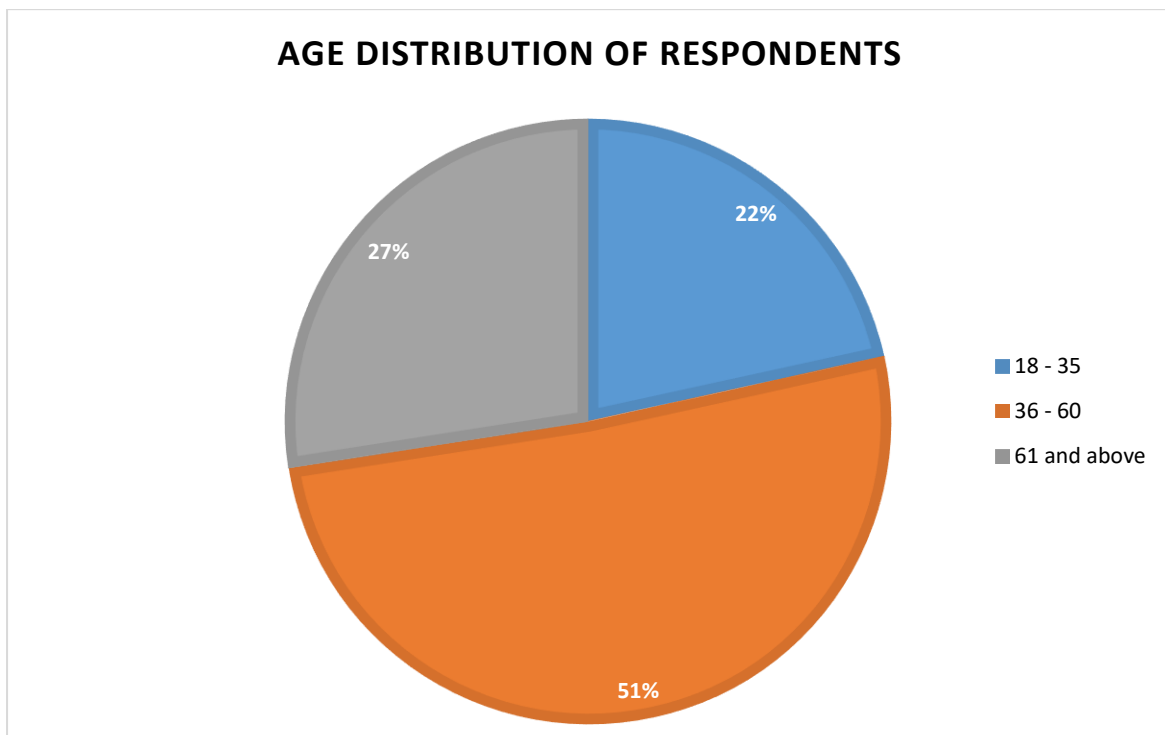


Figure 7: Age distribution of respondents

4.2.3 Marital status of the respondents

Table 4 exhibits the marital status of respondents involved in UA in Kwa-Mashu. The dominant group constitutes UA participants who are unmarried, while married and widowed constitute the rest. When analysing the results, it appears that marital status is not really a significant discriminator on the participation in UA activities. This is because people are compelled to practice UA for various reasons, and the status of being married wouldn't affect practices in anyway.

Table 3: Marital status of the respondents

Marital status	Frequency (n=36)	Percentage (%)
Married	11	31%
Single	17	47%
Widowed	8	22%

Source: Survey data (2022)

4.2.4 Education level of the respondents

Although agriculture is a pillar of the economy, it doesn't seem to attract educated people (GSS, 2014). This claim seemed to be true in this current study. High percentage of respondents were found to have secondary education (41%), followed by those with primary education (38%) while those holding tertiary qualifications accounted for 21% (Figure 8). This may be attributable to the fact that even educated people who studied agriculture may prefer working in offices as opposed to being on the ground. Even though there were variations in education levels, Pedzisai et al. (2014) argues that education does not significantly discriminate on the involvement of UA. Conversely, Aryeetey and Boateng (2015) argued that failure of the agriculture sector to attract people with higher education results in agricultural activities being practiced mostly at subsistence level. Perhaps transparency regarding funding opportunities, new technologies and accessible extension services may just be the mechanism used to attract educated people to practice UA (Thorp, 2014).

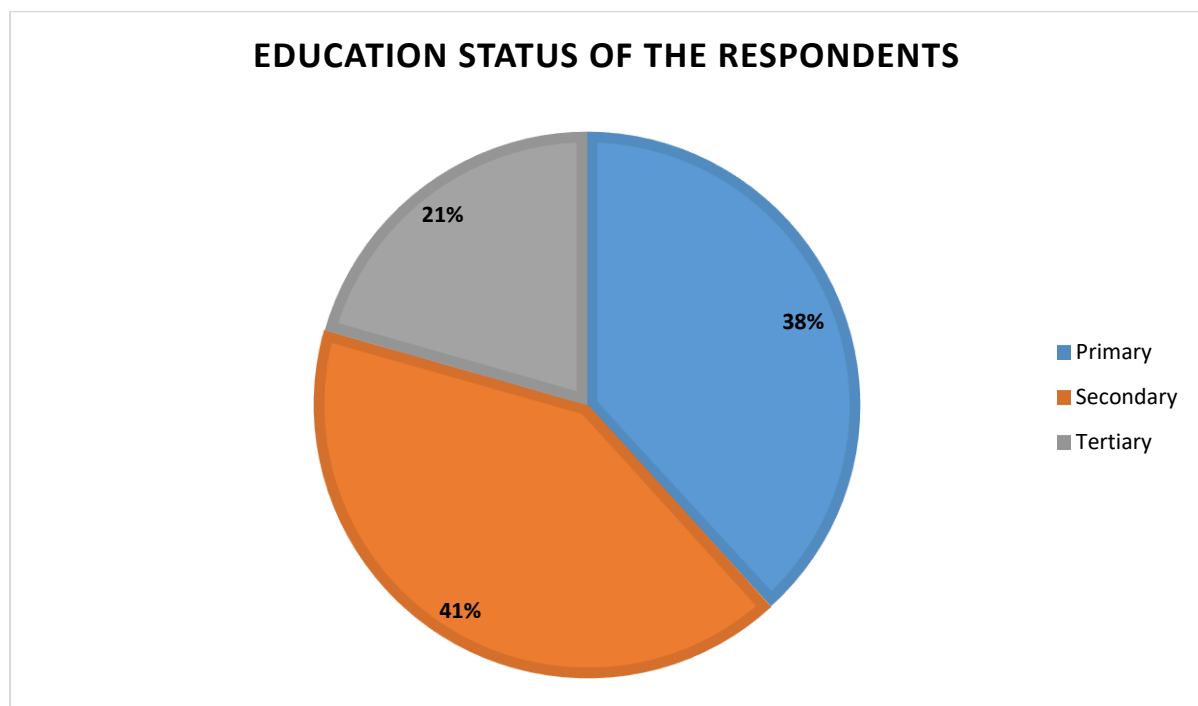


Figure 8: Education status of respondents

4.2.5 Employment status of the respondents

With regard to the employment status of the respondents, UA in Kwa-Mashu seemed to be dominated by unemployed persons (63%). On the other hand, 37% of the respondents indicated that they have other paying jobs, most of which are informal such as working at a salon, plumbing, fixing doors, etc. (Figure 9). As acknowledged by Wamutheya, (2010), majority of marginalized communities in SSA economies hold low levels of education and their source of income is derived from the informal sector. As explained by Pedzisai et al. (2014), even people who have formal employment practice UA because the income they earn does not meet all the household needs. Hence the need to supplement their household food provisions. Also, it can be inferred that UA is recognized as a vital subsistence and income-generating activity for most people in Kwa-Mashu. According to the 2022 IDP review, a large portion of the eThekweni Municipality's population is economically inactive. Instead of increasing, the unemployment rate in the city keeps decreasing; for example, at the beginning of 2016 the unemployment rate was 19.7%, with an increase of 22% by the end of the year. In 2017, the rate of unemployment decreased to 21.8% (COGTA, 2020). This should indeed compel government and people to work together in making UA economically sustainable.

