



**Urban and peri-urban agriculture: An analysis of the perceptions and use
of food sovereignty among low-income dwellers in Harare, Zimbabwe**

by

Michelle Tendai Chihambakwe

Submitted in partial fulfilment of the requirements for the degree of

Doctor of Philosophy (Food Security)

School of Agriculture, Earth and Environmental Sciences,

University of KwaZulu-Natal

Pietermaritzburg,

South Africa

November 2018

DECLARATION

I, Michelle Tendai Chihambakwe, declare as follows

1. The research reported in this thesis, except where otherwise indicated, is independent research conducted and written from August 2015 to November 2018.
2. My contribution to this thesis involved the conception of the problem, developing the analytical framework, designing the methodological procedures, collecting, computing, analysing the data and writing the final output.
3. This thesis has not been submitted for any academic degree or examination at UKZN or any other tertiary institution.
4. This thesis does not contain other persons' writing, data, pictures, graphs or other information, unless duly acknowledged as being sourced from them. Where
 - a. written sources have been used, words have been re-written, but the general information attributed to them has been referenced
 - b. exact words have been used, then their writing has been indented and/or placed in italics, inside quotation marks, and referenced.

Signed

Date

.....

.....

M. T. Chihambakwe

Signed

Date

.....

.....

Prof. P. Mafongoya(Supervisor)

Signed

Date

.....

.....

Dr. O. Jiri (Co-Supervisor)

DEDICATION

Dad (**Addmore Blessings**), thank you for your unwavering love and support.

May your soul rest in eternal peace †

ACKNOWLEDGEMENTS

Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody. (Jacobs, 1961)

Jacob's excerpt has as much relevance as it did five decades ago, more so, for the urban poor. I envisage that this manuscript will contribute to the co-creation of sustainable pathways for urban farmers. May they find value in the co-production of their agricultural experiences. Thank you, immensely for your valuable input and lessons learnt. Also, this thesis would not have been conceivable without reflections from the councillors, Agricultural Extension Officers and staff from Agricultural Research Council and Environmental Management Agency.

Drafts of this thesis were reviewed by Prof. P Mafongoya (Supervisor) and Dr. O Jiri (Co-supervisor) whose efforts I sincerely appreciate. Thank you for the constructive criticism and support.

For the refined output, I would like to express gratitude to the independent reviewers.

In no small measure, I also extend my appreciation to the following;

- For introducing me to food sovereignty in my early postgraduate years, I am grateful to Dr M Ngcoya, an astute mentor. Thank you for inspiring me to think off-centre. This foundation continues to undergird my views on 'the everyday'.
- Your foresight in my first year of undergraduate studies has come to fruition. Thank you, Nontokozo Nemarundwe.
- For your sacrifices and sustained provision from day one, I heartily appreciate you Mum and Dad. Thank you, Dad for believing in me, for leaving an indelible mark, you would have been so proud! Thank you, Roy and Russell, for your endearing support.
- For your unwavering love and support I can't thank you enough Tarirai, my rock! Thank you for helping me hold it together!
- To God, for your provision and abundant love and grace. I am indebted to you!

TABLE OF CONTENTS

DECLARATION	i
DEDICATION	ii
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF FIGURES	viii
LIST OF TABLES	ix
LIST OF PLATES	ix
ACRONYMNS	x
ABSTRACT	xii
INTRODUCTION	1
1.1 Background	1
<i>1.1.1 Harvests to hunger: Zimbabwean transition</i>	3
1.2 Problem statement	5
1.3 Rationale and intended scientific contribution	6
1.4 Objectives and brief methodological reflection	8
1.6 Methodological framework	10
1.5 Synopsis of the thesis	13
References	15
CHAPTER 2	19
URBAN AND PERI-URBAN AGRICULTURE, INSTITUTIONAL ARRANGEMENTS AND FOOD SOVEREIGNTY	19
2. 1 Introduction	19
2.2 Historical overview of Urban Agriculture	19
2.2.1 Urban food (in)security in SSA	21
2.2.2 Evidence from Harare	24
2.3 (In)significance of UPA	26
<i>2.3.1 Significance of UPA in Africa</i>	27
<i>2.3.2 UPA and Household Dietary Diversity</i>	29
<i>2.3.3 Insignificance of UPA</i>	31
<i>2.3.4.1 Who are the urban farmers?</i>	32
<i>2.3.4.2. Typologies of UPA</i>	33
2.3.5 Challenges and constraints of UPA postulate	35
2.4 Food production practices	38
<i>2.4.1 Agroecological or conventional practices?</i>	38
<i>2.4.2 Agronomic and horticultural crops</i>	39
2. 5 Understanding Food Sovereignty	40

2.5.1 Weaving climate change into food sovereignty.....	43
2.6.2 Food sovereignty in Zimbabwe	45
2.7 Conclusion	47
References.....	48
CHAPTER 3	55
URBAN AND PERI-URBAN AGRICULTURE (IN)SIGNIFICANCE TO FOOD SECURITY AND NUTRITION AMONG LOW-INCOME HOUSEHOLDS IN HARARE.	55
Abstract.....	55
3.1 Introduction.....	55
3.2 Materials and methods	59
3.2.1 Location of the study and sampling strategy	59
3.2.2 Data collection.....	60
3.2.3 Analysis.....	61
3.3 Results.....	62
3.3.1 Participant characteristics.....	62
3.3.2 Production practices of urban farmers	64
3.3.3 Nutrition and consumption patterns of urban farmers	65
3.3.4 UPA's contribution to HFS and HDD	66
3.4 Discussion.....	69
3.5 Conclusion	73
References.....	75
CHAPTER 4	78
CULTIVATING AGAINST THE BIAS: INSTITUTIONAL ARRANGEMENTS AND THEIR IMPLICATIONS ON URBAN FOOD SECURITY	78
Abstract.....	78
4.1 Introduction.....	79
4.2 Methods.....	82
4.2.1 Study area and sampling.....	82
4.2.2 Data acquisition.....	83
4.2.3 Data management and analysis	84
4.3 Results.....	84
4.3.1 Impact of the practice of UPA.....	84
4.3.2 Policies and regulations governing the practice	86
4.3.3 Constraints faced by urban farmers.....	88
4.4 Discussion.....	91
4.5. Conclusion	96
References.....	98

CHAPTER 5	101
MAPPING CLIMATE CHANGE AND VARIABILITY PERCEPTIONS OF URBAN FARMERS AND THEIR APPLICATION OF AGROECOLOGICAL PRACTICES	101
Abstract	101
5.1 Introduction	101
5.2 Methods and materials	105
5.2.1 <i>Research setting</i>	105
5.2.2 <i>Data collection and management</i>	106
5.2.3 <i>Data management</i>	107
5.3 Results	107
5.3.1 <i>Perceived changes and variability in climate</i>	107
5.3.2 <i>Perceptions on the impact of climate change on crop production</i>	108
5.3.3 <i>Adaption strategies adopted by urban farmers</i>	108
5.3.4 <i>Agroecological practices and sources information for urban farmers</i>	110
5.4 Discussion	114
5.5 Conclusion	117
References	118
CHAPTER 6	122
THE USE OF FOOD SOVEREIGNTY AMONG URBAN AND PERI-URBAN HOUSEHOLDS IN HARARE	122
Abstract	122
6.1 Introduction	122
6.2 Materials methods	126
6.2.1 <i>Study location</i>	126
6.2.2 <i>Data collection</i>	126
6.2.3 <i>Analysis</i>	127
6.3 Results	127
6.3.1 <i>Contribution of UPA to sufficient and appropriate foods</i>	127
6.3.2 <i>Stakeholder value on urban farmers and the practice of UPA</i>	130
6.3.3 <i>Localisation of food production and its implications for urban farmers</i>	131
6.3.4 <i>Developing knowledge base and skills of urban farmers</i>	132
6.3.5 <i>Urban and peri-urban agriculture's impact on the environment</i>	133
6.3.6 <i>Adaption to climate change</i>	134
6.3.7 <i>Barriers to food sovereignty</i>	135
6.4 Discussion	136
6.5 Conclusion	140
References	141

CHAPTER 7	145
CONCLUSION AND AREAS FOR FUTURE RESEARCH	145
7.1 Conclusion	145
7.1.1 <i>Urban and peri-urban agriculture's (in)significance to food security and nutrition</i>	145
7.1.2 <i>Institutional arrangements and their implications on urban food security</i>	146
7.1.3 <i>Perceptions of climate change and application of agroecological practices</i>	146
7.1.4 <i>Application of food sovereignty among urban farmers</i>	147
7.2 Areas for future research.....	147

LIST OF FIGURES

Figure 1. 1 Projected global yield growth of Maize, Rice, Wheat and Soybean	2
Figure 1. 2 Conceptualising an alternative pathway	12
Figure 1. 3 Visual depiction of the thesis structure	14
Figure 2. 1 Linking food security to availability, access, utilisation and stability	22
Figure 3. 1 Projected impact of UPA on HDD against dimensions of food security	57
Figure 3. 2 24-hour recall of food groups consumed by urban households in Harare.....	66
Figure 4. 1 Main constraints faced by urban cultivator disaggregated by study site.....	90
Figure 4. 2 Frequency of Agritex Visits across study sites	90
Figure 5. 1 Effects of climate change and variability on urban farmers.....	103
Figure 5. 2 Perceptions of urban farmers on extreme weather patterns over the past decade	108
Figure 5. 3 Agroecological practices employed by urban farmers	114
Figure 6. 1 Household food security status of urban households in Harare	128
Figure 6. 2 Ranking of UPA benefits based on importance.	129
Figure 6. 3 Crop and vegetables produced by urban farmers	130
Figure 6. 4 Perceptions of households on the importance of citizen participation	131
Figure 6. 5 Urban cultivator's relationship with UPA stakeholders.....	131
Figure 6. 6 Perception of climate change on food production and changes to agricultural practices	135

LIST OF TABLES

Table 2. 1 Major categories of urban crop production in Africa	34
Table 2. 2 Provisions for official UPA support	36
Table 3. 1 Summary statistics of household and socio-economic characteristics, production practices, dietary diversity and food security status.	63
Table 3. 2 Crops grown by urban farmers disaggregated by motivation for their production	65
Table 3. 3 HDD score of food groups consumed by households in Harare.....	66
Table 3. 4 Ordinal regression parameters for HFS and HDD score among urban farmers	68
Table 3. 5 Spearman's correlation of food security indicators (HHS, Crop diversification, Agritex Services, HDD and Income)	69
Table 4. 1 UPA activity disaggregated by study site	86
Table 4. 2 Main source of income for urban households.....	86
Table 4. 3 Household food security ^a and UPA constraints	88
Table 5. 1 Percentage of urban farmers who effected changes to farming practices because of climate change	109
Table 5. 2 Binary logistic regression on adaptation measures relative to perception of the impact of climate change on crop production.....	110
Table 5. 3 Major constraint to climate change adaptation	110
Table 5. 4 Use of agroecological practices based on key source of agricultural information	113
Table 6. 1 Ordinal regression parameters for HFS and HDD score disaggregated by study area.....	128
Table 6. 2 Primary source of agricultural information by urban households in Harare	133
Table 6. 3 Adaptation strategies adopted by urban farmers.....	135
Table 6. 4 Barriers to food sovereignty	136

LIST OF PLATES

Plate 4.1 Types of open space cultivation in Harare.....	87
Plate 4.2 Wilting spinach at a community garden in Epworth	89
Plate 6.1 Seed multiplication in a community garden in Ushewokunze.....	132
Plate 6.2 Crop residue (maize stalks) in an open space garden in Hatcliffe	134

ACRONYMNS

AIV	African Indigenous Vegetables
Agritex	Agricultural Extension
AFSUN	African Urban Food Security Network
ARC	Agricultural Research Council
EMA	Environmental Management Agency
ESAP	Economic Structural Adjustment Programme
FTLRP	Fast-Track Land Reform Programme
FNC	Food and Nutrition Council
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organisation of the United Nations
FSF	Food Sovereignty Framework
GHI	Global Hunger Index (GHI)
GoZ	Government of Zimbabwe
HDD	Household Dietary Diversity
HHS	Household Hunger Scale (HHS)
HFIAP	Household Food Insecurity Access Prevalence Indicator
IPCC	Intergovernmental Panel on Climate Change
KII	Key informant interview
LPI	Lived Poverty Index
NGOs	Non-governmental Organisations
RBZ	Reserve Bank of Zimbabwe
RTTC	Right to the City
SADC	Southern African Development Community
SLA	Sustainable Livelihoods Approach
SSA	sub-Saharan Africa
SPSS	Statistical Package for Social Sciences
UA	Urban Agriculture
UPA	Urban and Peri-Urban Agriculture
USD	United States dollar

WFP	World Food Program
ZimStat	Zimbabwe National Statistics Agency
ZimVAC	Zimbabwe National Vulnerability Assessment Committee

ABSTRACT

Urbanisation has transfigured the urban landscape and heightened food acquisition within cities. Urbanisation, coupled with systemic socio-economic, political and climatic challenges, has heightened food security concerns. Food sovereignty, which is grounded agroecological and political centred principles has been touted as an alternative avenue to attaining food security. Yet, studies investigating agricultural issues frame responses seldom consider alternatives to the food security approach and rarely examine the urban dynamic. By unfurling extensively debated concepts of urban and peri-urban agriculture and food sovereignty, considers the interaction between food and politics. Mixed methods was employed to identify and draw on indicators associated with food sovereignty principles such as food security and nutrition, the impact of institutional arrangements, climate change adaptation and agroecological practices. Multiphase sampling was used to draw data from 400 urban farmers from four study sites in Harare, including 35 participants in four focus group discussions and eight key informant interviews. Ordinal, binary and multinomial logistic regression was used to analyse quantitative data and NVivo was used to analyse the qualitative data. To reinforce our analysis, Henri Lefebvre's Right to the City and the Food Sovereignty Framework were used for exploring practices and processes holistically. By so doing, we explored the use and benefits of food sovereignty and corresponding constraints were explored. The key finding is that the practices of urban farmers resonated with food sovereignty, however, lack of attention to UPA, inadequate land, lack of information, undervalued indigenous crops and deteriorating economic environment reduced their control over productive and consumptive practices. This negatively affected their ability to apply principles of food sovereignty to their food systems. Findings also confirm that not all forms of UPA are inherently agroecological, particularly for those that cultivated on a large scale. These findings prompt a re-casting of urban and peri-urban agriculture. Recognition that intricacies produced by the interaction of socio-economic, political and environmental vulnerabilities also affect urban dwellers and concerted effort to pursue alternative avenues have the potential to reinforce food security at both household and national level. It is therefore critical for authorities to formulate policies that support urban and peri-urban agriculture in order to address urban food insecurity.

Keywords- agroecology, climate change, food security, food sovereignty, urban and peri-urban agriculture

CHAPTER 1

INTRODUCTION

1.1 Background

Food insecurity is one of the most topical issues of the 21st century (Beddington et al., 2012, De Schutter and Vanloqueren, 2011, Holt-Giménez and Altieri, 2013, Schanbacher, 2010, Tomich et al., 2011). While food security has been part of global food issues for centuries, recent episodes have accentuated its uncertainty. Urbanisation, climate variability, the sequential market related food and fuel crises have been identified as some of the key factors (Ehlert and Voßemer, 2015). Consequently, these factors have eroded the ability of the urban poor to feed themselves. While, more than half of people reside in rural areas globally (Heinemann et al., 2011), by 2025 the urban population is projected to surpass 6 billion (United Nations, 2014). Africa's population is also pre-dominantly rural. However, its urban population is expanding faster than other continents (UN-Habitat, 2014). Urban inhabitants are exposed to unique challenges that intensify their poverty compared to their rural counterparts. One such reason is their strong reliance on the cash economy compared to the rural population as explained by the phenomenon of the “urbanisation of poverty” (Satterthwaite, 2004). For Taylor and Lovell (2012) projections of issues on food provisioning affirm that food security will be an urban challenge.

Climate change has been reported to amplify “the urbanisation of poverty” through a decline in staple crops (Johnson and Breil, 2012, Lwasa and Dubbeling, 2015, Pricope et al., 2013, Stocker, 2014). As a result, Pricope et al. (2013) project that yields from rain-fed agriculture are likely to be halved in the next three decades due to climate change. This was cemented by Garcia (2008), who stated that Africa is more susceptible to the impact of climate change due to its warm climate, high dependence on agriculture which is a climate sensitive sector, and socio-economic challenges. Even more daunting is the fact that, the impact of climate change is projected to increase over time (Lal, 2013). Also, the overstretched urban fabric in African countries is set to experience additional demographic strain. As suggested by Pieterse and Parnell (2014) developing countries will experience increases in the number of city inhabitants, placing great strain on the capacity of governments. In turn, households will find it increasingly difficult to address their consumptive needs as a result these biotic and abiotic tensions.

These tensions have fuelled the debate on “how to feed the world” . It is characterised by the clash between the food security and food sovereignty approach, which although distinct are related methods to addressing food security. The latter has been proposed to reduce the susceptibility of the poor to

market prices through a more sustainable means of production. Food security focuses on issues of accessibility, availability, utilisation and stability (Hwalla et al., 2016). Considering the systemic problems affecting the urban poor, there has been waning confidence in the ability of the conventional¹ food security approach to addressing their consumption needs. Its technical and market based orientation means that poor urban households will find it increasingly difficult to enhance their food security status (Dubbeling and de Zeeuw, 2011). Doubling crop production through conventional means as the key solution to food security has been dismissed by scholars (Ray et al., 2013, Wittman, 2010). By charting data on annual fluctuations in crop yields Ray et al. (2013) illustrate that the potential of doubling global food production in the next three decades is only feasible in a few countries (See Fig 1.1). On the other hand, the food sovereignty approach, coined through peasant struggles for autonomy in their food systems is a political concept that advocates for shifting from the dominant model of production to one that is attuned to the needs of the poor. It goes beyond the focus on food security by placing control in the hands of the farmers (La Via Campesina, 2007).

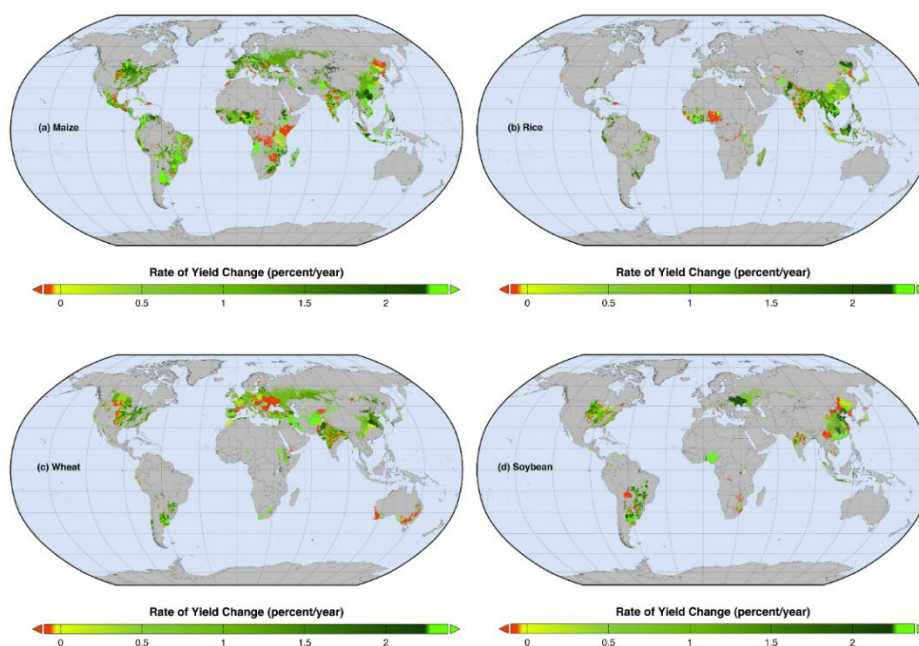


Figure 1. 1 Projected global yield growth of Maize, Rice, Wheat and Soybean

Source: Ray et al (2013)

Note: The darkest areas denote deteriorating harvests and lime reflects areas in which a twofold increase in harvests by 2050 is conceivable

Several scholars (Carney, 2016, Heckelman and Wittman, 2015, Schanbacher, 2010) have demonstrated how applying the food sovereignty approach cushions farmers from market failures. They further point

¹Dominant or mainstream farming which involves the production of cash crops at large scale which utilises heavily mechanised machinery and artificial inputs.

out how it enables them, through sustainable and climate smart agricultural practices, to grow crops that are not only healthy but also culturally appropriate. Unlike the food security approach, food sovereignty is framed around the wider political context in which farmers exist. For this reason, this study assessed the use of food sovereignty principles in the Zimbabwean context.

1.1.1 Harvests to hunger: Zimbabwean transition

Formerly the ‘bread basket’ of sub Saharan Africa (SSA), Zimbabwe is now experiencing one of the worst forms of food insecurity (Martens, 2012). Over the past few years, there has been evidence of a decline in crop yield (United Nations Development Programme, 2016). Pegged at a Global Hunger Index (GHI) of 16.5, Zimbabwe’s food security status falls under the “serious” category (von Grebmer et al., 2014). This decline in national food provisioning and resultant food shortages stem from a confluence of historic and contemporary crisis which include colonial inequities, urbanisation, escalating rate of poverty, hyperinflationary episodes and declining agricultural performance (Moyo, 2011, Rukuni, 2006). The decline during the colonial period according to Moyo (2011) was not to the quarantining of Africans to unproductive spaces but the compulsory adoption of conventional agricultural practices which include the heavy mechanisation and synthetic inputs. In addition to changes in production practices the gradual increase in food insecurity was fuelled by three successive events. These were the introduction of Economic Structural Adjustment Programmes (ESAP)² in 1991, and the droughts of 1992 and 1994/5 and the Fast Track Land Reform Programme (FTLRP) in 2000. This period was not only the advent of Zimbabwe’s economic afflictions but the dissolution of its title as one of the region’s best agricultural performers. To rectify skewed land ownership injustices and the financial challenges, the Government of Zimbabwe (GoZ) introduced the FTLRP. However, Rukuni (2018) posits that undertaking land reform without requisite agrarian support structures led to the underperformance of the programme and increased food insecurity.

The global economic meltdown, which precipitated hyperinflation led to episodes where food prices could potentially change three times within a day mid-2008 to October (Tawodzera et al., 2012b). During the month of October, Reserve Bank of Zimbabwe (RBZ) recorded an inflation rate of over 231 million% (Ndedzu et al., 2013). The re-introduction³ of a pseudo-currency (bond notes and coins in 2014) provides evidence of the country’s sustained economic instability. The gradual introduction of

² A phase where the introduction of neoliberal policies in efforts to revitalise economic through measures such as the privatisation of services, cutback on government subsidies, which led to inflation and the worsening of poverty.

³ In 2006 the government introduced ‘bearer cheques’ in a bid to ease the cash crisis that had plagued the country since the 2003 hyperinflationary period.

higher denominations echoed the unprecedented economic turmoil experienced by the country a decade earlier. Prior to this *Operation Murambatsvina*, slighted informal livelihood opportunities of nearly one million urban dwellers in 2005 (Tibaijuka, 2005). While the idea behind the clean-up campaign was 'logical', it destabilised informal income generating activities for urban dwellers. The ensuing *Operation Garirkai* made futile attempts, if any, to re-build the livelihoods of affected households (Tibaijuka, 2005). According to Potts (2011) uprooting urban livelihoods in the hope of transposing them to rural areas was a direct challenge to informality. Urban agriculture (UA) was not immune to this exercise as it is regarded as an informal practice (Taru and Basure, 2013). Such concerns are unswervingly expressed in the concept of the *Right to The City* (RTTC), which is explored fully in Section 1.5 and Chapter 2.

Urban and Peri-urban Agriculture has been advanced as being critical to buttressing household food security by increasing food supply, adding to dietary diversity, reducing the amount households spend on food and earning an income (Lwasa and Dubbeling, 2015). As a result, UPA is increasingly becoming a key survival strategy of the urban poor in Zimbabwe. While households have engaged in the practice since the establishment of colonial centres (Mbiba, 1995), some scholars have attached the economy's poor performance to its intensification and growing importance (Kutiwa et al., 2010, Taru and Basure, 2013). More than two decades ago urban cultivation was practiced by two thirds of the urban poor in Harare (Bowyer-Bower and Drakakis-Smith, 1996). The contracting of the formal economy over the past decades has resulted in soaring unemployment rates which was pegged at 85% in 2014 (Rusvingo, 2015). On the contrary, Zimbabwe National Statistics Agency (ZimStat) records a highly conservative unemployment rate which is below 12% ZimStat (2015). While one may argue that temporal difference may account for the marked variance, Zimbabwe's employment sector has not experienced notable growth for decades. In fact, Zivanomoyo and Mukoka (2015) provide evidence of a negative correlation between unemployment and economic growth for the past four decades. In a study on the food security in Harare almost half of the urban dwellers (43%) in Mabvuku, Tafara and Dzivarasekwa who participated in the survey were unemployed. Of these, more than two thirds were despondent and had stopped seeking formal employment (Tawodzera et al., 2012b). If borne recurrently, unemployment expresses itself through multiple forms of poverty. Making UPA one of the options available for the urban poor, more so, those with no sustainable means of earning an income.

Considering the changes in the urban landscape and increasing failure of the food security approach to address the food needs of the urban poor it is critical to explore the implications of alternative approaches on food security. No studies in Zimbabwe, to date have examined the application of food sovereignty among urban farmer. Thus, the proposed study focused on a) identifying the food

production practices of households in Harare and; b) assessing the extent to which Food Sovereignty Framework (FSF) is applicable to the practices of urban farmers. Having presented the contextual frame, the following section explains why the food sovereignty approach and UPA warrant more recognition in the food security field.

1.2 Problem statement

Africa south of the Sahara harbours a hungry population. Regionally, Zimbabwe is home to a large proportion of this population (Rukuni, 2006). While poverty remains largely rural, there is evidence that it is gaining traction more rapidly in urban spaces because of natural growth (Mbiba, 2017). Despite evidence of increasing poverty in cities over the past few decades, food security initiatives and policies remain rural centred (Crush and Frayne, 2010, Padgham et al., 2015). In a national poverty assessment survey in 2003, the GoZ established that the poverty rate in urban areas was 23% higher than rural areas. In a more recent example, ZimStat also demonstrated the vulnerability of urban households. ZimStat (2013b). As the financial, food and fuel ‘crises’ mount, characterised by increasing food imports (Masvaure, 2016, WFP, 2014b) and quests for food aid (OCHA, 2016) the ‘masking’ of urban poverty amplifies the struggles experienced by urban households in addressing their consumptive needs.

More problematic is the fact that the informal sector, pegged at approximately 90% continues to grow (Jones, 2010) and legislative instruments to address it are non-existent (WFP, 2014b). This is potent, particularly for households attempting to optimise food security in adverse socio-economic and climatic conditions. Structural socio-economic barriers which translate to low purchasing power and the effects of climate change have a potent significance on food insecurity. This means that low-income households in Harare, who make up 41% of the country’s urban dwellers are increasingly faced with this immediate challenge (ZimStat, 2013a). Prior to 2013, Zimbabwe had no policy on food security and climate change. The recently launched Food and Nutrition Security Policy published by the Food and Nutrition Council (FNC) and National Climate Policy makes no explicit reference to UPA (Food and Nutrition Council, 2012, Government of Zimbabwe, 2017). For Jayne et al. (2006) the lack food security policies in cities is one of the factors that has contributed to food insecurity. While strides have been made in terms of recognising UPA in Zimbabwe, an explicit policy on UPA is non-existent (Kutiwa et al., 2010, Masvaure, 2016).

Of note is that on the African continent, Zimbabwe stands out as one of the countries whose maize production is deteriorating. Such revelations prompt alternative thinking. Persistently addressing global food security (Godfray et al., 2010) through conventional methods is dogmatic. As demonstrated in

Chapter 6, the conventional approach to food security has failed to address this problem (Wittman, 2010). Yet, the food production in Zimbabwe is shaped by its approach to provisioning. The GoZ ratifies its obligation to provide food for its people through Section 77b of its constitution (Government of Zimbabwe, 2013). However, the section also highlights that provision is conditioned by availability. Rightly so, statutory capabilities as highlighted earlier have been deteriorating rapidly. Section 15 which focuses on Food Security is couched under 'Right to Work'. This section points to the idea that the state is obligated to promote citizens to control their food systems, which is a key tenet of the FSF. What remains unclear is whether the systems and processes that surround UPA promote food sovereignty.

Thus, the study attempts to address two caveats. Firstly, there is a dearth of studies that focus on the urban dynamic of food security in Harare, those that do, overlook the importance of interrogating the wider political issues in which food provisioning is framed. Colonial based assumptions in UPA, particularly off-plot cultivation continue to spurn the practice, rendering it 'invisible' (Crush and Frayne, 2010). Secondly, the food sovereignty approach, whose principles uphold the practice of UPA remains in its embryonic stages at the regional level. Discussions on its use in the Zimbabwean urban context are non-existent to the author's knowledge. In *The Wretched of the Earth* (a book on transformative nature of decolonisation in the Algerian-French revolution) Fanon et al. (1963) argued that omitting the most vulnerable violates the basic fundamentals of democracy. Thus, the study's line of enquiry explores issues of power and agency as they relate to food production practices in Mabvuku, Hatcliffe Extension (high density areas) and Epworth, Ushewokunze (peri-urban areas) in Harare.

1.3 Rationale and intended scientific contribution

Large scale maize production in Zimbabwe has been deteriorating (Rukuni, 2006, Martens, 2012). In the context of the country's current economic climate, food has increasingly become a commodity that favours those with sufficient purchasing power. While the study does not dismiss the importance of conventional agriculture, evidence has shown that in times of market stress, it falls short (Godfray et al., 2010, Holt-Giménez et al., 2012). Drawing on the episodes of crises experienced by Zimbabweans over the past decades, it is not surprising that regionally, the country ranks second in terms of UPA practice (Crush and Frayne, 2014). It is, therefore, critical to assess how a re-thinking of current food provisioning applies to the household context, given increasing vulnerability of the urban poor to food insecurity. Focus on self-production locates the household level as "the epi-centre of food democracy" (Booth and Coveney, 2015) locate self-production provides a fundamental lens through which in-depth understanding of the extensive elements that fuel urban food insecurity can be gained. The rationale for focusing on agronomic and horticultural crops is that they form part of the staple diet of Zimbabweans.

Further, vegetables “can be grown in small spaces with minimal resource application” (Keatinge et al., 2011) providing a fresh supply of relish perennially.