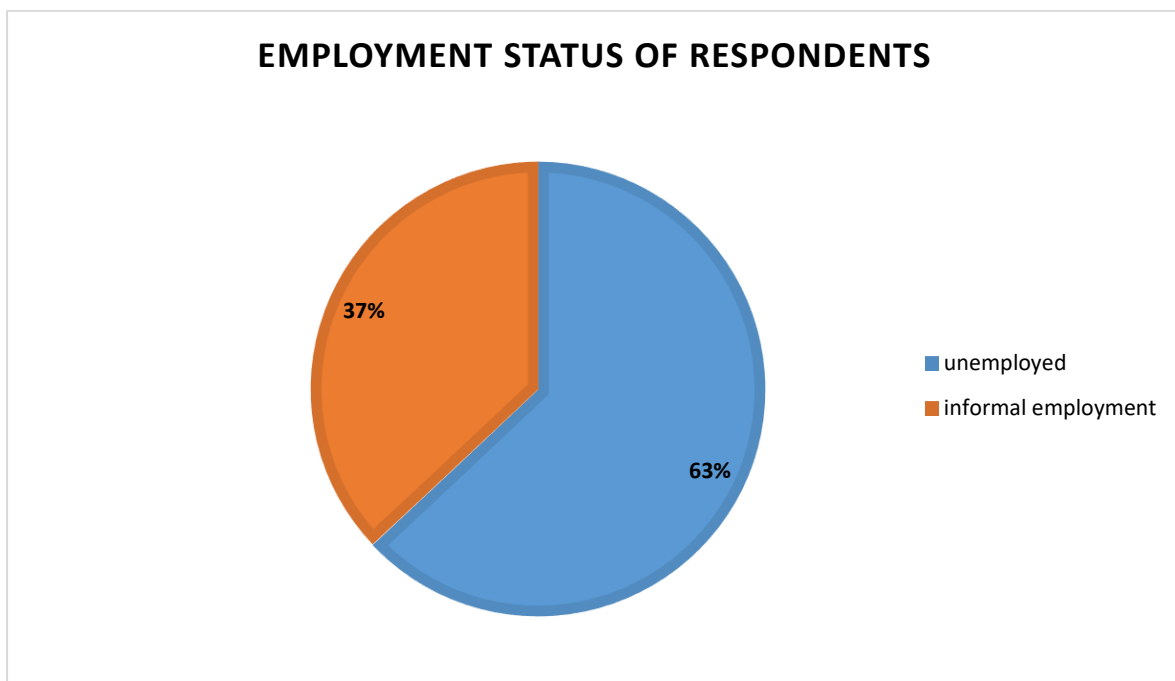


Figure 9: Employment status of the respondents

4.2.6 Sources of income and monthly income of the respondents

The most prevalent source of income identified by Kwa-Mashu respondents was government grant (61%); see Figure 10. This informed the fact that most respondents were unemployed. Other sources of income were identified by a low proportion of the respondents; hence sales from produce constituted (19%), remittance (14%) and salary (6%). Other respondents further highlighted that they receive donations in the form of money from their church organizations as well as philanthropists for food access. In addition, respondents with the highest income appeared to be those who are married as they highlighted that their income was a sum of what the couple brought home. It is interesting that besides having reliable sources of income, Kwa-Mashu farmers still participate in UA activities. Although people engage in UA activities for a variety of reasons, emphasis was made more on the fact that UA has the potential to enhance food security. Indeed, some respondents highlighted that they participate in UA activities because it supplements their household food baskets. Complementary to this, Pedzisai et al. (2014) argued that even people who practice UA view it as a short-term measure rather than as a source of income in adulthood.

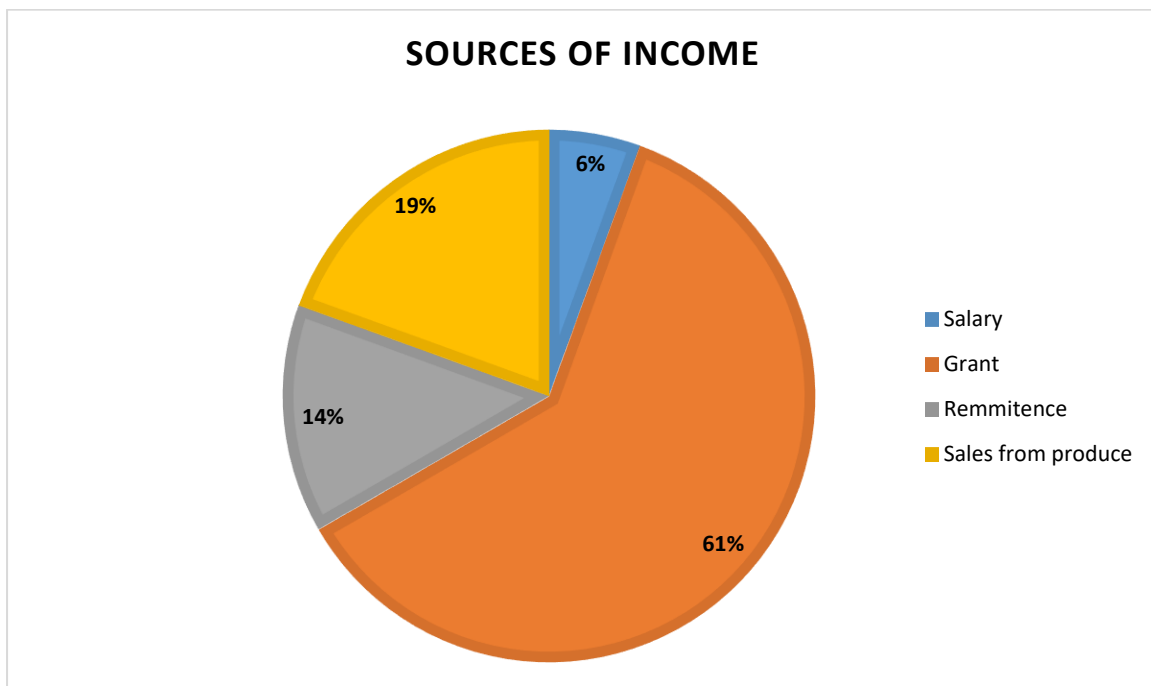


Figure 10: Respondents' sources of income

About 60% of households in eThekweni are low income, earning less than R38 400 per year or R 3 200 per year (COGTA, 2020). In 2018, the Global Insight indicated that over one million people lived below the food poverty line in eThekweni, which is a higher number when compared with people living below poverty in Johannesburg, Cape Town, Tshwane and Nelson

Mandela Bay Metropolitan Municipalities (COGTA, 2020). Concurrently, Figure 11 exhibits the household monthly income where relative minority (8%) of the respondents stated that their monthly income is below R1000, while relative majority (14%) of the respondents highlighted that their monthly income ranges from R10 000 – R 20 000, followed by those (33%) whose monthly income ranges between R1 000 – R3 000. The significant proportion (44%) of the respondents revealed that their monthly income ranges between R3 000 – R10 000; thus, substantiating what is highlighted in Figure 9 in respect to informal employment income as a supplement to the grant.

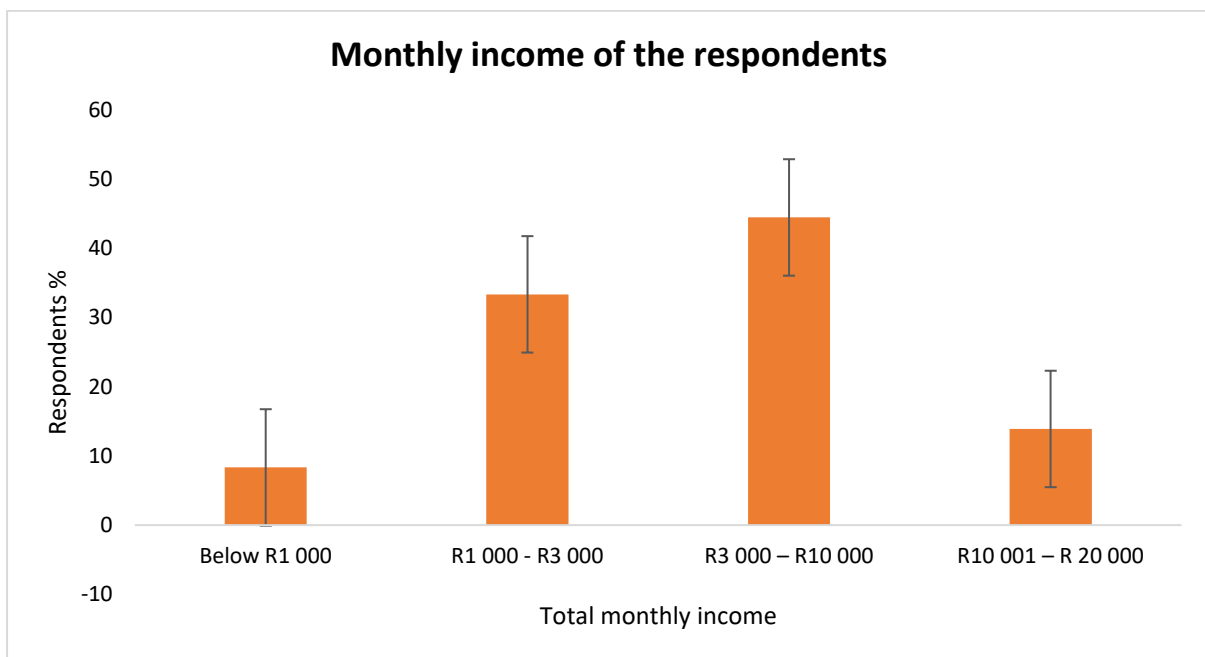


Figure 11: Average monthly income of the respondents

4.2.7 Dependants currently supporting

Because of their age, most of the respondents have dependants either as immediate or extended family. In this study, all respondents indicated that have dependants living with them. About 60% of the sampled UA participants in Kwa-Mashu indicated they have dependants ranging from 1-5, while 40% indicated that they have dependants of about 6 and above (this included that they have grand children living with them). Participating in UA does not only contribute to food provision in big families, but also help farmers to meet their other basic needs such as clothing, electricity and improving nutrition.

4.3 Land tenure and land use management

Out of the 36 respondents that were sampled, only 7% have legal ownership of the land. The rest of the respondents indicated that they are either leasing the land from the Municipality or using a school premises to practice farming. Because of this, Opitz et al. (2016) mentioned that

in most cases, UA initiatives are practiced in such a way that allows gardens to be removed in case reclaims or changes in land ownership occur. This means that the farmers cannot invest in permanent structures, and/or make long terms goals regarding their UA practices due to not knowing what might happen to their farms at any point. This therefore may explain the reason farmers are practicing UA just for subsistence purposes as opposed to being fully commercial. In the area of traditional land tenure (traditional land allocation and leasing), there are clear challenges between traditional and municipal governance, leading to development that is vastly out of sync with municipal land use plans (Sutherland et al. 2016).

It is also worth noting that the traditional and land allocations on Ingonyama trust land, primarily for residential purposes have rapidly increased in recent years, taking up land availability for UA practices. According to Magidimisha et al. (2011), it appears that land issue is critical within the city of eThekweni, especially considering that land has to also be made available for other uses that enhance the economy such as industries, housing etc. Even those who stated that they practiced gardening in school had no ample land, and they indicated that they are unable to make long term goals due to changes that may occur with the leadership of the schools. To remedy this, the municipality should make land that is not utilized available for agricultural practices. This will not only help reduce illegal dumping sites within the city, but would also minimize number of people building shacks in areas they are not supposed to.

Table 4: Size of land use for urban agriculture in Kwa-Mashu

Size of land for farming	Frequency (n=36)	Percentage (%)
Less than a ha	20	56%
1ha -2ha	13	36%
3ha -4ha	3	8%
5ha and above	0	0

Source: Survey data (2022)

With regards to natural resource management, majority of the respondents (50%) indicated that they rotate their crops to preserve the soil and protect it from being attacked by pests, while 30% indicated that they practice organic farming, 10% apply minimum tillage and practice soil management (Figure 12). Studies such as Pedzisai et al. (2014) emphasized that good agricultural practices indeed include environmental conservation which entails minimum mechanical disturbance, use of organic matter, as well as crop rotation. Furthermore, majority of the respondents (80%) indicated that the municipality provides them with resources for land

resource management, while the rest of the respondents stated that they were assisted by the NGOs. Resources provided to farmers by the municipality include organic fertilizers, seedlings, water for irrigation as well as garden implements.

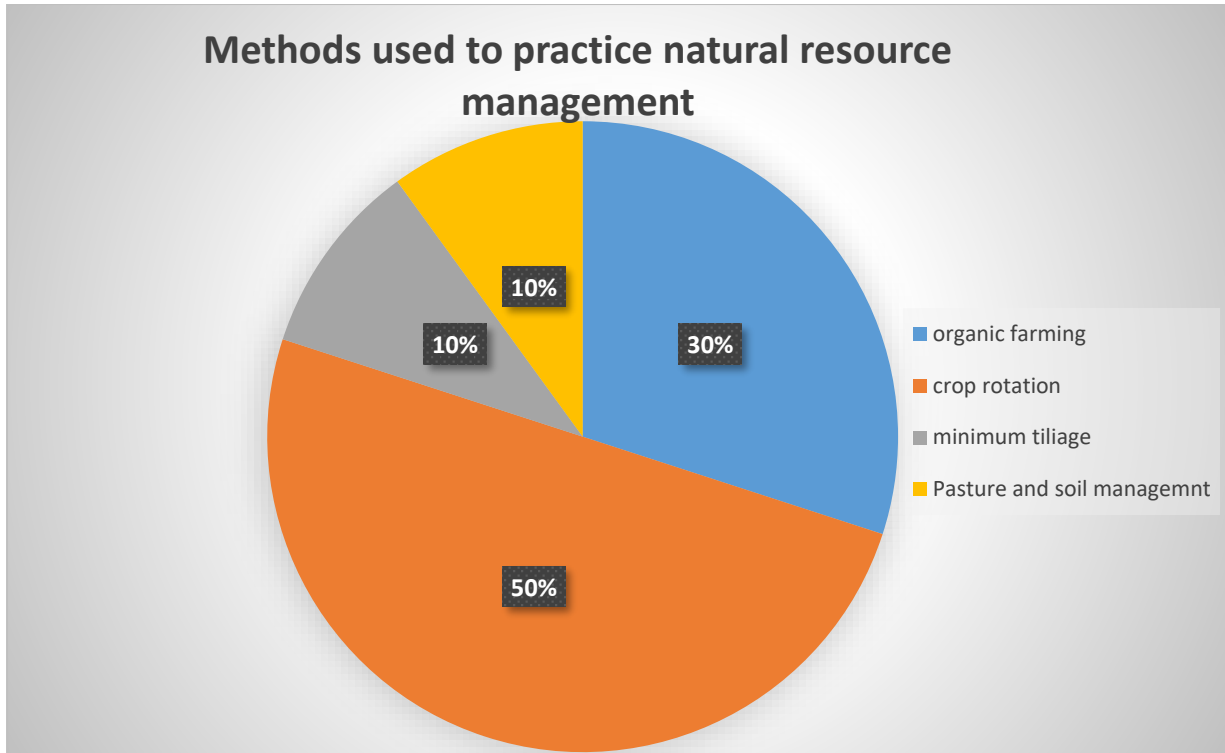


Figure 12: Methods for practicing land resource management

4.4 Evaluating factors that contribute to the sustainability of UA in Kwa-Mashu

Sustainability can be defined as a development that meets the needs of the present without compromising the ability of future generations to meet their needs (Berry et al. 2015). Urban agriculture’s contribution to sustainability can be in the form of nutrient recycling, community development, employment opportunities and social safety net for poor populations (Tiraieyari & Hamzah, 2015). As UA advances as a strategy to address critical needs related to urbanization, food security, and employment, the importance of strong policies that maximize the benefits of UA to ensure sustainability while prioritizing SDGs is emphasized (Banik, 2019). As explained in the previous chapters UA as a practice addresses three main aspects of sustainability which are summarized in Table 5 below. Looking at these aspects in detail based on the findings, there is a need for the municipality to intervene.

As mentioned in chapter 1, farmers need to be made aware and be imparted with knowledge regarding sustainability. The information seems to be there; however, it appears that it was incorrectly assimilated. Perhaps confusion is caused as a result of receiving support from both

the municipality and the provincial government. While the municipality's focus is more on applying agroecological principles in farming, the provincial government promotes conventional farming practices such as spraying insecticides and using chemical fertilizers. Not only does this confuse the farmers, but it affects the sustainability efforts. Most respondents indicated that they received support from both the municipality and the provincial government, as well as other entities like NGOs (which mostly advocate for organic farming).

Table 5: *Pillars of sustainability in UA (Adapted from Krishnan et al. 2016)*

Sustainability	Impacts
Environmental	Environmental sustainability refers to the protection of natural resources and maintaining their stability. It is also aimed at mitigating climate change and other environmental issues.
Economic	An economically sustainable system should provide people with the best standard of living and should also be able to compete in a global market.
Social	Socially sustainable development refers to the distribution of opportunities and services to the poor. This can be achieved through programs and actions that promote women's rights and participation.

4.5 Perceptions of Kwa-Mashu farmers towards sustainability of urban agriculture

Insights of farmers towards the sustainability of UA in Kwa-Mashu was investigated. Respondents were asked to indicate their level of agreement and/or disagreement (posed on a five (5) point Likert scale) towards certain statements with regards to various pillars of sustainability of UA. These statements would give an indication of how farmers perceived their agricultural activities and their role towards achieving sustainability. The statements were subjected to an internal reliability test using the Cronbach Alpha statistics. Cronbach's alpha is a measure of internal consistency, that is, how closely related a group of items are to each other. It is considered a measure of scale reliability. Table 6 shows the results of the Cronbach's alpha statistics.

Table 6: Cronbach's Alpha statistics (reliability analysis)

Pillars of sustainability	Total sample	No. of items
Environmental sustainability	4	3
Cronbach's Alpha = 0.72 (acceptable)		
Economic sustainability	4	5
Cronbach's Alpha = 0.847 (acceptable)		
Social sustainability	4	6
Cronbach's Alpha = 0.788 (acceptable)		
Combined analysis	4	14
Cronbach's Alpha = 0.928 (acceptable)		

Source: Own survey data computed from SPSS

The statistical value of the questionnaire Cronbach's Alpha of this study for all pillars of sustainability (combined analysis) was 0.928, with environmental, economic and social sustainability having a value of 0.720, 0.847 and 0.788, respectively. For the 3, 5 and 6 respective statements (items) in the questionnaire regarding respondent perceptions on the sustainability of UA. Cronbach's alpha statistics indicate that the items have relatively high internal consistency. It is noted that a reliability coefficient of 0.70 or higher (close to 1) is considered acceptable in most social science research (Golnaz et al. 2016).

4.5.1 Environmental sustainability

In order to protect the environment, there is a need to ensure application of proper farming methods, and that means transitioning to agroecological way of farming. Agroecological farming can thus be defined as the type of farming that works in harmony with the natural environment, including economic usage of water and soil enrichment without use of chemical fertilizers and pesticides. According to Lee et al. (2019), improper agricultural practices may lead to soil degradation and in turn poor productivity. In addition to other benefits, there are various environmental advantages that are worth noting. From the respondents sampled, organic farming practice was found to be significantly ($p > 0.05$) higher when compared to conventional farming practices in Kwa-Mashu. Thus, there seem to be a compelling argument towards organic farming. On the other hand, only 17% of the respondents stated that they use chemicals when farming.

These poor agricultural practices are due to limited expertise and lack of knowledge regarding appropriate gardening practices and proper crop management (Lee et al. 2019). Consistent with

Pedzisai et al (2014), inadequate education about safe farming practices results in farmers having little incentive of taking responsibility for the long-term effects of the land they farm. With regards to source of water for irrigating their crops, most respondents (44%) stated that they extract water from naturally existing systems such as streams, dams and rivers, while 22%, 19% and 17% of respondents constituted those using municipal, rain and grey water respectively (Figure 13). Unfortunately, most of these farmers are using the water from the natural systems illegally, with some even mentioning that they steal municipal water. This is due to the challenges with the irrigation system. One respondent opined that “although the municipality provides us with water storage tanks, we still struggle to get water for irrigation as using pipes to extract water from stream require us to use petrol or diesel”