Climate change has major implications on food production and is one of the pivotal principles of the FSF. Focusing on food sovereignty is critical because it allows for a re-thinking of food production issues by not only an exploration of power dynamics in agricultural spaces but ensuring that practice has a minimal negative impact on the environment. Specifically, the principles of the framework focus on: who defines their food system, how food is produced, how farmers articulate the impact of climate change and the power dynamics of different stakeholders in UPA. Such complex questions append potent significance in a three-pronged crisis (food, socio-economic and climatic) by offering a critical approach towards food provisioning for the urban poor. Naturally, these questions are informed by diverse disciplines under the ambits of agroecology, economics and social sciences

Also, the complexity of food security issues warrants a multidimensional approach to both data collection and analysis. Employing a mixed method approach to the complex issue of urban food security will increase the likelihood of yielding significant results (Creswell et al., 2011). Informed by the FSF’s emphasis on the actor-oriented approach, the study is shaped by the perceptions of urban farmers. By so doing, overall insight on the significance of UPA and the extent to which urban farmers control food production amid structural challenges such as insecure land tenure and high unemployment can be gained. These structural factors expose them to episodes of hunger, which are likely to impinge on their ability to enhance household food security through self-production. The quantitative arm of the study provides an extensive breadth of household food security. Drawing on the proximate elements of UPA practices, experiences and perceptions of urban farmers the study aims to reinforce empirical evidence in the distinct fields of UPA and food sovereignty.

This thesis offers three scientific contributions to scholarship and practice. Literature on UPA in Zimbabwe is scarce and follows the conventional approach to food production by framing its analysis using the food security approach. Secondly, while there is traction in embracing traditional/localised perceptions of climate change; there is a dearth of studies on the urban dynamic. Lastly, thus far, no studies to the author’s knowledge exist in Zimbabwe, which seek to establish the use of an alternative to the food security approach. By moving beyond a rudimentary understanding of food security issues, the findings of the study have the potential to contribute to literature on the food sovereignty discourse in low-income urban contexts (Windfuhr and Jonsén, 2005). Food sovereignty which is in its embryonic stages globally, seldom appears in literature in Zimbabwe. As discussed above, UPA contribution to

the livelihoods of urban households has been widely documented, however, the path taken to attain food security has been a central to global debates.

By attempting to understand the agricultural practices of farmers in Harare, the intention of this study is not to suggest that food sovereignty will pull poor households out of poverty. Rather, the study attempts to establish the whether principles of the FSF are mirrored in the agricultural practices of the urban farmers in Harare and how this impacts household food security. Such an appraisal is well-merited given the urbanisation forecasts, increasing poverty and the uncertainties of climate change (Beddington et al., 2012, De Schutter and Vanloqueren, 2011). Aptly, the thesis' scientific contribution rests in its potential to invoke cross-cutting discussions among 'farmers', stakeholders and policy makers to refine or re-define approaches aimed at enhancing food security.

1.4 Objectives and brief methodological reflection

The study sought to establish the use of the food sovereignty approach among urban farmers in Harare. For this purpose, explanatory sequential design consisting of two phases; a) quantitative using a survey ensued by b) qualitative using focus group discussions and key informant interviews between June and July 2017. These instruments were framed using specific objectives. Concurrently, manuscripts forming individual chapters of this thesis respond to the following objectives;

1. To examine the contribution UPA to food nutrition and security among urban poor households in Harare. (*Chapter 3 and 6*)
2. To identify the crop and vegetable production practices employed by UPA households in Harare. (*Chapter 3 and 5*)
3. To critically assess the degree to which institutional arrangements support the practice of UPA and mediate challenges faced by farmers. (*Chapter 4*)
4. To map the perceptions of urban farmers on the impact of climate change on crop and vegetable production and their application of agroecological practices to their food systems. (*Chapter 5*)
5. To assess the extent to which the identified agricultural practices lend themselves to the food sovereignty paradigm. (*Chapter 6*)

To ensure that the objectives were adequately addressed, they were broken down into the following research questions;

1. Why are urban residents in Harare involved in UPA and how do they address challenges to maintaining food security and nutrition?
2. What are the types of crop and vegetable production practices do urban farmers apply?
3. What legislative mechanisms and processes have been put in place to govern UPA?
4. To what extent do the institutional arrangements address challenges experienced by urban farmers?
5. How urban farmers in Harare articulate their relationship (power dynamics) with stakeholders?
6. Do the existing policy arrangements consider the urban dynamic?
7. What is the state of knowledge among households practising UPA regarding the effects of climate change on their agricultural productivity?
8. What barriers to climate change adaptation do urban farmers experience?
9. To what extent do the agricultural practices of urban farmers reflect principles of food sovereignty?

To address these objectives and research questions, a two-phase data collection procedure using a mixed methods approach was adopted. The multidimensionality of the research design allows for a panoptic approach to problems. Mixed methods research involves merging quantitative and qualitative components in one study (Creswell and Clark, 2011). A survey, Focus Group Discussions (FGDs) and Key Informant Interviews (KII's) and participant observation were the primary methods of data collection. Triangulation using diverse methods enhanced the reliability of the study. Conforming to the objectives and research questions, the study is guided by the pragmatist paradigm which is oriented towards an applied-centred approach to problems (Shannon-Baker, 2016). The unit of analysis for the study were urban farmers residing in four residential areas in Harare. Divergent areas, Mabvuku, Hatcliffe Extension (high density areas), Epworth and Ushewokunze (peri-urban areas) were selected.

Multi-phase sampling was employed. Based on the choice of research methods employed, both probability and non-probability sampling was used to draw participants. Stratified systematic sampling method was employed in the first phase. In the second phase, stratified random sampling was used to obtain members for the focus group discussion. Purposive sampling was used to identify 'experts' who are knowledgeable on the subject matter (Palinkas et al., 2015). The rationale for using this sampling strategy is that it enhances accurate representation across all sites i.e. it increases the external validity of the study (Levy and Lemeshow, 2013).

A sample size of 384 was determined using Krejcie and Morgan's table at a level of confidence of 95% and a margin of error of 0.05% (Krejcie and Morgan, 1970). The calculation is presented below:

$$S = \frac{X^2 NP(1 - P)}{d^2(N - 1) + X^2 P(1 - P)}$$

S = required sample size

X^2 = A constant value of 3.841 (the square of the Z value of 1.96 for 95% confidence level)

N = Population size

P = Population proportion (assumed to be 0.5 since this would provide the maximum sample size)

d = the degree of accuracy expressed as a proportion (.05)

However, to account for non-responses 100 urban farmers per from each study site were sampled. Statistical Package for the Social Science (SPSS) version 24 was employed to facilitate the analysis of the quantitative strand of the data using Chi square, Spearman's correlation, ordinal and multinomial regression models. Geographic (urban and peri-urban) or temporal (old and new settlements) variation in terms of food security status were computed using the Chi square test. NVivo 12 was used to organise and systematically cross-examine qualitative data. Explanatory variables were analysed against six principles of the FSF using logistic regression models.

In observing ethical protocol, the researcher sought permission from the gatekeepers who included; Agricultural Research Council (ARC) who regulate access in agricultural research in Zimbabwe, The Ministry of Local Government, Public Works and National Housing, City of Harare, Environmental Management Authority (EMA) and councillors in all the study sites (Seidman, 2013). Thereafter, the researcher identified participants and sought their permission to participate. Upon verbal approval, participants signed an informed consent form which consisted of a) a description of the study, its purpose and underscore the voluntary nature of the study b) how participants will not be harmed as a result of their participation in the study. c) assurance that reported data (both verbal and written form) is kept confidential and anonymity of the participants will be maintained (Miller et al., 2012).

1.6 Methodological framework

As demonstrated in by the works of Economist, Amartya Sen, availability does not guarantee access. The concept of 'entitlements' Sen (1981), shows how power⁴ significantly affects access to food. Paradoxically, the multi-dimensionality of the concept of food security, does not match its approach to

⁴ Power here is defined as capabilities and access to land, capital and social networks

food questions. The conventional food security approach, which has been dominant world over does not explore questions of power as it relates to food (Schanbacher, 2010). As illustrated in Fig. 1 this approach rests on four pillars (availability, access, utilisation, and stability) which should be addressed concurrently to achieve food security (Hwalla et al., 2016). This alludes to the importance of agency in issues of food provisioning.

Agency has relevance to this study as an element within the FSF. Principle 2 of the framework emphasises agrarian reform by promoting the agency of farmers to control their productive and consumptive practices. Principle 5 underscores agency of farmers in knowledge production (Windfuhr and Jonsén, 2005). It emphasises building knowledge and skills and sustainable food production. The remaining 3 principles⁵ embedded in the framework include:

- 1) Recognition of food as a right-emphasis placed on sufficient and nutritional adequacy food for all
- 4) Places locals at the centre of decision-making and
- 6) Protecting natural resources; works with nature by employing resources and techniques that are sustainable and environmentally friendly.

Space is socially produced through the triad of “the physical”, “the conceived” and the “lived” (Fig 1.2). The physical dimension denotes visible, solid objects, e.g. land; conventional conceptions and ideas crafted by experts to alter these spaces are associated with the conceived dimension; the lived dimension represents people who live and have the potential to re-claim and re-produce spaces to suit their livelihoods (Lefebvre, 1991). The fixation on ‘the urban’ has however been critiqued on the grounds that it disregards rural spaces (Merrifield, 2006) as. Admittedly, this critique is accurate, however it further denigrates ‘the urban’, whose coverage remains inadequate (Brown, 2001). Right to the City provides a platform to examine the ‘hidden’ urban food crisis. The growing magnitude of urban poverty (Manjengwa et al., 2016) and food insecurity (Tawodzera et al., 2012b) make RTTC an ideal tool to understand how farmers in Harare and relevant stakeholders can jointly confront urban challenges.

⁵Five out of the six principles of the framework were filtered based on relevance. The fourth principle relates to the reorganisation of food trade which has no is a national policy concern. Thus, it has no direct relevance to the objectives of this thesis.

The study augments RTTC with food sovereignty based their critical connotations on issues of food and space. The intersection of the two is a suitable analytical lens because a) it reinforces the scope of the study by exploring the production of food and knowledge within the tripod of the spaces that farmers operate. *Right to the City* augments common strands in FSF and extends understanding of how households appropriate and control spaces of production to augment household food security. c) it provides a platform for a critical reflection on the pathway to sustainable urban food security. Pivotal, here is the interplay between food production and environmental concerns such as climate change. Beyond this, control of the nutritive aspect of their diets is central to the scientific discipline and practice of agroecology. As argued by Altieri (2004) agroecology and food sovereignty oriented practices look beyond the scientific and traditional divide and purposefully merger the two to create a food system. This pragmatic approach, informs the methodological approach. d) it reproaches the use of conventional/ dogmatic approaches to problems to phenomena (Lefebvre and Enders, 1976, Wittman, 2011). It thus, validates rationale for adopting the mixed methods approach, which adopts a multi-pronged and practical approach to problems (Mertens, 2017).

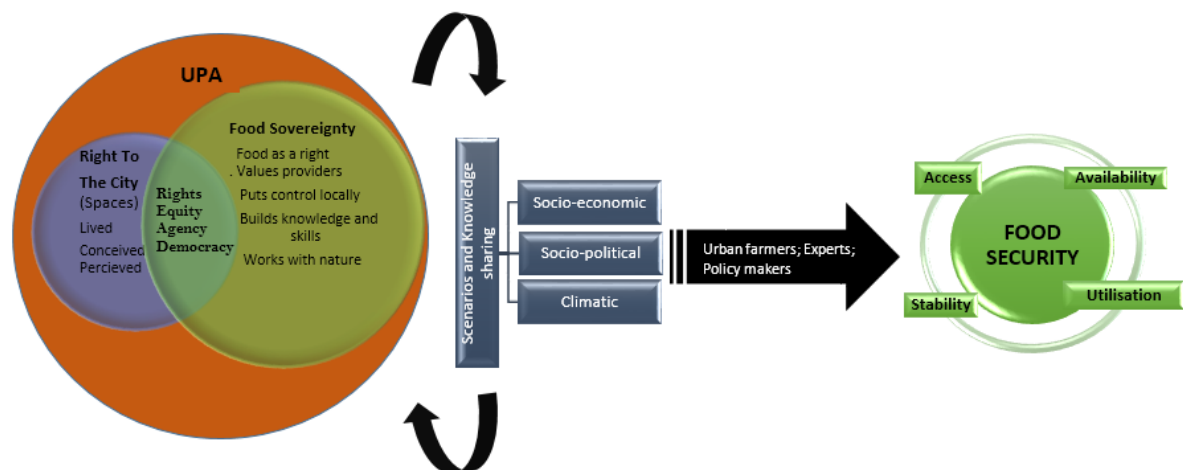


Figure 1. 2 Conceptualising an alternative pathway
Source: Author

Established by rural peasants, food sovereignty gained global coverage through the movement La Via Campesina (Altieri and Toledo, 2011, Patel, 2009). Framed by the voices of farmers, the framework is grounded on self-production that relies on “uses local resources, ecological practices, and traditional knowledge” (Peña, 2013). It was borne out of the need by small-scale farmers to regain control of their food systems by redressing a concerted formation favouring conventional agriculture (Patel, 2009). As highlighted earlier, food sovereignty is holistic in its approach to issues of food and incorporates urban landscapes as well. As illustrated in Fig 1.2, it couches itself in the lived experiences (socio-economic, socio-political and environmental spheres) of citizens. Further, its antagonism towards top-down

approaches characterised by conventional means of production is expressed in its support for ‘horizontal’ production of knowledge (Altieri and Toledo, 2011) as it relates to food security.

1.5 Synopsis of the thesis

This thesis is presented in seven chapters. The preceding chapter contextualised UPA within the ambit of food sovereignty in developing countries. Explicitly, it unearths power dynamics embedded in food provisioning, the implications of climate change and how it affects food security in urban spaces. By weaving strands that endorse the Food Sovereignty Framework and the Right to the City, the chapter explored constructs, proffered to enhance household food security. The framework offers a lens through which subsequent chapters are distilled.

Chapter two critically engages discourses on urban critical theory, political economy agroecology and food sovereignty. The chapter addresses issues central to agricultural practices and experiences of urban households and whether these resonate with the concept of food sovereignty. By so doing, the chapter creates the parameters that frame the significance of the research, methodology and findings. The ensuing three chapters (3, 4, 5 and 6) are manuscripts, which have been submitted for publication⁶.

Chapter 3 casts an in-depth analysis on of the association between UPA, household dietary diversity HDD and Food Sovereignty. This chapter raises fundamental questions on significance of the practice on household nutrition. The relational character of food and disciplinary myopia of ‘the urban’ is explored in Chapter 4. It underscores and endorses the potency of urban critical theory, political economy which foreground Henri Lefebvre’s RTTC. This chapter adapts Lefebvre’s theoretical construction of the production of space as a tool to unearth systemic elements (institutional, biophysical and social dynamics) as they relate to urban food production. The chapter offers a way to categorize cities according to the constraints they pose/degree of support they offer to urban farmers and urban farming. Responses to these constraints are discussed in Chapter 4.