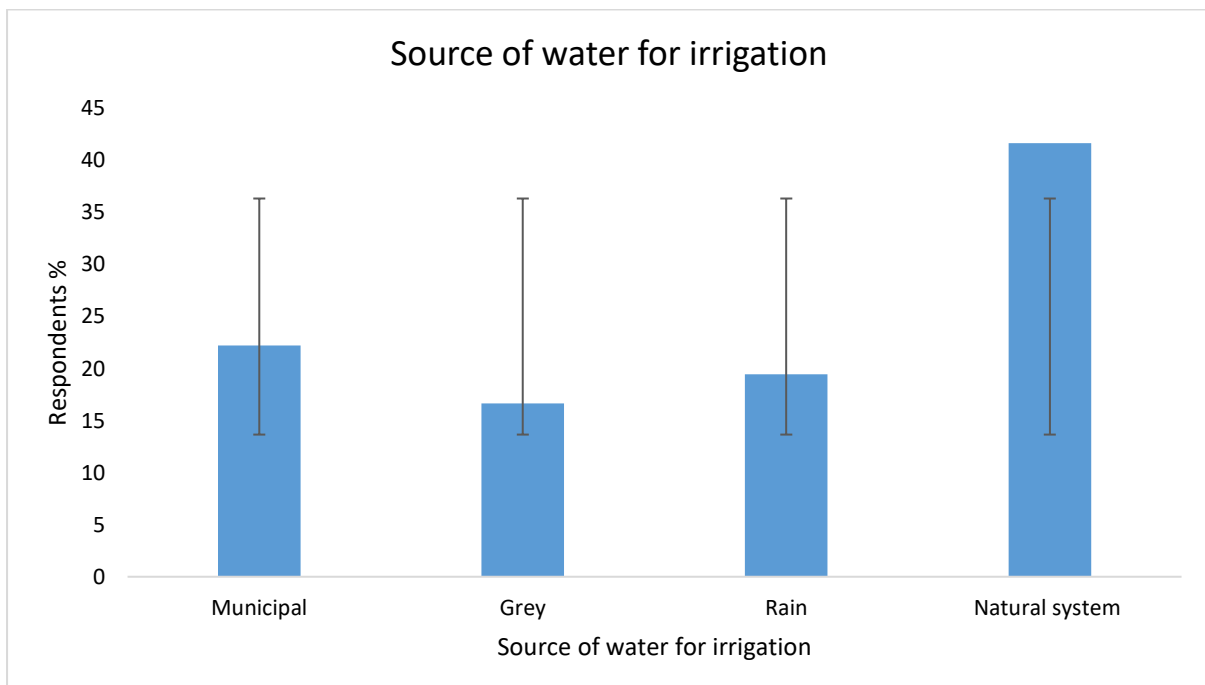


Figure 13: Sources of water for irrigation of crops

According to Game and Primus (2015), UA has been classified into Uncontrolled Environment Agriculture (UEA) and Controlled Environment Agriculture (CEA). As the term suggests, UEA comprises of communal, rooftop, and open-space vegetable gardens, while CEA includes activities that apply environmental optimization commonly in conjunction with surrounding urban structures. Examples of CEA may include but are not limited to greenhouses, vertical gardens, hydroponics, and aquaponics (Gwynn-Jones et al. 2018). In this study, 60% of the respondents practice agriculture in communal gardens, while 40% practice in open spaces of schools. While mentioning this, emphasis was made on the fact that lack of arable land is a serious challenge. Some respondents indicated that they make use of household fruit and

vegetable peels, as well as leftover food as fertilizer for their gardens. On the contrary some respondents stated “I had no idea that the household left overs can be used to make compost for my garden”. This shows that the Kwa-Mashu farmers are not informed of many things regarding organic farming.

In addition, respondents were asked to indicate the degree to which they agree or disagree to various statements regarding environmental sustainability. Responses were rated at a five-point scale, with 1 being strongly disagree, 2 disagree, 3 undecided, 4 agreed and 5 strongly agreed. The highest percentage of 39% in Figure 14 indicates that majority of the respondents strongly agreed that they farm organically. Conversely, 31% of respondents agreed and strongly agreed that they feed some of their produce to their livestock. This help minimizes food wastage. Finally, although respondents claimed to practice organic farming as discussed, most have stated that they do not make their own compost. This just means that Kwa-Mashu farmers need training and skills development on this.

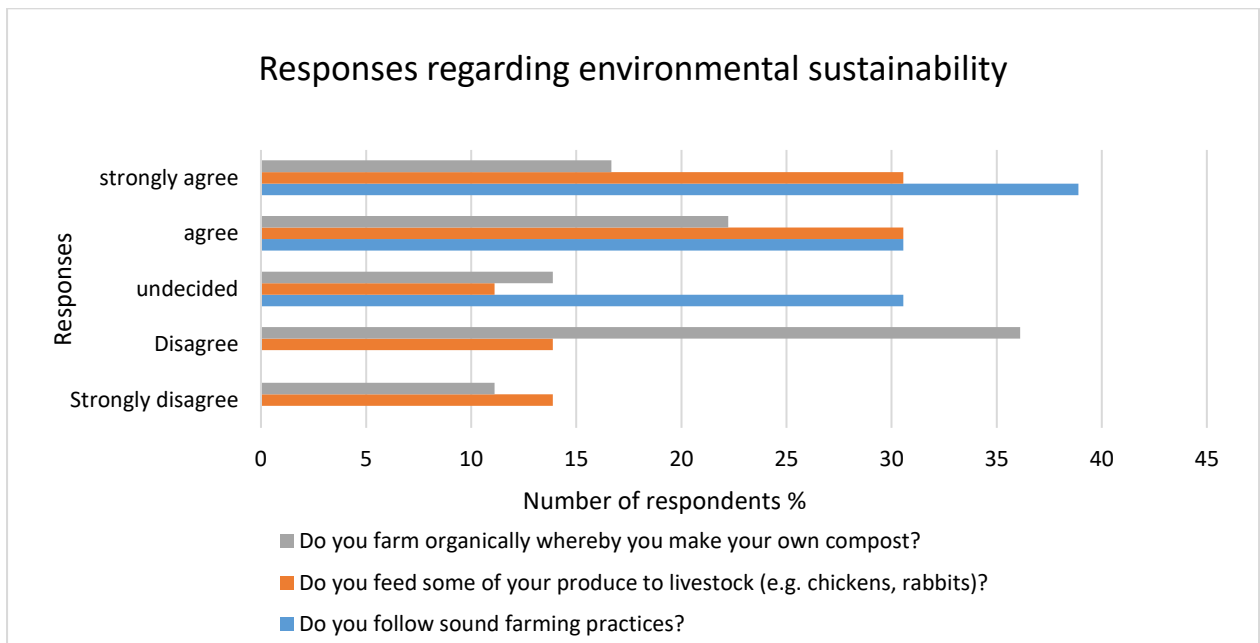


Figure 14: Responses on the environmental sustainability

4.5.2 Economic sustainability

In the economic and community literature, UA is typically viewed merely as a social enterprise as opposed to adding economic value (Hunold et al. 2016), reflecting aspirations of Kwa-Mashu farmers to achieve sustainability. In this study, 69% of the respondents revealed that they are semi-commercial, which means they produce for consumption and only sell excess

food and generating a monthly income between R1 000 – R3000 per month. Although this is the case, the income generated from selling of produce was not significant ($p < 0.005$). on the other hand, 28% of the respondents indicated that they practice UA at a subsistence level, while 3% of the respondents claimed that they are commercial, with the income generated from selling produce ranging from R3 000 – R10 000 monthly (Figure 15).

Some of the respondents (18%) indicated that they resided in informal settlements, which tend to be susceptible to various conditions and are considered the most vulnerable in the city. In addition to improving their household food security and access to safe and nutritious food, respondents made mention that “even though not enough income is generated, we are able to supplement household food baskets, and give school pocket money to our kids”. In addition, most female respondents indicated that the income they generate limit their full dependency on their partners. Other benefits from other authors which agree with those noted in this study include reduced transport problems of going to buy food, provision of livelihood for several unemployed youths and the elderly, improved family budgets as well as increased stability and poverty reduction (Hasan, Ahmed & Chowdhury 2013). There is little argument that UA’s contribution to economic development goals attracting capital, income generation, and employment creation will likely remain unassured (Sadler, Arku & Gilliland 2015).

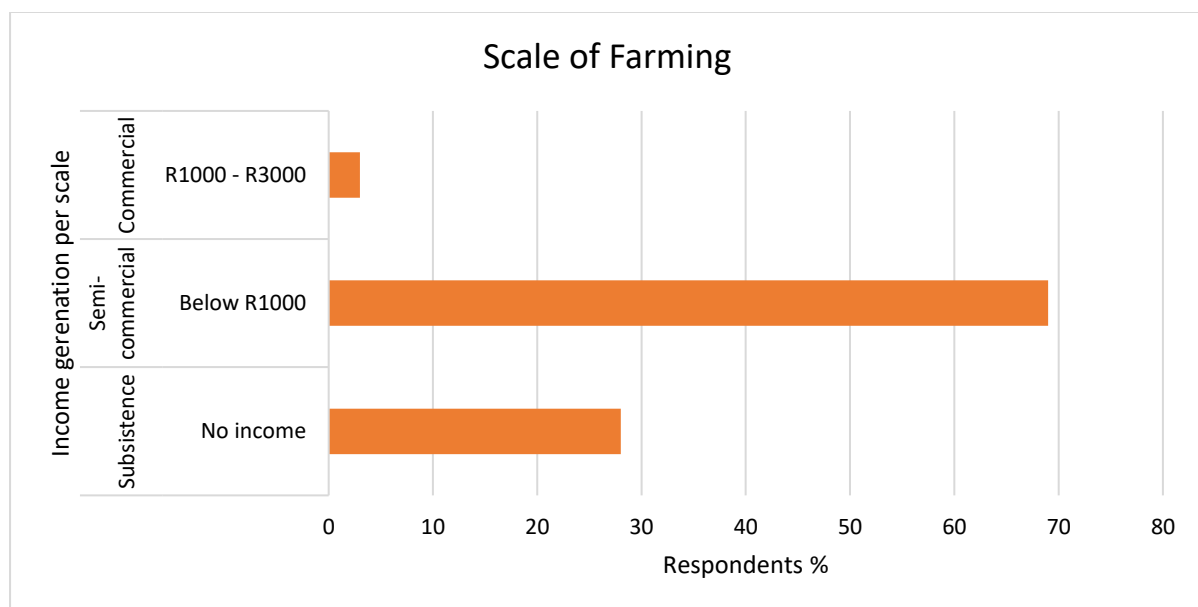


Figure 15: Scale of farming respondents are involved in

In addition, as shown in Figure 16 responses were rated at a five-point scale, with 1 being strongly disagree, 2 disagree, 3 undecided, 4 agreed and 5 strongly agreed. Based on most

responses agreeing with all the statements, there is a compelling argument that UA contributes to economic sustainability.

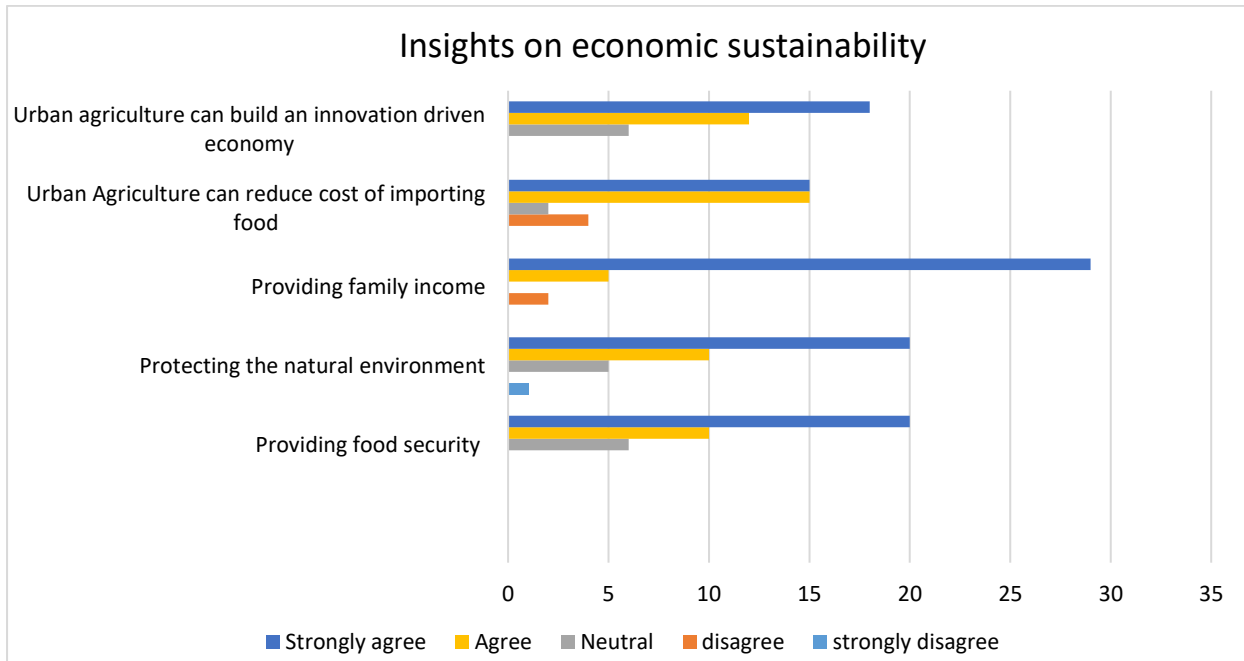


Figure 16: Insights of the respondents on economic sustainability

With regard to the types of crops farmed, majority of the respondents indicated that they farmed crops that were suitable for the seasons, while those who are commercial indicated that they farm crops according to the demand. Crops farmed included tomatoes, cabbage, spinach, herbs, beans as well as some indigenous crops such as *Amadumbe* and *Umfino*. Most of these farmers also indicated that they have no access to formal market. According to one of the respondents who gave a detailed response on the questionnaire, “access to market has always been a challenge throughout his 10 years of my farming”. This is attributable to issues such as non-compliance to local good agricultural practices (Local GAP), lack of knowledge and market analysis, market demand and pricing. According to Aryeteey and Boateng (2015), education culminates high skills, innovation and knowledgeable workforce which may greatly contribute to the agricultural sector. Thus, the municipality should invest in providing more skills especially regarding market.

4.5.3 Social sustainability

As alluded in previous chapters, the benefits of UA go beyond food production and consumption, as they also enhance social cohesion. For example, in this study respondents mentioned that through practicing UA, they are able to interact to their neighbours when selling to them and neighbours are free to ask for advice regarding farming. Similar to environmental

sustainability, responses were rated at a five-point scale, with 1 being strongly disagree, 2 disagree, 3 undecided, 4 agreed and 5 strongly agreed. Majority of the participants (50%) strongly agreed that UA provides healthy food for consumers. On the other hand, 56% of the respondents strongly agreed that UA enhances social cohesion (Table 8). In addition, 53% of the respondents indicated that they had prior knowledge of agriculture and that the municipality added to what they knew already. Indeed, majority of the respondents agreed to the questions regarding social sustainability. Social benefits of UA are highlighted in studies such as Artmann and Sartison (2018) who indicated that UA significantly contribute to mental and physical health, particularly for vulnerable populations such as the elderly people or patients in hospitals.

Table 7: Perceptions on social sustainability by farmers towards urban agriculture in Kwa-Mashu

Urban agriculture provides healthy food for the consumers			Does urban agriculture increase social interaction and cohesion between community members?	
Level of agreement	Frequency	Percentage (%)	Frequency	Percentage (%)
	Respondents		Respondents	
Strongly disagree	2	6%	0	0%
Disagree	1	3%	1	3%
Neutral	0	0%	5	14%
Agree	15	42%	10	28%
Strongly agree	18	50%	20	56%
Did you have prior farming knowledge or were you taught by eThekwini Municipality?			Do you believe eThekwini Municipality has provided you with sufficient skills needed for Urban Agriculture?	
	Responses		Responses	
Strongly disagree	0	0%	0	0%
Disagree	2	6%	0	0%
Neutral	2	6%	5	14%
Agree	19	53%	4	11%
Strongly agree	13	36%	27	75%
Do you believe eThekwini Municipality has provided you with the technical support needed for your practices?			Is eThekwini Municipality providing relevant and sufficient resources to enable the success of your agricultural practices?	
	Responses		Responses	
Strongly disagree	0	0%	2	6%
Disagree	6	17%	5	14%
Neutral	0	0%	0	0%
Agree	15	42%	15	42%
Strongly agree	15	42%	14	39%

Urban agriculture can thus be considered as a recreational greening activity that promotes learning and self-determination (Milliron et al. 2017). Health benefits also accrue from

promoting social sustainability consumption of healthy foods (Worldwatch, 2011). A comparison of self-reported health effects between gardeners and non-gardeners found that those participating in UA generally perceive better health than non-UA participants (Soga et al. 2017). The inclusion of women and children in the UA would indeed makes a difference as far as social inclusion is concerned. It is also important to note that the growing social awareness of food and effects of UA may be highly political and can be observed as a pathway to general critique of capitalism that has detrimental effects to social justice. Due to the critical view of the current economic system, UA is receiving a reviewed attention as an important space for addressing “politics of food”.

4.6 Assessing obstacles to UA and provide suggestions to transition to sustainability

Despite that UA has a lot of benefits, there tend to be challenges that daunts this practice in various ways. Malan, (2015) noted that in order to improve the situation of farmers in the urban food system, it is imperative to understand the challenges they face when growing crops in cities. Understanding challenges of farmers is important as it helps officials to improve their extension services. General challenges experienced by farmers include adverse weather effects, diseases and pests outbreak, theft, lack of resources, farm pollution as well as potential of eviction. Various issues emerged from the analysis of UA practices in Kwa-Mashu. A factor that appeared to be consistent and was pointed out by almost 90% of the respondents is the issue of land. As shown in Table 4, most respondents practiced UA on a land of less than a hectare. As a result, this means even if they manage to secure market for their produce, chances of meeting the demand would be slim. In most cases, especially where respondents claimed to have land size of between 1ha to 2ha, farmers stated that they share land for UA practices whereby individual farmers sectioned the land into various plots for farming. A similar situation has been observed in a study by Pedzsai et al. (2014) who indicated that majority of farmers in his study had no legal access to enough land and as a result they could not produce in abundance.

Another factor that appeared to be an issue was food wastage. According to the respondents, this is a frequent occurrence especially during harvest season when they are unable to secure market. Due to lack of access to agro processing that would otherwise turn their produce into value added products to avoid food waste, farmers end up having to throw away excess produce that couldn't reach the market. Currently, almost one fourth of total food production is wasted, an amount that could feed four times the number of the hungry people in the world (FAO,

2011). Food waste is not just an issue linked to inefficiency; it raises important questions of equity and ethics in the global food system. Magidimisha et al. (2011), pointed out challenges such as lack of technologies being one of the major challenges faces by Kwa-Mashu farmers. In addition, the respondents pointed out the issue of water as being a constraint affecting the productivity of their crop production. Although most of these farms are close to rivers and streams, extracting water from the sources remains a challenge due to lack of resources and non-compliance.

There are regulations in place that govern the use of land along natural water systems, such as Environmental Management Act (National Environmental Management Act No. 46, of 2003). However, the disjointed ability to implement and impose environmental laws presents challenge for the municipality. With little power at municipal level and lack of integration between various levels of governments that are involved in regulating the environment, farmers end up suffering due to non-compliance (World Bank, 2016). Thus, as an alternative some of these farmers indicated that they illegally use municipal water for their crops in many instances. As an alternative, farmers should be encouraged to harvest rain water during rainy seasons, and usage of grey water towards their irrigation.

In addition, respondents mentioned the issue of theft and vandalism as being a gloomy factor. Respondents mentioned that they seldom harvest all their produce peacefully as there is always theft of crops and vandalism to the infrastructure which is discouraging for them. This is indicative of lack of security and social capital which must be governed by various mechanisms (Magidimisha et al. 2011). Lack of employment which is supposed to be remedied by UA contributes to the theft of produce by those who are not practicing UA. Moreover, it was observed that the respondents do not possess sufficient skills regarding organic farming, health benefits of crops farmed as well as the market that they are targeting, which undoubtedly hinders their development. FAO, (2014) confirmed that inadequate education regarding proper farming methods restricts productivity, skill acquisition and limited access to information hinders the development of agricultural ventures. To a limited extent, lack of finance to further development their UA initiatives was pointed out especially by farmers that claimed to be commercial.

The respondents also indicated climate change as a contributing factor to the unsuccessful running of their projects. Between the 8th and the 12th of April 2022, KZN torrential rains

leading to floods, fatalities, loss of infrastructure and of course affecting gardens of farmers. With regard to the agricultural practices, not only was fencing destroyed but the soil in gardens eroded leading to loss of crops. This took some farmers some time to recover, while others haven't even recovered. Due to the dependency on the municipality, respondents indicated that they are waiting for the municipality to assist them in resuscitating their farms. It is stated that climate change, especially increased flood risk is envisaged to affect vulnerable populations such as those residing in informal settlements. This was raised in the IDP review (2022) before the floods occurred. Moreover, conflicts among co-operatives results in UA practices being unsuccessful. A few respondents indicated that the continuous change of members in the practices results in the inefficiency. For example, people may come up with different rules of running the project, causing delays in what was already achieved over the years. Also, some people find it difficult to transition to organic farming as they are made to believe that it is costly when compared with conventional farming. Other responded opined that "as a cooperative we had a disagreement regarding application of chemicals onto the crops and as a results the individuals within the cooperative ended up farming separately in plots".