Chapter 5 explores linkages of UPA, local perceptions of climate change and its impact on crop and vegetable production. Exploring perceived changes in rainfall and temperatures by urban farmers and resultant responses to these provides an in-depth understanding of agency and control. Drawing an

⁶ The papers are at various phases of acceptance.

analysis on the UPA and food sovereignty nexus Chapter 6 is centred on understanding whether food sovereignty principles are reflected in the practices of urban farmers. It illuminates the contrasting global debate on the ‘correct’ pathway to food security and establishes the importance of food sovereignty. A comprehensive consideration of questions reviewed in Chapter 3, 4 and 5 is assimilated into the chapter.

Chapter 7 draws a conclusion to the thesis by gleaning the main findings and cements the need to explore the potential of UPA shaped by principles of food sovereignty. Prospective lines of enquiry that reinforce the field are also offered in this chapter.

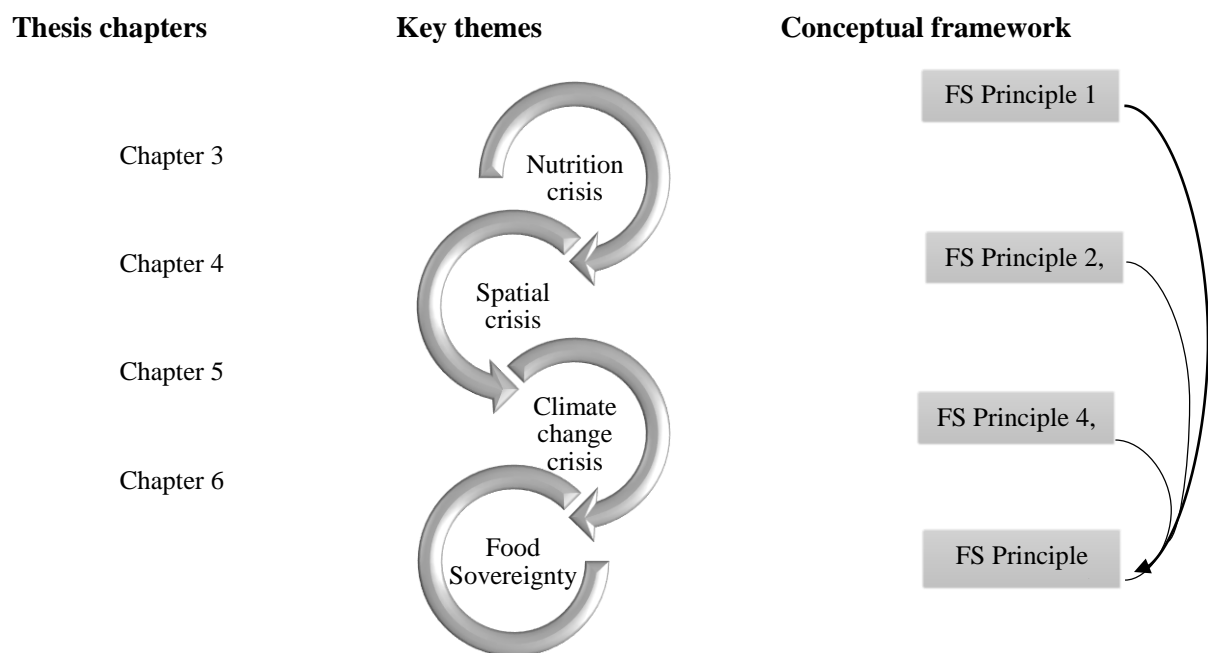


Figure 1. 3 Visual depiction of the thesis structure
Source: Author

References

- ALTIERI, M. A. 2004. Linking ecologists and traditional farmers in the search for sustainable agriculture. *Frontiers in Ecology and the Environment*, 2, 35-42.
- ALTIERI, M. A. & TOLEDO, V. M. 2011. The agroecological revolution in Latin America: rescuing nature, ensuring food sovereignty and empowering peasants. *Journal of Peasant Studies*, 38, 587-612.
- BEDDINGTON, J. R., ASADUZZAMAN, M., FERNANDEZ, A., CLARK, M., GUILLOU, M., JAHN, M., ERDA, L., MAMO, T., BO, N. & NOBRE, C. A. 2012. Achieving food security in the face of climate change: Final report from the Commission on Sustainable Agriculture and Climate Change: Final report from the Commission on Sustainable Agriculture and Climate Change. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).
- BOOTH, S. & COVENEY, J. 2015. *Food democracy: From consumer to food citizen*, Singapore, Springer.
- BOWYER-BOWER, T. & DRAKAKIS-SMITH, D. 1996. The needs of the urban poor versus environmental conservation: conflict in urban agriculture, Final Report of ODA Project R5946. London: Overseas Development Administration.
- BROWN, A. 2001. Cities for the urban poor in Zimbabwe: urban space as a resource for sustainable development. *Development in Practice*, 11, 319-331.
- CARNEY, M. 2016. " Food Security" and " Food Sovereignty": What Frameworks Are Best Suited for Social Equity in Food Systems? *Journal of Agriculture, Food Systems, and Community Development*, 2, 71-87.
- CRESWELL, J. W. & CLARK, V. L. P. 2011. *Designing and Conducting Mixed Methods Research*, Carlifonia, USA, Thousand Oaks.
- CRESWELL, J. W., KLASSEN, A. C., PLANO CLARK, V. L. & SMITH, K. C. 2011. Best practices for mixed methods research in the health sciences. *Bethesda (Maryland): National Institutes of Health*, 2094-2103.
- CRUSH, J. & FRAYNE, B. 2010. *The invisible crisis: urban food security in Southern Africa*, Cape Town, Unity Press.
- CRUSH, J. & FRAYNE, B. 2014. Feeding African cities: The growing challenge of urban food insecurity. *Africa's urban revolution*, 120-132.
- DE SCHUTTER, O. & VANLOQUEREN, G. 2011. The new green revolution: how twenty-first-century science can feed the world. *Solutions*, 2, 33-44.
- DUBBELING, M. & DE ZEEUW, H. 2011. Urban Agriculture and climate change adaptation: ensuring food security through adaptation. *Resilient Cities*. Springer.
- EHLERT, J. & VOßEMER, C. 2015. Food sovereignty and conceptualization of agency: A methodological discussion. *Austrian Journal of South-East Asian Studies*, 8, 7-26.
- FANON, F., SARTRE, J.-P. & FARRINGTON, C. 1963. *The wretched of the earth*, New York, USA, Grove Press.
- FOOD AND NUTRITION COUNCIL. 2012. The Food and Nutrition Security Policy for Zimbabwe: Promoting Food and Nutrition Security in Zimbabwe in the Context of Economic Growth and Development. Available: <https://extranet.who.int/nutrition/gina/en/node/14829> [Accessed 9 February 2017].
- GARCIA, D. 2008. The climate security divide: bridging human and national security in Africa: feature. *African Security Review*, 17, 2-17.
- GODFRAY, H. C. J., BEDDINGTON, J. R., CRUTE, I. R., HADDAD, L., LAWRENCE, D., MUIR, J. F., PRETTY, J., ROBINSON, S., THOMAS, S. M. & TOULMIN, C. 2010. Food security: the challenge of feeding 9 billion people. *Science*, 327, 812-818.
- GOVERNMENT OF ZIMBABWE 2013. Constitution of Zimbabwe Amendment (Number 20) Act. Harare, Zimbabwe: Government Printers.
- GOVERNMENT OF ZIMBABWE 2017. National Climate Policy. In: MINISTRY OF ENVIRONMENT, W. A. C. (ed.). Harare, Zimbabwe Government Printers.

- HECKELMAN, A. & WITTMAN, H. 2015. Food sovereignty: A framework for assessing agrarian responses to climate change in the Philippines. *Austrian Journal of South-East Asian Studies*, 8, 87-94.
- HEINEMANN, E., PRATO, B. & SHEPHERD, A. 2011. Rural Poverty Report 2011. *International Fund for Agricultural Development (IFAD)*. Rome, Italy: IFAD.
- HOLT-GIMÉNEZ, E. & ALTIERI, M. A. 2013. Agroecology, food sovereignty, and the new green revolution. *Agroecology and sustainable Food systems*, 37, 90-102.
- HOLT-GIMÉNEZ, E., SHATTUCK, A., ALTIERI, M., HERREN, H. & GLIESSMAN, S. 2012. We already grow enough food for 10 billion people... and still can't end hunger. *Journal of Sustainable Agriculture*, 595-598. .
- HWALLA, N., EL LABBAN, S. & BAHN, R. A. 2016. Nutrition security is an integral component of food security. *Frontiers in Life Science*, 9, 167-172.
- JAYNE, T., CHISVO, M., RUKUNI, M. & MASANGANISE, P. 2006. Zimbabwe's food insecurity paradox: hunger amid potential. In: RUKUNI, M., TAWONEZVI, P., EICHER, C., MUNYUKI-HUNGWE, M. & MATONDI, P. (eds.) *Zimbabwe's agricultural revolution revisited* Harare: University of Zimbabwe (UZ) Publications.
- JOHNSON, K. & BREIL, M. 2012. Conceptualizing Urban Adaptation to Climate Change Findings from an Applied Adaptation Assessment Framework. Fondazione Eni Enrico Mattei.
- JONES, J. L. 2010. Nothing is straight in Zimbabwe – The rise of the kukiya-kiya economy, 2000–2008. *Journal of Southern African Studies*, 36, 285–299.
- KEATINGE, J., YANG, R.-Y., HUGHES, J. D. A., EASDOWN, W. & HOLMER, R. 2011. The importance of vegetables in ensuring both food and nutritional security in attainment of the Millennium Development Goals. *Food Security*, 3, 491-501.
- KREJCIE, R. V. & MORGAN, D. W. 1970. Determining sample size for research activities. *Educational and Psychological Measurement*, 30, 607-610.
- KUTIWA, S., BOON, E. & DEVUYST, D. 2010. Urban agriculture in low income households of Harare: an adaptive response to economic crisis. *Journal of Human Ecology*, 32, 85-96.
- LA VIA CAMPESINA 2007. Nyéléni declaration. Sélingué, Mali: Forum for Food Sovereignty. *Declaration of the Forum for Food Sovereignty*. Selingue, Mali.
- LAL, R. 2013. Food security in a changing climate. *Ecohydrology & Hydrobiology*, 13, 8-21.
- LEFEBVRE, H. 1991. *The Production of Space*, Oxford, United Kingdom, Blackwell.
- LEFEBVRE, H. & ENDERS, M. J. 1976. Reflections on the politics of space. *Antipode*, 8, 30-37.
- LEVY, P. S. & LEMESHOW, S. 2013. *Sampling of populations: methods and applications*, New York, John Wiley & Sons.
- LWASA, S. & DUBBELING, M. 2015. Urban Agriculture and Climate Change In: DE ZEEUW, H. & DRESCHER, P. (eds.) *Cities and Agriculture: Developing Resilient Urban Food Systems*. London: Routledge.
- MANJENGWA, J., MATEMA, C. & TIRIVANHU, D. 2016. Understanding urban poverty in two high-density suburbs of Harare, Zimbabwe. *Development Southern Africa*, 33, 23-38.
- MARTENS, J. 2012. How Zimbabwe lost its food sovereignty and food security. Rosa Luxemburg Stiftung. Available: www.rosalux.co.za/wp-content/uploads/2012/09/2012-Zimbabwe-SD-012012.pdf.
- MASVAURE, S. 2016. Coping with food poverty in cities: The case of urban agriculture in Glen Norah Township in Harare. *Renewable Agriculture and Food Systems*, 31, 202-213.
- MBIBA, B. 1995. *Urban Agriculture in Zimbabwe: The Implications for Urban Management, Urban Economy, the Environment, Poverty and Gender* Vermont, USA, Ashgate Publishing Co.
- MBIBA, B. 2017. Missing urbanisation in Zimbabwe on the periphery. *Africa Research Institute Counterpoints*. London.: Africa Research Institute.
- MERRIFIELD, A. 2006. *Henri Lefebvre: A critical introduction*, Taylor & Francis.
- MERTENS, D. M. 2017. *Mixed methods design in evaluation*, Sage Publications.
- MILLER, T., BIRCH, M., MAUTHNER, M. & JESSOP, J. 2012. *Ethics in Qualitative Research*, Sage.
- MOYO, S. 2011. Changing agrarian relations after redistributive land reform in Zimbabwe. *Journal of Peasant Studies*, 38, 939-966.
- NDEDZU, D., MACHEKA, A., ITHIEL, M. M. & ZIVENGWA, T. 2013. Revenue productivity of Zimbabwe's tax system. *Asian Journal of Social Sciences & Humanities*, 2, 144-156.

- NOKO, J. 2011. Dollarization: the case of Zimbabwe. *Cato J.*, 31, 339.
- OCHA. 2016. Humanitarian Needs Overview. Available: <https://www.humanitarianresponse.info/en/operations/zimbabwe/document/zimbabwe-humanitarian-needs-overview-2016>.
- PADGHAM, J., JABBOUR, J. & DIETRICH, K. 2015. Managing change and building resilience: A multi-stressor analysis of urban and peri-urban agriculture in Africa and Asia. *Urban Climate*, 12, 183-204.
- PALINKAS, L. A., HORWITZ, S. M., GREEN, C. A., WISDOM, J. P., DUAN, N. & HOAGWOOD, K. 2015. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42, 533-544.
- PATEL, R. 2009. Food sovereignty. *The Journal of Peasant Studies*, 36, 663-706.
- PEÑA, K. 2013. Institutionalizing food sovereignty in Ecuador. *Food Sovereignty: A Critical Dialogue, International Conference 14-15 September*. Yale University, USA.
- PIETERSE, E. & PARNELL, S. 2014. *Africa's Urban Revolution* London, Zed Books Ltd.
- POTTS, D. 2011. Making a livelihood in (and beyond) the African city: the experience of Zimbabwe. *Africa*, 81, 588-605.
- POTTS, D. 2013. Urban livelihoods and urbanization trends in Africa: winners and losers. *Environment, politics and development working paper series*, 57.
- PRETTY, J. 2008. Agricultural sustainability: concepts, principles and evidence. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 363, 447-465.
- PRICOPE, N. G., HUSAK, G., LOPEZ-CARR, D., FUNK, C. & MICHAELSEN, J. 2013. The climate-population nexus in the East African Horn: Emerging degradation trends in rangeland and pastoral livelihood zones. *Global environmental change*, 23, 1525-1541.
- RAY, D. K., MUELLER, N. D., WEST, P. C. & FOLEY, J. A. 2013. Yield trends are insufficient to double global crop production by 2050. *PloS one*, 8, 1-7.
- RUKUNI, M. 2006. Revisiting Zimbabwe's agricultural revolution. In: RUKUNI, M., TAWONEZVI, P., EICHER, C., MUNYUKI-HUNGWE, M. & MATONDI, P. (eds.) *Zimbabwe's agricultural revolution revisited*. Harare: University of Zimbabwe (UZ) Publications.
- RUKUNI, M. 2018. Land reform in Zimbabwe: Dimensions of a reformed land structure. In: BOWYER-BOWER, T. & COLIN STONEMAN, C. (eds.) *Land reform in Zimbabwe: constraints and prospects*. London: Routledge.
- SATTERTHWAITE, D. 2004. The under-estimation of urban poverty in low and middle-income nations, IIED, London, 71 pages. *Human Settlements Poverty Reduction in Urban Areas Series*. International Institute for Environment and Development (IIED).
- SCHANBACHER, W. D. 2010. *The politics of food: The global conflict between food security and food sovereignty*, ABC-CLIO.
- SEIDMAN, I. 2013. *Interviewing as qualitative research: A guide for researchers in education and the social sciences*, Teachers college press.
- SEN, A. 1981. *Poverty and Famines: An Essay on Entitlement and Deprivation*, Oxford, Clarendon Press.
- SHANNON-BAKER, P. 2016. Making paradigms meaningful in mixed methods research. *Journal of Mixed Methods Research*, 10, 319-334.
- STOCKER, T. 2014. *Climate change 2013: the physical science basis: Working Group I contribution to the Fifth assessment report of the Intergovernmental Panel on Climate Change*, Cambridge University Press.
- TARU, J. & BASURE, H. 2013. Conflicts, contestation and marginalization in urban agriculture: experiences from Kuwadzana Extension, Harare. *Russian Journal of Agricultural and Socio-Economic Sciences*, 18, 15-26.
- TAWODZERA, G., ZANAMWE, L. & CRUSH, J. 2012. The state of food insecurity in Harare, Zimbabwe. Urban Food Security Series No. 13. Queen's University and AFSUN: Kingston and Cape Town.
- TAYLOR, J. R. & LOVELL, S. T. 2012. Mapping public and private spaces of urban agriculture in Chicago through the analysis of high-resolution aerial images in Google Earth. *Landscape and Urban Planning*, 108, 57-70.