Although the municipality is assisting these farmers with basic infrastructure and garden kits, the respondents indicated that they were not satisfied with this kind of assistance. They alluded that the infrastructure provided isn't of good quality and the specifications thereof results in them not qualifying for Local GAP. Studies have shown that access to agricultural inputs is considered as an important invest stream that can lead to sustainable production, and thus financing in agriculture plays a pivotal role in enhancing production and help farmers to overcome challenges they face (Norman et al. 2016). It would thus be ideal for the municipality to engage with farmers prior to establishment of their gardens. Ruete, (2015) concurred that smallholder farmers indeed require finance to expand their agricultural production, as far as better-quality seeds, fertilizers, farm machinery and equipment is concerned. Some studies have observed that available funds including donors and government efforts are more biased towards bigger farms and the export-crop subsector. As a result, smallholder farmers do not meet the criteria and requirements to secure mainstream bank loans, as they are viewed to be high risk offering with inadequate financial management offering demure returns on invest in UA due to poor financial management (Thorp, 2014).

4.5 Chapter Summary

This chapter presented and analysed the findings. Socio-demographics and various pillars of sustainability in UA in relation to the findings herein were discussed in detail. reference was made to various literature where similar or varied studies were conducted in various regions. This chapter addressed objective 1 and 2. Results were presented in graphs, tables and pie charts to clearly outline the comparisons were discussed in detail. Responses from the open-ended questions were summarized and incorporated in this chapter. This study found that UA has and continues to contribute to food production despite the challenges faced, and therefore efforts by the respondents are laudable. It may be a challenge to completely make changes to the current economic situation outlined by the respondents. The next and last chapter will provide conclusions based on the findings outlined herein, discuss the gaps identified and then address objective 3, which is to propose and recommend a sustainable livelihood framework to be used by eThekweni Municipality for the UA projects.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

As stated in chapters 1, 2, 3 and 4, this study aimed to investigate factors that contribute to the sustainability of the small-scale urban agriculture projects in Kwa-Mashu, so that it can come up with a sustainable conceptual framework that could be used to inform food policy and food system strategy for eThekweni Municipality. Covered in the preceding chapters, various authors argued that the movement of people from rural areas into cities exerts pressure on existing resources, affect the environment and contribute significantly to urban poverty, necessitating policy makers, planners and officials to come up with ways to feed urban dwellers, while preserving resources in cities. Findings revealed that although, they receive assistance in the form of infrastructure, garden kits and extension services from the municipality, Kwa-Mashu farmers are still facing major challenges that threatens their sustainability and requires the city to explore other approaches to assist them to overcome these challenges in order to achieve sustainable food systems. This chapter therefore takes off by outlining research limitation and challenges faced, followed by recommending a conceptual framework for UA, followed by conclusion and recommendations.

5.2 Research limitations and challenges faced

5.2.1 Dispersion of the participants

Due to the researcher, not being familiar with the township, it would be difficult to travel to the gardens. This was addressed by requesting the extension officer responsible to provide directions and/ or take the researcher to the gardens.

5.2.2 Sample size

The study is limited to 36 farmers in Kwa-Mashu Township; therefore, the researcher could not be able to generalize the data to a larger population. To address this, the researcher looked at similar studies that were conducted in other regions within the city. The findings of this study could be used as a baseline for other regions within the city.

5.2.3 Language barrier

Due to the researcher, not being fluent in Isizulu, the language could be a limitation, this was addressed by translating the questionnaires into Isizulu for better facilitation.

5.3 Recommendations for future research and conclusion recommendations

5.3.1 Sustainable conceptual framework

Taking the findings and the challenges faced by Kwa-Mashu farmers into account, there is a need to develop a conceptual model of antecedents and outcomes of the UA activities that can be used by the municipality to ensure that their UA projects are sustainable (Figure 17). Firstly, the city need to propose a sense of urgency. In doing so as the first step, it is suggested that the municipality prioritize food systems and immediately act on the outlined and potentials challenges. This will ensure the urgent change needed by both farmers and the government, because an improved food system requires radical change to its organization. Secondly, instead of just providing same support to all, it would be ideal if the municipal officials first mapped the needs of various farmers according to the size of land, location, number of people involved, reason for farming etc., so that they can know exactly how to address the needs identified. In doing so, the municipality may be able to direct funds to other functions such as building agro-processing facilities for farmers to avoid food wastage. In addition, it is proposed that the municipality identifies risks that led to challenges facing the farmers and have the mitigation strategies in place so that they can immediately act when challenges occur.

In turn, it is suggested that the city creates a roadmap for change and communicate the vision with various stakeholders. Importantly, since majority of the issues lay in the beneficiaries being assisted, reviewing the current form of support could assist the city to swiftly incorporate assistance from food production, distribution, processing and to consumption, while ensuring that food waste is minimized. Stakeholder engagement would mean creating a vision for change that all actors involved can buy into and contribute to influencing a new plan. In addition, analysing challenges facing the municipality (eg. Maybe budget cuts) and their stakeholders to avoid repetition of similar challenges when implementing new projects is important. Moreover, Training and development of extension officers who will in turn train the farmers to establish new structure with required skills that was not there in old. Equally important, the developing and applying the Balanced score card (BSC) will enable the municipality to monitor and evaluate how their beneficiaries are performing from four different perspectives i.e. financial, internal business, learning and growth, and customer to see whether strategic goals are being achieved in a balanced way. Finally, and importantly, the new culture and structure must continuously be reinforced.

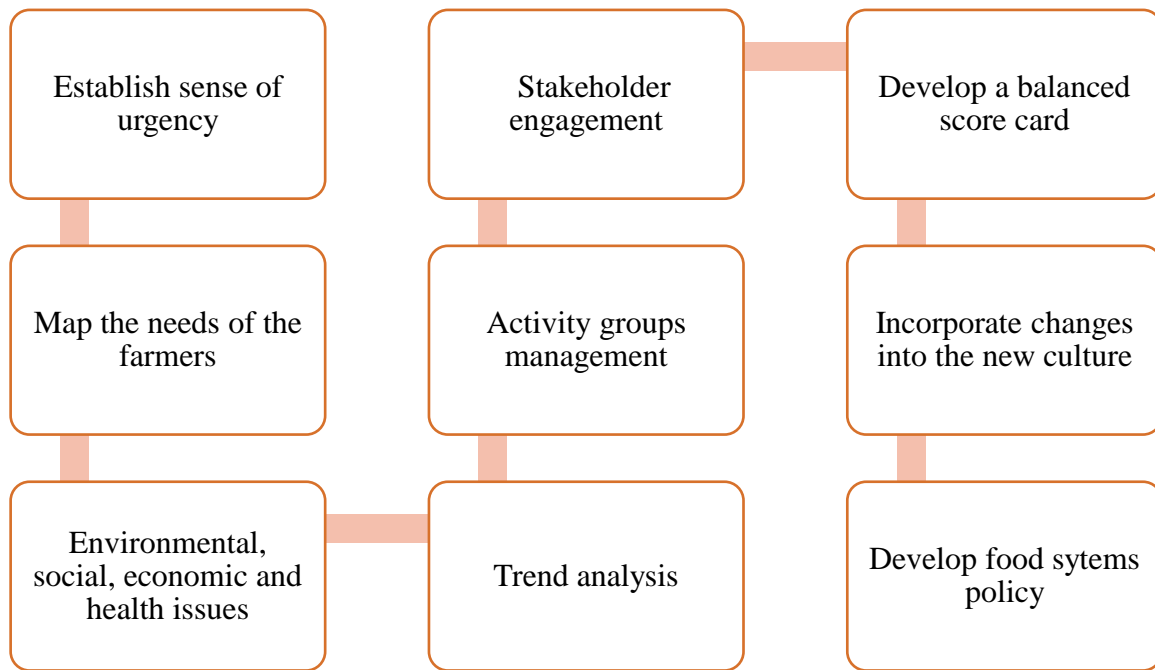


Figure 17: Conceptual framework for sustainable urban agriculture (Source: own diagram)

5.3.2 Systems approach

On the other hand, assessing UA in relation to the principles of sustainability provides factors that affect the success of these projects. This study therefore strengthens the systems approach, which can be defined according to Probst and Bassi (2014) as an approach that enables better understanding and prediction of the decision outcomes across sectors and agents and over time. This kind of approach is transdisciplinary and it encompasses environmental, economic and social dimensions, while encouraging multiple interconnected parts, as opposed to individual parts (Zhang et al. 2018). The municipality’s focus for intervention should be creating a “system change”, which basically means strengthening the social, economic, political and cultural structures that compromise and sustain a socio-ecological system (Zhang et al. 2018). Below is an example of how multiple subsystems interact (Figure 18).