- TIBAIJUKA, A. K. 2005. Report of the fact-finding mission to Zimbabwe to assess the scope and impact of Operation Murambatsvina.
- TOMICH, T. P., BRODT, S., FERRIS, H., GALT, R., HORWATH, W. R., KEBREAB, E., LEVEAU, J. H., LIPTZIN, D., LUBELL, M. & MEREL, P. 2011. Agroecology: a review from a global-change perspective. *Annual Review of Environment and Resources*, 36, 193-222.
- UN-HABITAT 2014. The State of African Cities: Re-Imagining Sustainable Urban Transitions.
- UNITED NATIONS 2014. World's Population Increasingly Urban with more than half living in Urban Areas.
- UNITED NATIONS DEVELOPMENT PROGRAMME 2016. Appeal as 4 million in need of humanitarian assistance.
- VON GREBMER, K., SALTZMAN, A., BIROL, E., WIESMAN, D., PRASAI, N., YIN, S., YOHANNES, Y., MENON, P., THOMPSON, J. & SONNTAG, A. 2014. *Synopsis: 2014 Global Hunger Index: The Challenge of Hidden Hunger*, Intl Food Policy Res Inst.
- WFP 2014. Adapting WFP Report 2014.
- WINDFUHR, M. & JONSÉN, J. 2005. *Food sovereignty*.
- WITTMAN, H. 2010. *Food sovereignty: Reconnecting Food, Nature & Community*, Oakland, Food First.
- WITTMAN, H. 2011. Food sovereignty: a new rights framework for food and nature? *Environment and Society*, 2, 87-105.
- ZIMSTAT 2013a. 2012 Population Census Results. Final Report. ZIMSTAT, Harare. Harare: Zimbabwe National Statistics Agency (ZimStat).
- ZIMSTAT 2013b. Poverty and Poverty Datum Line Analysis in Zimbabwe 2011/12. Harare: Zimbabwe National Statistics Agency (ZimStat).
- ZIMSTAT 2015. 2014 Labour Force Survey. Harare: Zimbabwe National Statistics Agency. Harare: Zimbabwe National Statistics Agency (ZimStat).
- ZIVANOMOYO, J. & MUKOKA, S. 2015. An Empirical Analysis of the Impact of Unemployment on Economic Growth in Zimbabwe. *Archives of Business Research*, 3, 38-49.

CHAPTER 2

URBAN AND PERI-URBAN AGRICULTURE, INSTITUTIONAL ARRANGEMENTS AND FOOD SOVEREIGNTY

2. 1 Introduction

This chapter establishes the context of the study's line of enquiry. It critically reviews scholarship on the agronomic and horticultural practices of urban dwellers to explore whether they resonate with principles of the Food Sovereignty Framework. By bridging three bodies of literature: urban critical theory, political economy and agroecology which, when woven together, respond and promote autonomous subsistence production. Food sovereignty has been presented as an alternative and more sustainable approach to enhancing household food security compared to the dominant food security approach. In view of increasing calls for the adoption of food sovereignty, the pivotal element of this review are spaces of urban production. These analysed through an intersection of the Food Sovereignty Framework and The Right to the City, as illustrated in Chapter 1.

Guided by both the research questions and the conceptual framework, this chapter distils themes (highlighted in Chapter 1) which frame the discussion. Six sections emerge from this process. The first section charts the evolution of UPA and its (in)significance⁷ through an examination of literature on urban food (in)security in sub-Saharan Africa. Thereafter, the significance of the practice is discussed together with challenges and constraints faced by farmers. Section four will discuss the production practices. Section five engages the politics of space and how urban farmers shape their livelihoods. Critical questions emerging from this discussion will lead to an assessment of the implications of climate science and its relation to food sovereignty. Collectively, these sections explore whether UPA farming practices espouse principles of food sovereignty and the resultant implications.

2.2 Historical overview of Urban Agriculture

Urban agriculture (UA) predates centuries. The cumulative literatures of (Maxwell and Zziwa, 1992, Pudup, 2008, Glasser, 2017) concur that the practice is not recent. Tracing the development of UA in

⁷ The use of the pre-fix (in) denotes refraining from idealising UPA as a significant practice in all contexts. Results from rigorous scientific enquiry into the food security status of households will determine the use of the prefix

America, Glasser (2017) attributes the presumed ‘newness’ of the practice to how, historically, its literary work has been overlooked. Equally, the ‘invisibility’ of UA has also been reported in developing countries (Crush and Frayne, 2010, Padgham et al., 2015). Concurring with Glasser (2017), Pudup (2008) traces its origins to the Europe, where allotment gardens were set up in peripheral areas of some cities during the 18th century. In response to food scarcity during the Second World War, ‘Victory Gardens’ were established in parks to ensure access to fresh vegetables and fruits by communities.

Similarly, in Africa UA is an archaic practice, which began when colonial towns were established (Maxwell and Zziwa, 1992, Mbiba, 1995, Anyane, 1963). Writing on urban food production in Ghana, Anyane (1963) suggests that the practice, particularly the cultivation of vegetables around fortresses began in the sixteenth century. While contemporary scholars such as Lerner and Eakin (2011) trace its practice in the African context to the 1970s. Mbiba (1995) suggests that UA in Zimbabwe dates as early as 1950 in African townships. Akin to the European context in the late twentieth century, the rise of UPA in Africa has been more prevalent during economic decline where food shortages or scarcity are inclined to exist (Frayne et al., 2014b). Charting the history of the practice in developed and developing countries Bryld (2003) denoted permanence of the practice in the developing countries due to pronounced economic and political challenges. These have had negative implications on the livelihoods of farmers in resource poor contexts. One of the ways households have attempted to address these shortages has been through the production of food in and around cities. Considering the dominance of agriculture in the rural areas, research on UA in Africa only started surfacing after the implementation of Economic Structural Adjustment Programmes (ESAP), thereafter increase in the practices have been recorded (Maxwell et al., 1998).

As discussed in the first chapter there was an influx of Africans into cities after their countries attained independence. This movement led to an increase in the practice in the 1970s and 80s (Bryld, 2003, Maxwell, 1995, Sawio, 1993). Subsequently, food production and supply in ‘newly’ independent countries, however, declined due to financial challenges. Changes in the urban landscape led to an increase in poverty in urban areas; translating to a decline in food production and supply. During this period, rural migrants transposed their rural agricultural practices into urban spaces in response to the changing socio-economic conditions. Patches of gardens in urban spaces played a critical role of enhancing the diets of newly resettled rural migrants. Scholars (Ellis and Sumberg, 1998, Maxwell et al., 1998) drew on three noteworthy phases between the 1970s and 1990s that denote the steep rise in UA in Uganda ranging from the oil crisis in the 1970s to SAPs in the 1990s. The introduction of SAPs in developing countries during 1990s had wide-ranging negative impacts in Sub-Saharan African

countries. These neoliberal economic policy reforms translated to government revoking state support on both goods and service. Consequently, privatisation led to price increases which further entrenched poor households into poverty.

Whilst the rise in UPA cannot be solely attributed to the SAPs, they exacerbated poverty and food shortages. Empirical evidence which concurs there was an increase in UA following the implementation of SAPs is abound. Approximately only a quarter of the population in African cities were engaged in UA in the 1980s, the following decade the percentage nearly trebled to 70% (Bryld, 2003). In Tanzania, studies conducted over a 25-year period (1967-1991), show that UA almost quadrupled from 18% to 67% (Sawio, 1993). Similarly, two thirds of the food consumed by urban households in Harare was obtained from their gardens or plots (Bowyer-Bower and Drakakis-Smith, 1996). This figure corroborates with ENDA-Zimbabwe's examination of remote sensing imagery, which displays a doubled spatial increase in UPA between the 1993-1994 farming season (4822,38 hectares) compared to 1990 (9827,96 hectares) ENDA-Zimbabwe (1994). Having provided a historical account and prevalence of UA, it is useful to provide current evidence of its significance and contribution to household food security in developing countries.

2.2.1 Urban food (in)security in SSA

Urban food security is a key challenge for most households in cities. According to the Food and Agricultural Organisation (FAO) urban landscapes in sub-Saharan Africa rank highly in terms of urban poverty and undernourishment FAO (2012a). Before discussing literature on food (in)security in the region, it is necessary to define the concept of food security. It refers to "a situation where all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life"(FAO, 2014). Returning briefly to the history of UA, the trend has been that there is a gain in momentum on the discourse of food security in periods of food crises. The global financial recession and ensuing increase in fuel and food prices (2007/8) have led to the mushrooming of research on food security (Pieters et al., 2012). Once defined as a rural concern, urbanisation has amplified the visibility of food insecurity in sub-Saharan African (SSA) cities. These developments have increased research interest in urban food security on the continent (Battersby, 2011, Mubvami and Toriro, 2011). A critique developed by Sen (1981) on the dominant of literature citing availability as the key problem can be credited to these

developments. This critique resulted in a profound shift in some of the scholarship from a global, regional and national focus on the local (Sen, 1981).

Food access is one of the critical issues that plagues the African continent (FAO et al., 2013). Cementing the argument by Sen (1981) on the importance of entitlements, the erratic income earning opportunities in the developing countries have heightened home-grown production. It has been conclusively shown that UPA contributes to food security at varying levels (FAO, 2012a). As noted by Hwalla et al. (2016), the concurrent attainment of four vital elements (availability, access, utilisation and stability) embedded in this definition are a precondition for food security. Jones et al. (2013) provides an abstract illustration that simplifies the intricate relationship between these four elements in Fig 2.1. However, most studies on UPA fail to fully acknowledge the importance of all elements (Upton et al., 2016, Hwalla et al., 2016) pointing to definitional complexities. Conversely, food insecurity, as defined by Cabannes (2012) “[...] exists whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain”. As highlighted in Chapter One, access is the most challenging element of food provisioning because even though food may be in abundance, access may prove difficult for some. Access to food involves acquisition in cash or kind. Sen’s ground-breaking investigation into food provisioning challenges, revealed that factors beyond the household’s food production capabilities are fundamental (Sen, 1981). His assertion is grounded on the fact that the dearth in food is also a product of market failures related to irregularities in food supply.

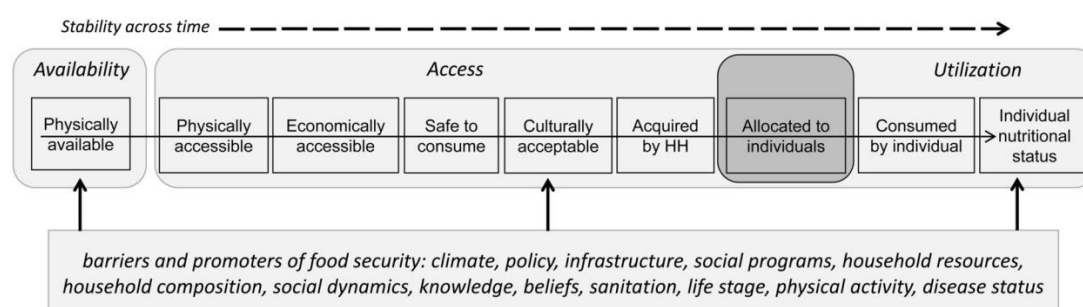


Figure 2. 1 Linking food security to availability, access, utilisation and stability
Source: Jones et al. (2013)

Consequently, a generally accepted measurement of food security is lacking. Notwithstanding the universal and heightened focus on food security at the global level there is uncertainty over its components and how to calculate them (Pieters et al., 2012). The multidimensionality of the concept (Headey and Fan, 2008, Jones et al., 2013) explains the varied formulations of measuring food security. Further, Upton et al. (2016) point out that existing measures, lack accuracy due to their single or dual dimensionality where data is confined by ‘self-reporting, recall periods, and proxy reporting’. In a bid

to remedy the lack of rigour in studies measuring food insecurity, Upton et al, formulated a scientific and pragmatic approach influenced by the work of Barrett and Constanas (2014) and Cissé and Barrett (2016).

Distinct from existing measures, the following axioms address all dimensions of the food security approach:

- a) By identifying food security at the individual or household level, the measure is agreeable into higher-level groups (social groups, regions, etc.), thereby satisfying the scale axiom.
- b) The approach is explicitly dynamic, thereby satisfying the time axiom.
- c) One can condition the moments of the food security distribution on any of a host of economic, physical and social factors, thereby satisfying the access axiom.
- d) If one uses suitable measures of health or nutritional status as dependent variables, this method satisfies the outcomes axiom.

In an analysis of panel data from 41 countries in SSA, Ogundari and Awokuse (2016) validate their use of availability as tool, based on how it foregrounds other dimensions. In addition to the omission of other dimensions, a methodological drawback of this study is that food availability is used as a proxy for national food consumption. Further, calculations are likely to be biased since consumption and availability are two different dimensions. However, as demonstrated in global literature, food is abundant, the critical issue remains access (Battersby, 2011). This explains why the fixation of food supply, which is captured by the availability dimension has ceased to be a sound argument in discourses related to food provisioning. Drawing on the work of Sen (1981), (Battersby (2011), Crush and Frayne, 2014) point out that disparities in resource allocation in a monetary based economy is the key challenge in the SSA region. In an environment where all transactions are monetary based, food access as opposed to food availability will continue to dominate discussion on food provisioning in cities.

Some studies in the region have focused on access with income as a direct indicator measuring food security (Thornton et al., 2016), in South Africa and Mubvami and Toriro (2011) in Zimbabwe). Income, however is only one dimension of food security (Sen, 1981). Scholars have critiqued such studies as they place emphasis on income at the expense of other equally important variables (Battersby and Crush, 2014, Upton et al., 2016). While financial access is a critical dimension of food security it cannot be used solely to infer food (in)security. Battersby (2012) laments that despite reproaches against its use as an indicator; it is commonly used. She provides examples such as the South African General Household Survey, Income and Expenditure Surveys and other surveys in the region that utilise statistics to deduce food security status. In the Zimbabwean context, hyperinflationary episodes,

resultant cash shortages and high unemployment rates have come to define its landscape over the past decade. As such, the use of income as a direct measure is likely to produce inaccurate outcomes since food insecurity is driven by multiple factors (Tawodzera et al., 2012b).