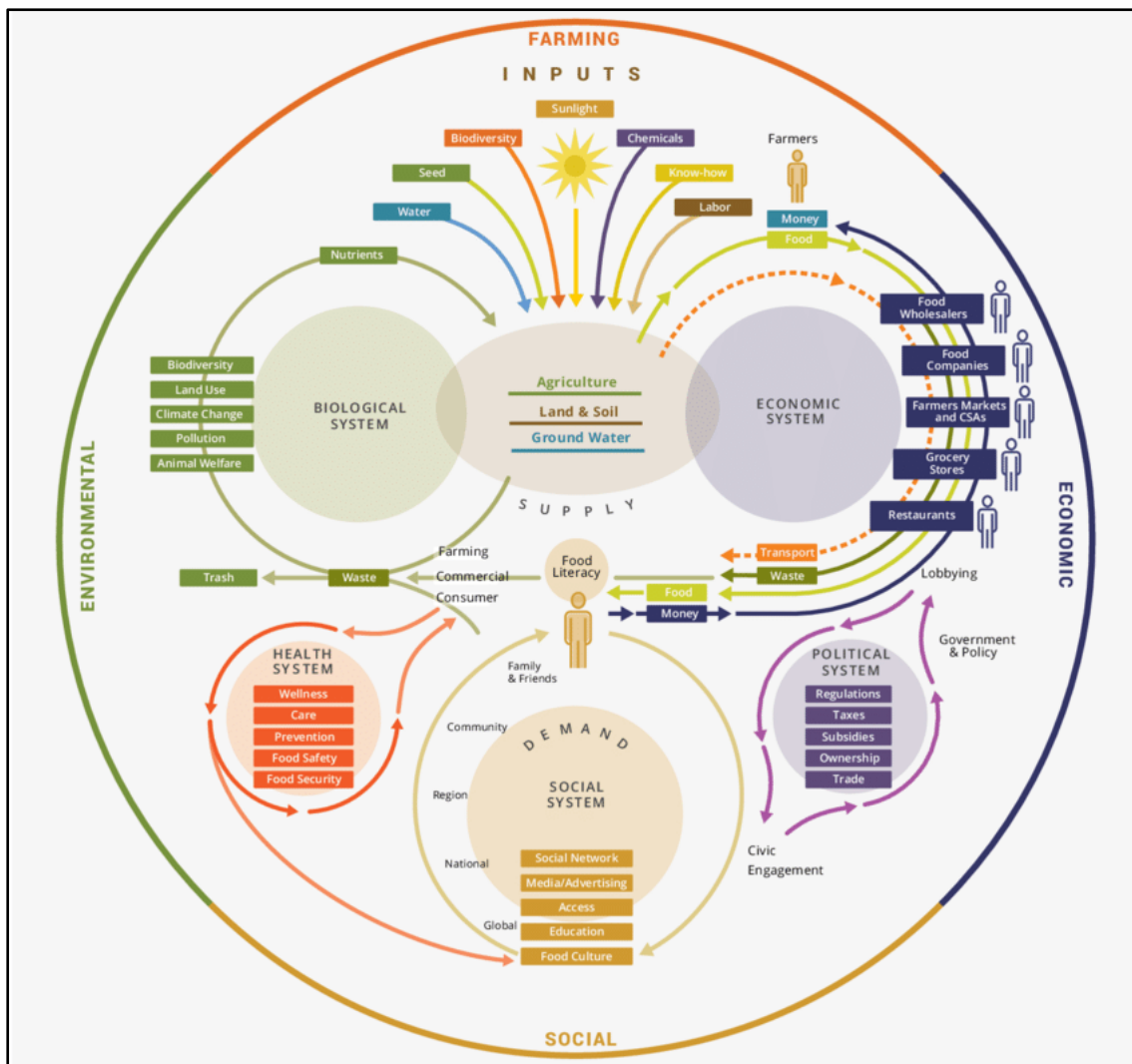


Figure 18: Food systems map showing interactions of various subsystems (Source Zhang et al 2018)

5.4 Recommendations for future research

Since this study only focused on Kwa-Mashu section, it would be ideal for further research to explore other regions within the city so that results can be consolidated to inform the municipality’s food policy. Further research could also focus on urban-rural linkages and on improving food systems in rural areas so that people do not move from rural to urban areas in search of a better life. Rural areas have abundant land that can be used for food production and improve the livelihoods of rural residents. Perhaps further research can explore ways to increase food production in rural areas that will make this possible.

5.5 Final comments and Conclusion

This study discovered that food production without any link to socio-economic empowerment and environmental protection, is unsustainable. The municipality should therefore offer opportunities for farmers to develop economic skills through supplementary modules on

financial management and food presentation. This study has found that, if well implemented and fully supported through co-produced planning regimes it would indeed contribute to sustainable development dimensions in various ways. The municipality should learn to facilitate such programs where farmers learn from each other. In the researcher's view, it would be more successful as they experience similar challenges and therefore will understand each other better and work towards being sustainable together. This could be done in the form of workshops, learning journeys or during the community market days.

Overall, urban agriculture succeeds where favourable policies are implemented but fails where government officials continue to struggle to understand its importance. Examples have been outline in chapter 2 of cases where government is fully supportive of UA initiatives. The irony here is that governments advocate for employment creation, yet they fail to consider UA initiatives that are sustainable. Every effort to provide security (be it food or employment) should aim to make provision of necessary resources, including involvement of all various actors required from production until market in order to help people to sustain their lives. Overall, this study found that UA contributes to food security and income generation.

5.5.1 Strengthening intersectoral collaboration

Respondents indicated that they received support from various entities such as NGOs, the municipality, private companies as well as traditional authorities. Incorporating change would begin by working in collaboration with each as a team. The municipality could focus on aspects, while other entities focused on the other. In doing so, they would be a balance in distribution of resources and shared responsibilities. Also, there would not be a situation where beneficiaries are double dipping. Food policy and food strategy development committee should thus be comprised of various actors from various organizations, such as private sector, NGOs, international community and local governments. It must be noted that despite the challenges encountered in their practice of UA over the years, farmers remain resilient and continue farming nonetheless. This shows the willingness and thus supporting them should not even be overstated.

5.5.2 Developing coalitions of support

According to the World Bank, (2016), lack of unswerving systems for cross-sectoral, cohesive discourse decision making presents a huge challenge within the municipality. When objectives, timelines and reporting requirements are not aligned, it becomes difficult to see with one eye

and come up with solutions to issues. Institutional disintegration thus result in difficulties when creating frameworks aimed to protect and sustain environmental resources for the communities. For UA to be a successful and a sustainable practice, it is vital that there is an alliance between national governments, local governments, farmers, consumers as well as agro processors and NGOs. Working together as a team and establishing relationships that are geared at improving local food systems is a contribution towards sustainability.

In conclusion, the researcher further acclaims that attention be paid to the following, as individual and collective consideration:

- Instead of seeking to retort to crisis, municipality need to focus on strategically responding to changing urban needs, by firstly understanding the sector as a whole and its needs to grow. There is a compelling need for developing implementable food policies.
- To enhance economic viability and productivity of UA, it is vital for governments to incorporate UA in urban land use, and ensure farmers have access to information regarding land, water and general support.
- It is important for governments to consider involving more youth and women, for example by creating more government agencies that deal with agricultural issues.
- Only invest in farmers that are willing to avoid wasting resources on people that will later give on the project leaving resources unattended.
- If successfully implemented and sustained with follow-up, monitoring, and evaluation to make necessary improvements, projects stand a higher chance of being successful. Therefore, officials should strive to consider, understand, and appropriately implement various research findings aimed at positive change.

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Appendix 1: Consent form and information sheet



GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP

Dear Respondent

My name is Balance Phala, a Master of Business Administration student, at the Graduate School of Business and Leadership, of the University of KwaZulu-Natal.

You are being invited to consider participating in a research study titled “Investigating factors that influence the sustainability of urban agriculture: A case study of Kwa-Mashu, eThekweni Municipality”. The aim of this study is to determine factors that contribute to the sustainability of the small-scale urban agriculture projects assisted by eThekweni Municipality in Kwa-Mashu and propose a sustainable livelihood framework to be used by eThekweni Municipality for their agricultural projects. The study is expected to enroll 36 farmers located in the Kwa-Mashu area. The duration of your participation, if you choose to enroll and remain in the study, is expected to be 20 to 30 minutes.

Through your participation, I hope to address the following objectives:

- To evaluate factors that contribute to sustainability of UA in Kwa-Mashu, eThekweni Municipality,
- To assess the obstacles to UA and provide suggestions to transition to sustainability,
- To propose and recommend a sustainable framework to be used by eThekweni Municipality for the UA projects

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number: **HSSREC/004196/2022**). In the event of any problems or concerns/questions you may contact the researcher at 0796056041/balancem21@gmail.com or the UKZN Humanities & Social Sciences Research Ethics Committee on the contact details as follows: HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION at Research Office: Ethics, Westville Campus, Govan Mbeki Building, Private Bag x 54001 Durban 4000, Tel: +27 31 2604557, email: HSSREC@ukzn.ac.za.

Your participation in this project is voluntary and you may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in this survey. Confidentiality and anonymity of records identifying you as a participant will be maintained.

Sincerely

Researcher's Signature _____ Date _____



CONSENT

I (Full names & surname) have been informed about the study titled “Investigating factors that influence the sustainability of urban agriculture: A case study of Kwa-Mashu, eThekweni Municipality” by Balance Phala. I understand the purpose and nature of the research project. I have been given an opportunity to answer questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and I am at liberty to withdraw from the project at any time without affecting any of the benefits that I usually am entitled to.

If I have any further questions/concerns or queries related to the study I understand that I may contact the researcher at 079605604 or balancem21@gmail.com.

If I have any questions or concerns about my rights as a study participant, or if I am concerned about any aspect of the study or the researcher then I may contact: HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION at Research Office: Ethics, Westville Campus, Govan Mbeki Building, Private Bag x 54001 Durban 4000 (031 260 4557) email HSSREC@ukzn.ac.za.

Signature of Participant

Date

Appendix 2: Research instrument



GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP

QUESTIONNAIRE

All the information provided herein will be treated as **STRICTLY CONFIDENTIAL**

SOCIO-DEMOGRAPHIC PROFILE OF RESPONDENTS

1. Age

Age	
18 -35	
36 - 60	
61 and above	

2. Gender

Male	Female

3. Marital status

Single	Married	Divorced	Widowed	Other

4. Education

Primary school	High school	Tertiary education	Type of qualification

5. How many dependants are you currently supporting (Number of members)

Immediate family	Extended family	Other (Specify)

6. How many years have you been involved in farming?

--

7. Prior experience in farming

--

8. Besides farming do you have other income paying job?

a. YES	b. NO
--------	-------

9. If yes, what other work do you do?

--

10. What are the main sources of your household income?

Salary/wage	Social grants	Remittance	Sales of agricultural produce	Other (Specify)

11. What is your total monthly income?

No income	
Below R1 000	
R1 000 - R3 000	
R3 000 – R10 000	
R10 001 – R 20 000	
R 20 001 – R 30 000	
R 30 001 – R 40 000	
Above R 40 000	

LAND TENURE AND LAND USE MANAGEMENT

1. How much land in hectares do you use for agriculture?

--

2. How was your land acquired?

Inherited	Traditional authority	Land restitution	Department of land and rural development	I don't know	No response	Other

3. Does owning land encourage you to engage in natural resource management? (YES/NO)

4. What methods do you use to practice natural resource management?

Organic farming	Crop rotation	Minimum tillage	Planting cover crops	Pasture and soil management	Other (specify)

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5. Who is responsible for providing resources for land resources management?

Traditional authority	The municipality	NGOs	Consultants	Other (specify)

6. What kind of resources do they supply?

Tractors	Fertilizers	Seed/seedlings	Tools/Implements	Water/irrigation	Other (Specify)

ECONOMIC SUSTAINABILITY

1. What type of dwelling do you occupy (house, flats, informal, etc.)?

--

2. What does the ability to farm in a peri-urban area mean to you?

3. Do you believe urban agriculture is beneficial in the following areas? (1: strongly disagree. 2: Disagree. 3: Undecided. 4: Agree. 5: Strongly Agree.)

	1	2	3	4	5
Providing food security					
Protecting the natural environment					
Providing family income					
Urban Agriculture can reduce cost of importing food					
Urban agriculture can build an innovation driven economy					

4. What type of gardening are you involved in?

--

5. What types of crops are you growing in your gardens?

6. What scale of farming are you involved in?

Subsistence	Semi-commercial	Commercial	Other (Specify)

7. Do you have a market secured for your produce? YES/NO

8. If yes, where do you sell your produce?

--

9. Do you generate income as a result of these practices? YES/NO

10. If yes, approximately how much

No income	
Below R1 000	
R1 000 - R3 000	
R3 000 – R10 000	
R10 001 – R 20 000	
R 20 001 – R 30 000	
Above R 30 000	

11. What are other economic contributions of peri- urban Agriculture to your household?

13. Do you feel like you have benefited from peri-urban agriculture?

Yes (Specify)	
No	

14. How would you improve your current situation and why?

SOCIAL SUSTAINABILITY

1. Would you consider your farming practices organic? YES/NO

2. Can you answer the following questions about your farming practices and rate them from 1 to 5? (1: strongly disagree. 2: Disagree. 3: Undecided. 4: Agree. 5: Strongly Agree.)

	1	2	3	4	5
Urban agriculture provides healthy food for the consumers					
Does urban agriculture increase social interaction and cohesion between community members?					
Did you have prior farming knowledge or were you taught by eThekwin Municipality?					

Do you believe eThekweni Municipality has provided you with sufficient skills needed for Urban Agriculture?					
Do you believe eThekweni Municipality has provided you with the technical support needed for your practices?					
Is eThekweni Municipality providing relevant and sufficient resources to enable the success of your agricultural practices?					

3. Are you satisfied with eThekweni Municipality's assistance? YES/NO

4. If NO, what would you suggest eThekweni Municipality does to improve on how they are currently assisting your practices

--

ENVIRONMENTAL SUSTAINABILITY

1. What water source do you use to irrigate crops?

Municipal water	Greywater	Rainwater	Natural (Dam, River, spring, etc.)	Other (Specify)

2. Do you use household (e.g. fruit peels, leftover food) and agricultural waste used as fertilizers?

YES	NO

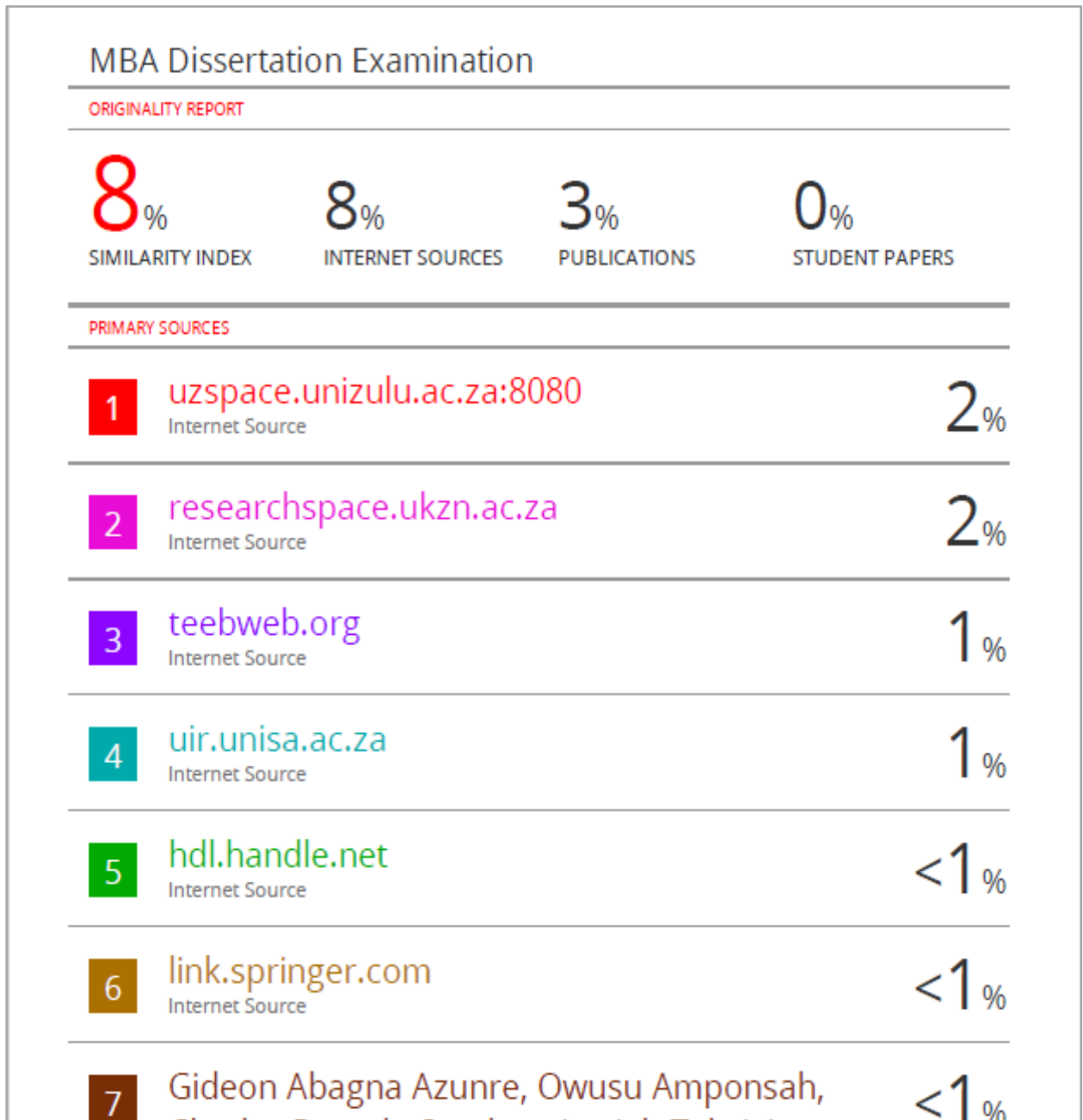
3. Do you use chemicals for production (e.g. fertilizers and pesticides)?

YES (Specify)	
NO	

4. Can you answer the following questions about your farming practices by rating them from 1 – 5? (1: strongly disagree. 2: Disagree. 3: Undecided. 4: Agree. 5: Strongly Agree.)

	1	2	3	4	5
Do you follow sound farming practices?					
Do you feed some of your produce to livestock (e.g. chickens, rabbits)?					
Do you farm organically whereby you make your own compost?					

Appendix 3: Turnitin report



Appendix 4: Ethical clearance



08 June 2022

Balance Matseilane Phala (221015101)
Grad School Of Bus & Leadership
Westville Campus

Dear BM Phala,

Protocol reference number: HSSREC/00004196/2022

Project title: Investigating factors that influence the sustainability of urban agriculture: A case study of Kwa-Mashu, eThekweni Municipality

Degree: Masters

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 17 May 2022 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted FULL APPROVAL.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

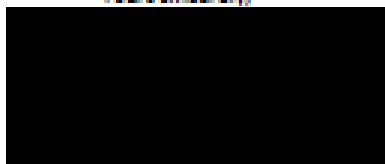
This approval is valid until 08 June 2023.

To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

All research conducted during the COVID-19 period must adhere to the national and UKZN guidelines.

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

Yours sincerely,



Professor Dipane Hlalele (Chair)

/dd

Humanities and Social Sciences Research Ethics Committee

Postal Address: Private Bag X34001, Durban, 4000, South Africa

Telephone: +27 (0)31 260 8350/4557/3587 Email: hssrec@ukzn.ac.za Websites: <http://research.ukzn.ac.za/Research-Ethics>

Founding Campuses: ■ Edgewood ■ Howard College ■ Medical School ■ Pietermaritzburg ■ Westville

INSPIRING GREATNESS

Appendix 5: Gatekeeper Letter



For attention:
Chair of Research Ethics Committee
Graduate School of Business & Leadership
College of Law and Management Studies
University of Kwazulu Natal
Durban
4001

28 April 2022

RE: LETTER OF SUPPORT TO BM PHALA, STUDENT NUMBER 221015101 - GRANTING PERMISSION TO USE ETHEKWINI MUNICIPALITY AS A STUDY SITE

I am pleased to inform you that the Agro-ecology Unit and Municipal Institute of Learning (MILE) in eThekweni Municipality recently considered a gatekeeper request from Balance Matselane Phala (Ms) to use eThekweni Municipality as a research study site leading towards a Master of Business Administration degree. The request is to collect data for a research study entitled "Investigating factors that influence the sustainability of urban agriculture: A case study Kwa-Machu, eThekweni Municipality".

We wish to inform you of the acceptance of this request and hereby assure the student of our utmost cooperation towards achieving her academic goals; the outcome which we believe will help eThekweni municipality improve its services. The student is reminded of the data collection conditions, ethical considerations as well as the current health related regulations when conducting the research. The student is expected to contact Dr Collin Pillay to share the findings and recommendations with the beneficiary unit on completion of her research.

Wishing the student all the best in her studies.

Supported

Mr. Sibusiso Chamane
Head: Agro-ecology Unit
eThekweni Municipality

Dr. Collin Pillay
Program Manager: MILE
eThekweni Municipality

IBalance Matselane Phala.....hereby accept as mandatory that I will comply fully as per the conditions stipulated above.

Signed: Date:28/04/2022.....