Four decades after Sen's declaration on the importance of access, most studies on UPA remain myopic in their focus. They pay limited or no attention to the link between access, human rights and food security. For example, Kimani-Murage et al. (2014) and Smart et al. (2015) focus on the vulnerability of poor households to food insecurity in relation to monetary crises and their ripple-effects. Kimani-Murage et al. (2014) used a mixed methods approach to explore the household food security status of informal settlers in Nairobi after the election crisis in 2007/8. Their findings suggest that while food insecurity was typical among households, it was heightened by political instability. Using the Household Food Insecurity Access Scale (HFIAS) the study concluded that a meagre 15% of the households were food secure. Half of the respondents were cited as experiencing chronic food insecurity (Kimani-Murage et al., 2014). Respondents had little regard for the nutritional component of the food they consumed because of poverty. Writing on the impact of the economic meltdown resulting in the closure of copper mines and allied industries in the 1980s, Smart et al. (2015) demonstrate how UA provided sustenance for residents in the Copperbelt. This example shows that, in times of crisis, UA is a lifeline that guarantees practising households an addition to their food supply.

2.2.2 Evidence from Harare

In one of the most methodically conducted regional surveys on the food security status of cities in SSA, African Urban Food Security Network (AFSUN) concluded that food security in Harare was poor. Using four seasoned measures established by the international and employed by the Food and Nutrition Technical Assistance project, this survey offers the most comprehensive and systematic data on food security in sub-Saharan cities. Using AFSUN data Tawodzera et al. (2012b) expand on the brevity of the food crisis in Harare. Taking heed of miscalculations due to rapidly changing inflation rates, the study reinforced income poverty with Afrobarometer's Lived Poverty Index (LPI). The LPI score indicates a strong relationship between poverty and food security. Ninety percent of the households in Mabvuku, Tafara and Dzivarasekwa were food insecure; more than a third of which were severely food insecure. Using the Household Food Insecurity Access Scale (HFIAS) which allocates food security along a continuum of 0 to 27 with 0 indicating food security and 27 indicating severe food insecurity. Harare scored a median of 16 which was the highest among the 11 cities surveyed and a mean of 14.7

only 0.2 points lower than Manzini, Swaziland which also recorded high levels of food insecurity (Tawodzera et al., 2012b).

In a different study based in Epworth, Tawodzera (2012a) explores the coping strategies and resilience of 200 informal settlement dwellers. The study explores households' inventiveness as they take on different forms of employment in the informal sector to address food insecurity. Turning to substantial discontent with the quantification of food security data, Tawodzera et al. (2012b), query both the definition and calculations made in surveys on food security in Harare. In addition to dismissing the claims that household food security is not a grave challenge for the urban poor, they critique claims of improvements in food provisioning in the city between 2003-2006 as stated by Zimbabwe National Vulnerability Assessment Committee (ZimVAC, 2006). Tawodzera et al (2012) renounced these findings on two methodological grounds. Firstly, ZimVAC upscaled its indicators from one in the first study conducted in 2003 to three (Food Poverty Line; caloric intake; dietary diversity) in its 2006 study making a qualified comparison between the studies implausible Tawodzera et al. (2012b). A more systematic study would, as suggested by Hwalla et al. (2016) include all four dimensions of food security and balance out the number of indicators to produce a credible assessment of the food security status of households. Secondly, a drastic decline in the number of food insecure households from 66% to 24% in 2003 and 2006 respectively is questionable given the prevailing weak financial and food provisioning capacities during that period. The deficiency in the measurement system used by ZimVAC to determine the food security status becomes even more apparent in its 2006 survey where a meagre 20% of poor urban households in Harare were food insecure.

By 2009, ZimVAC's third successive report suggested that there was small increase of 10% in the number of food insecure households in the city (Tawodzera et al., 2012b). Notwithstanding differences in measurement and location the reliability of ZimVAC results is questionable. In its fourth study, evaluating urban livelihoods in 2010, ZimVAC (2011) concluded that almost four fifths (87%) of households in high density and peri-urban area were food secure. According to Martens (2012) the economic situation in the country had not improved significantly since 2000. This raises concerns over the reliability of the ZimVAC findings. Moreover, the credibility of the ZimVAC results deviate from numerous studies which are more consistent to each other and the economic climate (Crush et al., 2011, Tawodzera, 2012a). While measurement tools may differ, the differences between ZimVAC and other studies conducted during the same periods is too wide to ignore.

2.3 (In)significance of UPA

The past decade has seen the emergence of urban food production in cities and growing scholarship on UPA (Clapp and Cohen, 2009, Zezza and Tasciotti, 2010). Notwithstanding UPA's global coverage, literature has demonstrated its dominance in developing countries because of growing food security concerns. Available evidence, also seems to suggest that UA has been practised by households for decades, yet according to Pedzisai et al. (2014) there remains limited understanding in the practice. This, stems in part, from its acutely challenged definition. Prior to engaging literature in on the (in)significance⁸ of UPA it is important to define the term. This assertion is reflected in the broader context of its use, where a plethora of definitions have been provided by scholars (Ellis and Sumberg, 1998, Foeken, 2006). Undergirding these definitions is that the practice includes the production of food in urban and peri-urban areas. Also, embodied in UA definitions are classifications such as the location, spaces in which the activity takes place within identified locations, the types of the products and the production system (subsistence, market or both). Mougeot (1994) broadly defined UA as

[...] an industry located within (intra-urban) or on the fringe (peri-urban) of a town, a city or a metropolis, which grows or raises, processes and distributes a diversity of food and non-food products, (re-)using largely human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area.

This comprehensive definition highlights diverse expressions of the practice. However, the inclusion of animal and fibre products, agribusiness and marketing of products, overlaps the parameter of this study. Thus, the study defines the practice as the cultivation of crops and vegetables within urban and peri-urban spaces. The purposive selection of a definition that focuses primarily on cultivation is in line with the research questions and objectives of the study. This cultivation involves agronomic and horticultural crops within the homestead or open spaces in urban and peri-urban areas. The rationale for focusing on vegetables and subsistence crops is based on their dominance in UPA practices at the household level.

Importantly, certain scholars make a distinction between urban and peri-urban agriculture (Ellis and Sumberg, 1998, Opitz et al., 2016, Zasada et al., 2012). Writing from a developed country perspective, Opitz et al. (2016) provide insight into spatial features of UA and UPA such as density, farm size, legal status and contractual obligations. These nuances do not permit the use of the terms interchangeably (Zasada et al., 2012), particularly when one of the objectives of the study is to capture variations in food production between the two urban spaces. Therefore, the two terms will not be used interchangeably.

⁸ The use of the pre-fix (in) denotes refraining from idealising UPA as a significant practice in all contexts. Scientific enquiry will determine the application or removal of the prefix in the analysis chapter.

The urban locale will refer to the area within the municipal boundary of the city and peri-urban locale will refer to the areas outlying the city boundary but within 30-40 km from the central business district (Prain et al., 2009).

2.3.1 Significance of UPA in Africa

A number of scholars have reported that urban food production plays a critical role in two broad ways; a) addressing the consumptive needs of households (Bellwood-Howard et al., 2015, Gallaher et al., 2013, Rezai et al., 2016) and b) supplementing household income or reducing on food expenditure (Mougeot, 1994, Onyango, 2010, Tambwe et al., 2011). The most noted benefit ‘actual and potential’ of engaging in UPA according to Bellwood-Howard et al. (2015) is that it offers households a supply of fresh and nourishing produce for consumption. They add that home-grown products can cover one fifth to two thirds of the total household food supply. Borras Jr et al. (2015) concurs by positing that the main function of UPA is seldom practiced for monetary gain but augmenting the household’s consumptive needs.

A Malaysian based study by Rezai et al. (2016) demonstrated that participating in UA translates to adequate fresh food and potential savings for other household necessities. They provide sufficient evidence that the impact of UPA on household food security necessitates its development. Additional evidence supporting the practice lies in the findings of Gallaher et al. (2013) who conducted a mixed methods study among sack gardeners in Kibera informal settlement, Nairobi. Their findings suggest a positive correlation between UPA and household dietary diversity. Gardeners were more food secure than those that did not engage in gardening. Also, gardeners stated that they relied on leafy vegetables harvested from sack gardening in periods of hardship to substitute relish. Eighty-seven percent of the respondents stated that home-production enabled them to procure cash savings, which they reserved for other uses.

In Ghana, Van Veenhuizen and Danso (2007) point out how urban farmers in Kumasi and Accra produced sufficient vegetable produce to feed 90% of urban dwellers. In addition to supplementing household dietary needs and monthly income, UA also contributed to job creation. Mbiba (1995) study revealed how urban households in Harare engaged in UA produced enough cereals to sustain them for an average of four months. More than 50% of urban farmers in Zambia relied on subsistence agriculture as a means of replenishing household consumptive needs (Simatele and Binns, 2008). Confirming these

claims at the continental level, FAO's publication on urban and peri-urban horticulture states that the production of food in cities augments the food and financial needs of 22 million people (FAO, 2012a). These examples, illuminate its importance and a survival strategy for urban poor who seldom have disposable income readily available to purchase food.

There is a direct correlation between poverty and the UPA engagement. More affluent economies and households in unstable economies are better attuned to deal with food shortages. Historical trends in Africa and beyond, as highlighted in the previous section point to how UPA provides a reduces the ramifications of poverty during periods of economic decline (Frayne et al., 2014b). Notably, AFSUN's analysis of food (in)security in 11 Southern African countries reflects how 50% of the sampled cities located in 'financially stable' economies like Botswana, Namibia, South Africa and Swaziland were less engaged in UPA. Less than 10% of urban dwellers were involved in UA compared to almost two thirds (60%) in Zimbabwe (Crush et al., 2010). This trend has also been reiterated by scholars such as Kutiwa et al. (2010) and Thornton (2008). Such examples underscore UPA's importance as an avenue to access food. In addition to feeding households in cities, Pedzisai et al. (2014) demonstrated its significance not only to urban households but their rural counterparts as well. Almost half (48%) of urban farmers mentioned that they occasionally sent a share of yields to their rural homes.

As highlighted above, the UA in Zimbabwe is widespread. Not surprisingly, numerous scholars, have sought to highlight the contribution that UPA makes to poor urban households in Zimbabwe. For example, more than two decades ago poor households in Harare obtained two thirds of their food through UA (Bowyer-Bower and Drakakis-Smith, 1996). More recent studies (Kutiwa et al., 2010, Pedzisai et al., 2014, Ncube and Ncube, 2016) confirm the importance of UPA to the livelihoods of urban dwellers. These studies argue that despite the numerous hurdles urban farmers in high density areas face their participation is integral to accessing nutritional produce. While Sithole et al. (2012) posit that the UA is a dominant practice which leads to improved dietary diversity, Kutiwa et al. (2010) posit that yields from UPA studies are exaggerated. Sithole et al. (2012) focus on community gardening, which is one of the numerous types of UA. Secondly, the community gardens are supported by the municipality or NGO's, which provides a skewed picture of the experiences of urban farmers. Finally, the sample size in the study by Sithole et al. (2012) is too small. A qualitative analysis of 15 interviews and five is not generalisable to the city or other areas (Johnson and Onwuegbuzie, 2004). The mixed method study by Kutiwa et al. (2010) involving urban farmers from Mabvuku, Mufakose and Budiriro, possesses a bigger sample size (59), however, the sampling procedure was poorly described.

Mrema and Chitiyo (2011) explored the agronomic activities of residents from different geographical and socio-economic backgrounds in Mutare. Using SPSS to analyse their findings, more than two thirds of 80 households stated that they had experienced a positive change in their diets due to their engagement in subsistence agriculture. More so, Mrema and Chitiyo (2011) stated that cultivation within the homestead provides the best reflection of the impact of self-production on food security since production is free from external interferences. Their study, however has three methodological flaws which are a) failure to provide a conceptual framework b) absence of a research design, and; c) an inadequately described sampling strategy.

Thus far, literature discussing the consumptive benefits of UPA's importance has been explored. Conversely, a qualitative study on how farmers perceive the practice by Cook et al. (2015) almost all (34 out of 35) respondents produced mainly for sale. Unlike farmers in the previous section, farmers in this study purchased most of their food and consumed very little of what they grew Cook et al. (2015). This example, illustrates how UPA augments the food systems of households. In a detailed evaluation of the correlation between UA and socio-economic status by the RUAF Foundation, more than half urban farmers (Accra 80%, Lima 73%; Nairobi 70% and Bangalore 56%) stated that income saved through self-production was siphoned to other significant household needs (Prain and Dubbeling, 2011).

2.3.2 UPA and Household Dietary Diversity

Nutrition is a critical component of food security. Household Dietary Diversity (HDD) has been used an instrument to measure food security. The measure is defined a count of food groups (grouped by nutritional components) consumed by a household over a specific interval (Ruel, 2003). Extending this definition, states that it is “a recall of foods eaten and their frequency or weights and measures based on direct observation, and then construct an indicator for food consumption and/or dietary diversity.” So, the probability that a household attains the recommended nutritional components is higher if more food groups form part of the daily diet. To Jones et al. (2013), HDD is an indicator for the quality of the household's diet. Vegetable and crop production is one of the options through which poor urban households can diversify their diets. Vegetables, enhance the diet quality of the household. Ojiewo et al. (2015) cements this by highlighting the important role vegetables and legumes in the diets of poor households in sub-Saharan Africa. The authors highlight how their phytochemicals enhance the nutrition and helps households evade malnutrition through the consumption of diverse home-grown vegetables.

Amartya Sen's germinal book *Poverty and Famine* provides valuable contributions to questions of HDD. A critical thesis that emerges from the work is that lack of food is not a matter of availability but a matter of access Sen (1981). The correlation between low purchasing power and deprivation mirrors what Sen coins 'entitlement'. Deficiency in financial or asset form increases the chances of low dietary diversity and vulnerability to food insecurity. An AFSUN study by Crush et al. (2010) reveals that the claim household food security improves as a result of involvement in UPA was negligible in 7 out of the 11 cities drawn from the Southern African Development Community (SADC). However, there was a positive correlation between HDD and the practice using HDD as a proxy measure for diet quality households in Maseru, Lusaka, Cape Town and Johannesburg recorded higher dietary diversity scores than none practising households. Significant HDD scores in Cape Town and Johannesburg (South Africa) are likely to reflect their location (a more stable economy compared to countries like Malawi and Zimbabwe as discussed earlier). Notwithstanding, only 20% of the households in Cape Town were food secure, this points to the brevity of the food security situation in SSA (Crush et al., 2010).

Remarkably, a close analysis of the AFSUN data by Battersby (2011) reveals that the study might have been over ambitious in its HDD score analysis. The foods consumed by Cape Town households within a 24-hour period were indeed diverse; one third of the foods from the 12 food groups were consumed by more than 70% of the households. Apart from cereals (93.2%) frequently consumed foods lacked nutritional components e.g., other foods, reported as mainly tea (88.4%); sugar or honey (82.8%) and foods made with oil, fat or butter (71.9%). This finding points to the need to conduct fine grained analysis on the nutritive composition of HDD scores to avoid misleading analyses. Focusing on broadly on food security among households in low income areas in Harare, Tawodzera et al. (2012b) captured two findings that are central to this study. Firstly, inflation translated to a significant number of households forgoing certain foods. A meagre 20% of participants could afford dairy products and eggs and less than 25% mentioned 'meat, poultry, roots, tubers and fruit' as forming part of their diets during this 24-hr period. This finding is alarming given that three quarters of urban households were partaking in meals that were deficient in essential nutrients.

In contrast to findings by Tawodzera et al. (2012a) ZimVAC's Urban Livelihoods Assessment in Zimbabwe's 10 administrative provinces present a more positive outlook of HDD among households. A survey of 2848 households revealed that 89% of households had medium levels of dietary diversity. Disaggregated geographically, results show that less than 1% urban households and 3.6% or peri-urban households had very low dietary diversity scores. While it is agreed that the measurement of food records is complex owing to its self-reported nature, the discrepancy between results from ZimVAC and Tawodzera et al. (2012a) is too large. Acknowledging the differences in study scale (countrywide

as opposed to citywide). However, ZimVAC's study rates Harare as one of the cities with one of the lowest levels of food insecurity and high dietary diversity scores. Perhaps, the difference in food entry tools explain the discrepancy. As suggested by Swindale and Bilinsky (2006), the 7-day recall does not produce accurate results, it is difficult to remember, particularly over a short space of time. Nonetheless, methodological and geographical differences do not suffice in explaining the inconsistency.

Many other studies on the state of food insecurity in Zimbabwe (Frayne et al., 2014a, Tawodzera et al., 2017, WFP, 2014a) deviated from ZimVAC's findings. In fact, WFP's *Adapting to an Urban World Report* makes contributions that are targeted at enhancing the research procedures and instruments for ZimVAC's future assessments. Similarities, however do exist in the types of foods consumed by households in case studies by Battersby (2011) and Tawodzera et al. (2012b). Zimbabwe National Vulnerability Assessment Committee listed the following dominant foods; maize meal, cooking oil, sugar and bread. Protein and calcium-based foods ranked lower in comparison to starch and oil-based foods. This puts to question nutritional components of the 'varied' diets.

2.3.3 Insignificance of UPA

Certainly, there is no shortage of dissenters within discussions on the viability of UPA as a pathway to food security (Crush et al., 2011, Frayne et al., 2014b, Mkwambisi et al., 2011). According to (Zezza and Tasciotti (2010))there is a dearth in UA studies that provide statistically grounded evidence of its impact on food security. This has led to wide scepticism among scholars regarding the level of impact UPA has in curbing food insecurity. However, Borras Jr et al. (2015) quantifiable measures of total yields are unattainable because they are seldom captured in 'the official statistics on food production or food circulation'.

Using multivariate analysis to assess the food security status of poor city dwellers in northern Bangladesh, Hillbruner and Egan (2008) concluded that there was no correlation between engagement in UA and food security. In view of the contentious issue of land in urban areas, there is pessimism surround the practice. Using secondary data from a survey conducted by Crush et al. (2011) in 11 cities through AFSUN in 2008, Frayne et al. (2014b) drew attention to the overestimated potential of UA among poor households. These findings highlight that lack of resources among the urban poor means that they derive nominal benefits from UA compared to their more affluent counterparts.

The findings by the AFSUN survey are ‘blanket’ in nature. They show that UA’s significance to households is largely dependent on the context, agents and resources at their disposal. Hence, writers both supportive and ambivalent towards the practice (Crush et al., 2011, Frayne et al., 2014b, Zezza and Tasciotti, 2010) have challenged complete dismissal of the UA on the grounds of contextual differences. Averages between and within countries may conceal examples where engaging in UPA forms a substantial portion of household food supply and income. Zezza and Tasciotti (2010) extended themselves by emphasising that while some studies report that the impact may be limited in poor households, the little that they produce goes a long way in averting hunger and malnutrition especially in the African context.

Notwithstanding the purported ‘unreliable’ nature of conclusions surrounding the significance of UPA, this study views UPA not as a panacea for food security but a practice that can improve the consumptive capacities of households. In essence, UPA should not be negated on the grounds of futilities recorded in different settings or periods. In addition to understanding the different positions of scholars regarding the significance of UPA to food security. It is useful to engage in literature demonstrating factors that hinder the practice of UPA. That way, this foundation provides an understanding of how farmers manoeuvre through socio-economic and socio-political hurdles in pursuit of improving their food security status.

2.3.4 Agents of UPA and production practices in SSA

2.3.4.1 Who are the urban farmers?

The foregoing discussion highlighted the ‘invisibility’ of UPA despite evidence of its role in enhancing household food security. This marginalisation is also reflected on the dearth of empirical studies in UPA quantifying the number and gender of urban farmers (Zezza and Tasciotti, 2010). What is clear however, is that UPA farmers are a heterogeneous group in terms of socioeconomic status and gender. Negating the claim that UA in developing countries is a sign of poverty (Zezza and Tasciotti, 2010, De Bon et al., 2010, Stewart et al., 2013, Tawodzera, 2012a) highlight that UPA is practised by all socio-economic groups (high, middle and low-income). While vast literature in developing countries concedes that it is an activity engaged in by households with diverse economic standing, it is prevalent among low-income households (Foeken, 2006). To illustrate, the author points out that limited alternative employment opportunities available to low-income households translate to insufficient funds to purchase food. In such cases, UPA is practised mainly for consumptive purposes.

Conversely, suggests that well-endowed households are well-represented among urban farmers given their advantage over access to land and capital. In the same vein, Foeken (2006) asserts that high and medium income earners form the bulk of households practising UA in Nakuru, Kenya. This confirms the claim that middle and income households are the majority urban farmers. However, evidence provided in the preceding sections and the fact that off-plot cultivation gives access to poor households, despite its ‘illegality’ and insecurity of tenure, means that even the poorest of households have temporary ‘access’ to land (Zezza and Tasciotti, 2010).

Globally, women are the main producers of food. Notably, urban food production in Africa is mainly undertaken by women (FAO, 2012a, Foeken, 2006, Tambwe et al., 2011). Similarly, two studies on UPA in Harare, report that 70% of the respondents are women (Kutiwa et al., 2010, Mubvami and Toriro, 2011). This dominance can be explained by the fact that women are caregivers and manage the consumptive needs of the household. Conflicting findings however, can be found in Mrema and Chitiyo (2011) where more than two thirds of the farmers were males. This difference can be explained by the fact that the study was only based on the production in home gardens, rather than off-plot cultivation where women are more dominant.

2.3.4.2. Typologies of UPA

Urban food production systems are diverse but can be grouped into two broad categories Disaggregated by location; UPA falls under on-plot or off plot cultivation (Stewart et al., 2013, Tambwe et al., 2011). On-plot cultivation as defined by Stewart et al. (2013) refers to cultivation within one’s residential compound and off-plot occurs in vacant spaces utilised under different arrangements such as “cession, lease, sharing, authorised or illegal”. Examples of these are displayed in Table 2.1, include, community gardens, roadsides, close to railway lines, swamps, swaths of land earmarked of construction. This table reflects not the different types of production systems, but the different sites of production within those systems, main crops and motivation engaging in UA.

The size of the area under cultivation depends on the location, for example, in Lubumbashi, (Tambwe et al., 2011). Findings from the study show that smaller pieces of land (50–101m²) were mainly for meeting the household’s consumptive needs. Conversely, larger pieces of land ($\geq 150\text{m}^2$) in surrounding areas (off-plot) and in the periphery of the city (peri-urban) were cultivated mainly for sale at markets (Tambwe et al., 2011). In Mutare, findings by Mrema and Chitiyo (2011) suggest that higher income earners had more access to agricultural land than their poorer counterparts who formed the more than

two thirds (73%) of urban farmers in the city. Land sizes varied from 20m² for poor households to 150m² for the more well-endowed residents.

Table 2. 1 Major categories of urban crop production in Africa

Farming system	Crops and consumption mode	Urban locations	Land size
Open-space production (off-plot farming)	Irrigated vegetables and herbs predominantly for market sale(year-round irrigation/ dry season); but in parts of eastern and southern Africa also for home consumption Rain-fed cereals (mostly maize) for home consumption and/or market sale	Unused plots, public open spaces, utility service areas Open areas along streams, unused lowlands	200- 8093.73m ² - 200m ² -8093.73
Backyard gardening (on-plot farming)	Cereals, vegetables, fruits, plantain, predominantly for home consumption	On the plots around houses, e.g. in backyards	50- 4046.86m ²

Adapted from Mbiba (2000) and (Drescher et al., 2006)

The predominant form of UPA is on-plot cultivation, particularly home or backyard gardening (FAO, 2012a, Kenny, 2014, Stewart et al., 2013). A plethora of names exist for home gardening, these are “mixed, backyard, kitchen, farmyard, rooftop, compound or homestead gardens” (Marsh, 1998). Micro-gardens, which are the smallest type of UPA are common countries slums, informal settlements or densely populated areas where there is little or no space available for food production(Gallaher et al., 2013). In Dakar, micro-gardens provide 7500 households with fresh vegetables and some income from the sale of excess vegetables (FAO, 2012a). The FAO note that sack gardening which fall under micro-gardening seems to be a viable income earning opportunity for 11 000 households Kibera. In addition to supplementing their diets, income from sales supplements rental payments (FAO, 2012a).

In addition to the two farming systems discussed above Mudimu (1997) identified peri-urban cultivation as the third broad category. Extensive studies in Zimbabwe (Mubvami and Toriro, 2011, Mudimu, 1997, Tawodzera et al., 2012b) have characterised the types of UPA as either formal or informal, showing continued dominance of perception that stigmatise open space cultivation. Home gardening is also, as in many African countries is the most common form of UPA practised in Zimbabwe (Mubvami and Toriro, 2011). On and off-plot cultivation are engaged in mostly for supplementing the household food supply and market sales respectively. The purposes of cultivation (subsistence or market) can be interchangeable, as consumptive and income needs differ from household to household. Also, it is common occurrence that urban households also cultivate in peri-urban areas even though they are not resident there primarily due to land availability and more productive soils (Tambwe et al., 2011).

Having presented a general profile of UPA farmers and the spaces, the following section explores the challenges and barriers they encounter in their everyday practices.

2.3.5 Challenges and constraints of UPA postulate

Notwithstanding the varying level of benefits UPA engagement offers for households, the activity is plagued by a wide range of constraints. In addition to understanding the significance UPA it is vital to identify ways in which cities promoted or deter farmers from drawing maximum benefits from the practice. Moreover, to explore the application of the political concept of food sovereignty in the urban food systems it is important to consider how systems and processes that influence the practice. Previous studies have well-articulated the barriers urban farmers face in their agricultural practices, particularly off-plot cultivation (Clapp and Cohen, 2009, Cook et al., 2015). Beyond the well-known physical access to land, there are many spectrums to challenges faced by urban farmers.

Urban Agriculture regarded as illegal in many African countries (Bryld, 2003). More than two decades ago, Maxwell (1995) pointed out that despite the ‘illegal’ status of UA, remained prevalent in South and East African countries. Some countries, such as Malawi and Uganda have since legalised urban food production upon realising its food provisioning capabilities in cities (Cabannes, 2012, Mkwambisi et al., 2011). While there are no ‘international legal instruments’ on UPA, national and municipal level arrangements exist (Cabannes, 2012). He adds that the introduction of regulations on UA in Uganda in 2005 validates that outlawing the practice is less progressive than providing support, rules and regulations that govern it. The trajectory of UPA according (Quon 1999), is dependent on the level of support. Drawing on this typology, Table 2.2 displays levels of support for UPA measured against existing institutional arrangements.

Table 2. 2 Provisions for official UPA support

Enabling	Government officially authorises UPA within confines of legislation. The practice is acknowledged and conceivably included in zoning systems of planners. Advocacy in the form of investments and information is strong.
Permissive	While the state acknowledges the practice, it is not necessarily supported by policy. It assumes tolerance for the practice owing to low or non-existent financial capacity. It allows UPA, with some reservations.
Neutral	It assumes an impartial or non-aligned position to UPA; it is overlooked. No official documentation exists which either supports or suppresses UPA.
Discouraging	The state expresses disapproval of UPA through either policy or action and labelling it illegal. This is evident in the lack of inclusion in urban planning.
Prohibitive	Prohibitive conditions are reflected in the state outlawing the practice through policy or by-laws and classifying it as distinctly illegal.

Adapted from Quon (1999)

Instruments and other declarations in developing countries spurred on by the Quito Declaration: Urban Agriculture in 21st century cities promulgated in 2000, led to changes in the urban landscape in terms of UPA declarations (Cabannes, 2012). Two such declarations were pronounced in Zimbabwe; the Nyanga Declaration on Urban and Peri-urban Agriculture in Zimbabwe 2002 and the Harare Declaration of Urban and Peri-urban Agriculture in Eastern and Southern Africa, signed the following year. In addition to endorsing the assimilation of UPA in urban development plans, both declarations promote the creation of policies and mechanisms that support the systems and processes of UPA. While lacking state and municipal instruments was a critical step in promoting UPA as a key source of urban food supply, practice has however presented a different picture.

Urbanisation as highlighted in Chapter One translates to two related spatial challenges which are the shrinking of urban spaces due to population growth and the resultant lack of ‘readily’ available space for food production (Crush et al., 2011, FAO, 2012a). For example, Crush et al. (2011) highlighted how less than 5% of poor households in Chipata, Lusaka engaged in UA. This low percentage reflects scarcity of land for food production. Secondly, insecure land tenure is one of the key challenges faced by urban farmers (Cook et al., 2015, De Bon et al., 2010). In a pilot project exploring the perception of Indian farmers along the Yamuna River, Cook et al. (2015) reported how the majority of urban farmers did not have land rights, most either paid rentals or cultivated ‘illegally’. They also noted that the ambivalent attitude of government towards UPA discouraged them from making investments in their practices as they could be removed from the land at any time. Correspondingly, a macro-economic survey on UPA in Harare noted that less than a third (29%) owned the land they cultivated (Mubvami

and Toriro, 2011). While the designation of vacant spaces to UA in is a rarity, there are cities such as Havana and Dar es Salaam have reserved spaces specifically for food production (Mubvami and Mushamba, 2004, Premat, 2009).

One of the key assumptions of the modernisation theory is that tradition is a condition that needs to be remedied by pulling the regressive into 'development.' The production of food is alleged to be illustrative of regression. Sceptics view the practice that belongs in the rural domain and it plays a marginal economic role at the city level (Maxwell, 1995). By cultivating in cities, urbanites are deemed to be 'ruralising' urban areas. Coined by Stren (1986) ruralisation connotes a degenerative change from the 'developed' city arrangement to the 'undeveloped'. Cultivating in towns, particularly open spaces is counter to growth, planning and development as it spoils the aesthetics of the city. In the American context, Moore (2006) describes this reasoning using the concept of the "urban normative", which can be explained as an invented interpretation of a city's structure and function. UPA is seldom acknowledged through statutes and ordinances. A few states and in some instances cities have, however documented and actively work on strategies that enhance household food security through urban food production (Gerster-Bentaya, 2013). Policies and decrees embracing UPA have been put in place in cities such as Accra, Beijing, Brasilia, Bulawayo, Govender Vlders, Havana, Nairobi and Uganda (Cabannes, 2012, Clapp and Cohen, 2009). Until 2005, food production in Kampala was unlawful and rendered insubstantial; since its legalisation UPA, its importance has grown. The importance of government mechanisms supporting UPA cannot be overlooked given its primacy in the food provisions of the urban poor (Cabannes, 2012).

Having explored factors that promote or hinder urban households to reap maximum benefits from the practice, it is necessary to unearth characteristics of the farmers, typologies of their production systems as well as agronomic practices. By so doing, this will enhance understanding of elements that shape the production systems of urban farmers.

2.4 Food production practices

2.4.1 *Agroecological or conventional practices?*

SSA is masked by a litany of challenges such as urbanisation, climate change and financial instability all of which have had a negative significant impact on food security. However, the debate on ‘best’ path to take in order to achieve food security remains inconclusive (Holt-Giménez and Altieri, 2013). As described in Chapter One, the conventional response to the problem is increasing large scale, heavily mechanised production in a sustainable manner. Naturally, scholars (FAO, 2014, Wezel et al., 2014) oppose this contribution on several grounds. Firstly, small-scale farmers who use more sustainable agroecological methods of food production are key producers, globally. Secondly, the agricultural production and marketing processes of the practice fuel climate change. Related to the second point is that climate change has devastating effects on yields and more broadly the environment. Lastly, over the past decades, conventional agriculture is yet to prove itself as far as sustenance of not agribusiness but vulnerable communities at grassroots level. Supporting the productivist view, are sceptics who reject the potential of alternative forms of agriculture related to agroecology⁹ as far as volumes are concerned (Collier, 2008). Dismissing claims of the astounding yields produced by small-holder farmers, Collier (2008) propounds that the alternative approaches overlook the prospect of agribusiness’ efficiency and ability to produce yields sufficient to sustain Africa’s populations. However, a current meta-analysis by Crowder and Reganold (2015) suggests a marginal profit variance between the two farming systems.

Literature demonstrates how agroecological principles have been adopted by farmers the world over. As highlighted in the above sections, Cuba is perhaps the country where the benefits of organic and sustainable growing have been most distinguished (Premat, 2009). Organic farming involves the harnessing of natural inputs in crop production. It proscribes the use of mechanised implements and synthetic fertilisers and insecticides (Reganold and Wachter, 2016). The importance of how food is grown is described in a study by Bezner-Kerr et al. (2011) on nutrition education. Although Gerster-Bentaya (2013) focuses on its contribution to food security, the addition of the ‘nutrition specific’ element sets it apart from other studies. Nutrition-sensitive involves questions ranging from seed acquisition, location of the production, distribution and consumption; all of which are fundamental to principles of the Food Sovereignty Framework (FSF). In a study investigating the motivation behind nutritional change in six countries (Nisbett et al., 2017) provided empirical evidence that gives credence

⁹Bezner Kerr et al (2016) defines it as “a set of agricultural practices embedded in ecological principles such as recycling of organic material, mulching and minimizing toxic inputs”.

to enhancing food security through localisation. For this reason, the current study focuses on household food security; premised on its direct link to the broader remit of poverty alleviation strategies.

While (Nisbett et al., 2017) focused on the dietary diversity of children, it's findings are critical to the argument woven by proponents of agroecology and food sovereignty alike, on the importance of agroecological practices. The study shows how child nutrition improved because of mixed cropping (maize and legumes). Legumes according to Ojiewo et al. (2015) not only improve soil fertility through the nitrogen fixation. Through intercropping, crops or vegetables will benefit from atmospheric nitrogen released from legume roots. Further, planting legumes means that farmers avert spending money on synthetic fertilisers. Nitrogen fixation among other benefits of agroecological practices contribute to the sustainability of the farming systems of household (Wezel et al., 2014).

Cook et al. (2015) and Mudzengerere (2012) demonstrated that small-holder or subsistence farming was not synonymous with agroecological agricultural practice. For example, urban farmers in Bulawayo practised conventional mechanised farming on in low-density areas and peri-urban areas where land was available Mudzengerere (2012). In another study, by Cook et al. (2015) all urban farmers engaging in UA along the banks of Yamuna River in Delhi used two to four 50-kilogram bags of fertiliser per 2ha on average. Less than 33% of the households used organic manure to improve soil quality. None of the farmers reported the exclusive application of organic fertiliser, it was used to extra additive to conventional fertiliser. Cook et al. (2015) attribute the lack of sustainable agricultural practices displayed by the Indian farmers to lack of awareness. They further point out that insecure tenure and minimal involvement by local authorities could explain why farmers had limited initiative to capitalise on more sustainable practices (Cook et al., 2015). This case study highlights conventional agriculture's power in shaping the perceptions of the Indian farmers.

2.4.2 Agronomic and horticultural crops

Urban and peri-urban agriculture is characterised by different assortments of agronomic and horticultural crops. Cereals are the most common food crop grown in Africa. Maize, which is the most grown crop in Africa, is a choice crop for many in SSA because of its nutritive value (Foeken, 2006). Sweet potatoes are also a common root crop that plays an important role in the diets of households especially in the developing countries (FAO, 2014). Farmers in Lubumbashi all three crops (maize, sweet potatoes and vegetables) but highlighted maize and leafy vegetables as the most important crops. Sweet potatoes were produced by a significant number of farmers. They cited that this starchy crop

played a critical role prior to the reaping period. It was grown and set aside for periods of crisis (price and consequently food) particularly during the end to the middle of the year (Tambwe et al., 2011).

Horticulture, according to FAO (2012a) constitutes a large share of UPA practice. They add that, it is suitable for both inner city and peripheral areas because it requires small parcels of land and consequently less water and other inputs than other crops would demand. Drawing on the perceptions of vegetable farmers from five regions in Tanzania, Afari-Sefa et al. (2016) explored the nutritional value of indigenous vegetables. They showed how the 181 farmers cultivated and produced more African indigenous vegetables compared to conventional ones on small parcels of land. Their perceptions are based on the belief that they are not only more nutritious but have health benefits. However, Shackleton et al. (2009) argue that there is little compelling quantitative evidence supporting this assertion. As opposed to former discussions supported by literature on the importance of large farm size for productivity. The research demonstrates how small-holders yielded more traditional vegetables on their smaller swaths of land than farmers with larger farms. As discussed in Section 2.3.4.2, households in Kibera practice sack gardening due to lack of gardening space. Thus, they mainly produce vegetables such as kale and Swiss chard which do not take up a lot of space (Gallaher et al., 2013). Status value essential vitality important central significance premium

In Zimbabwe, akin to other countries in SSA, maize is the predominant crop grown by urban farmers especially those engaging in off-plot cultivation (Brazier, 2012, Mubvami and Toriro, 2011). The centrality of the crop to citizens prompted Jelliffe (1967) to point out that connotations of hunger are habitually expressed using staple foods. Contrary to the assumption that the bulk of maize harvests are produced in rural areas, Brazier (2012) posits that most yields are derived from urban spaces. The author supports this claim on increasingly infertile rural soils since the poorest households do not have sufficient resources to irrigate or enrich soil using synthetic fertilisers. This assertion is questionable given the dearth in measurable statistics on UPA. Further evidence is provided in a survey by Mubvami and Toriro (2011) survey on UA in Harare where a meagre 9% of the respondents did not cultivate maize. This shows its dominance among urban farmers. In the same study, almost a third of the respondents cultivated vegetables (59%).

2. 5 Understanding Food Sovereignty

In recent years, there has been an upsurge in research into food sovereignty (Boone and Taylor, 2016, Yap, 2013). These studies are however, concentrated in developing countries. While scholarship in

developing countries is growing, the concept is still in its embryonic stages in the African context (Ngcoya and Kumarakulasingam, 2016). While no definitional consensus exists (Patel, 2009) this study borrows La Via Campesina's classical definition:

The right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods and their right to define their own food and agriculture systems. It puts those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations La Via Campesina (2008).

Coined by peasant's struggles for autonomy in their food systems, food sovereignty is a political concept which advocates for shifting from the dominant model of production to one that is more attuned to the needs of the poor (Wittman, 2010). It goes beyond the focus of food security by placing control in the hands of the farmers (La Via Campesina, 2007). It goes beyond the focus on food security by placing control in the hands of the farmers (La Via Campesina, 2007). Several scholars have demonstrated how applying the food sovereignty approach cushions farmers from market failures and enables them, through sustainable and climate smart agricultural practices, to grow crops that are not only healthy but culturally appropriate for their households (Carney, 2016, Heckelman and Wittman, 2015, Schanbacher, 2010). Unlike the food security approach, food sovereignty is framed around the wider political context in which farmers exist. For this reason, the proposed study, will attempt to assess the feasibility of the FSF in the Zimbabwean context.

While overwhelming evidence of the benefits of adopting agroecological practices in one's food system is evident dissenters such as Godfray and Garnett (2014) use the temporal argument to suggest that conventional agriculture yields crop at a much faster rate. They suggest that considering the vulnerability of farmers in third world countries and is more reason for them to take up conventional farming practices. However, (Bezner-Kerr et al., 2016) refutes this by validates the view that agroecology enhances farmers' ability to cope with the effects of climate change. Secondly, practicing nutrition-sensitive agriculture means that poor households also avert malnutrition. Thirdly, the application of agroecological principles means that farmers preserve as much as possible the soils nutrients. This not only leads to sustainable agriculture but also the farmer subscribes to the principles of food sovereignty.

In a study based in Ottawa, Kenny (2014) shows how the application of agroecological practices such as organic growing on appropriated land transformed the livelihoods of the farmers. Staying true to their traditional agricultural practices exemplifies how through ‘place-making’ the farmers carved out their surroundings to suit their household needs. This case study resonates with the sixth principle of the FSF which speaks to the use of natural and sustainable agroecological practices which promote methods that are not only organic but improve resilience to climatic shocks and minimise environmental damage. In direct contrast, a study by Boone and Taylor (2016) study in Northern Nicaragua showed how farmers in the Segovias region invalidated any attempts by stakeholders to transform their production practices. Despite its rural orientation, her study shows that farmers took no initiative to take control of their productive systems. Also, consultation with ‘experts’ was hastily done. These findings are in opposition with two principles of the FSF which speak to valuing food providers and putting control locally (Boone and Taylor, 2016).

To aid in understanding the complexities faced by urban farmers, this study will utilise the 6 principles of the FSF. According to La Via Campesina (2007) principles embedded in the framework include 1) emphasises the recognition of food as a right 2) values providers by asserting the importance of food production by low income farmers 3) localises food system by encouraging the food production within communities, 4) puts control locally by emphasising the sustainable production of food within the surrounds of the community; 5) builds knowledge and skills through sustainable systems and 6) finally works with nature by employing resources and techniques that are sustainable and environmentally friendly. According to Heckelman and Wittman (2015) food sovereignty provides a framework to develop a systems based approach” which focuses on how farmers are affected by external factors such as power dynamics and the wider ecosystem in which they exist. The central argument of this framework is that the control of food systems (from production to consumption) should lie in the hands of the ‘farmers’. Considering the increasing failure of the food security approach to address the food needs of the urban poor, the proposed study aims to a) identify the vegetable production practices of urban farmers in Harare and b) assess whether and how the FSF is applicable to the practices urban farmers in Harare.

As highlighted earlier, there is a shortage of studies on food sovereignty in the continent. In South Africa two key studies (Ngcoya and Kumarakulasingam, 2016, Zerbe, 2012) both situated in KwaZulu-Natal province explore food sovereignty. Noting how food sovereignty remains “invisible” in both policy and practice Zerbe (2012) states that scholarship on food is largely framed using the food security approach which is does not fully engage with issues of power and control. In another study, Ngcoya and Kumarakulasingam (2016) explore the lived experience of an elderly woman’s’ productive

practices in the rural village of Mtubatuba. This study provides a good illustration of how her production practices resonate reflect agroecological practices by using green manure, employing mixed cropping and using invertebrate ecology to enhance soil fertility. What is striking about this example is that she only purchases goods that she cannot produce herself, this attribute resonates with the fourth principle of food sovereignty. While this study aligns closely with the current study in terms of keen interest in gleaning out principles of food sovereignty from productive practices, it is based on one case study. Despite its richness, a conclusive argument cannot be drawn from this study based on its focus on an individual person. This study will adopt a mixed method approach in exploring the experiences of 400 farmers, while generalisability is not possible. Its methodological breadth and depth provide its empirical grounding with more credibility (Johnson and Onwuegbuzie, 2004).

Food sovereignty is a tool that facilitates progressive changes to archaic and restrictive ‘urbansim’ that is grounded on embracing all social classes and sustainably productive practices. A plethora of studies exist on ‘informality’ as a key component of the livelihoods of the poor, particularly in relation to food security. Moreover, a few focus directly on sustainable UPA, yet food provisioning is a critical development issue for most African governments. The next section briefly explores the link between food sovereignty and climate change.

2.5.1 Weaving climate change into food sovereignty

Global reactions to conventional agriculture are centred on environmental concerns. A key aspect of these is that the nature of production and distribution increases greenhouse gas (GHG) emissions (Sonwa et al., 2017) which has detrimental effects on the macroclimate. Such concerns also stem from agriculture’s susceptibility to the effects of climate change. Cementing this, (Pereira et al., 2012) highlighted the disturbing trend where climate variability continues threaten capabilities of governments and households to produce sufficient quantities of food. Food sovereignty proposes the framing agricultural practices around biotic ecologies as one of the ways to reducing the negative impacts of climate change and consequently abetting food insecurity (La Via Campesina, 2008). Having considered the importance of these in Section 2.4, it is crucial to explore the implications of practicing ecologically centred agriculture on climate change.

While scientific literature on drivers of climate change, less attention has been paid to its impact on food production (Sonwa et al., 2017). It is therefore important to understand the perceptions of urban farmers and how they respond to such changes. As highlighted in Chapter 1, differential entitlement plays a central role to issues of access to food (Sen, 1981) and relatedly access to space (Lefebvre,

1991). Drawing on Sen's analogy, a household's capability to respond to climate variability is also shaped by entitlements. Thus, a critical analysis of power dynamics through RTTC provides insights into aspects that hinder or promote adaptation at household level. There has been a proliferation of literature on the nexus between climate change and food security in Zimbabwe. Brown et al. (2012) however, point out that climate change data in Zimbabwe is limited.

Adaptation is intrinsically linked to perception. Responding to the third objective of this study, this study highlights the importance of perception. To appreciate local adaptation patterns, it is vital to understand reasoning processes that shape efforts to adapt to climate change (Boillat and Berkes, 2013). The dearth of empirical evidence on this is tied to the longstanding contention between the science and social science disciplines (Chanza and Mafongoya, 2017). Scientists approach the climate change crisis as a problem that is adequately captured through statistical modelling. Recently, however, social scientists have objected to this claim by advocating for the streamlining of traditional knowledge into climate change issues. For example, findings from a study on the perceptions of Cochabamba farmers in Bolivia highlight the vital role of traditional or local ways of knowing in unravelling the intricacies of the climate crisis (Boillat and Berkes, 2013). In Africa, studies exploring perceptions of farmers on climate change (Gbetibouo, 2009, Jiri et al., 2017) have dispelled this by citing congruence between the trends observed by farmers and official climate science data. Chiredzi Research station recorded trends that correspond with those elicited from the farmers based four wards within Chiredzi district. A mere 10% of the respondents failed to observe the rise in temperature, evidenced through a rise in "droughts and heatwaves" and decrease in rainfall over the past two decades (Jiri et al., 2017).

Using Heckman probit model and a multinomial logit (MNL) analyse adaptation factors among Ethiopian farmers, a study by Gbetibouo (2009) showed that half of the farmers attuned their practices to the changing weather conditions. Fundamental constraining factors for farmers who failed to adapt were financially related. Logistic regression model of farmer's perception on climate change in southern Ethiopia reflects the same trend reported by Gbetibouo where perception of climate change is high; a) 90% perceived changes in precipitation (onset, regularity, length, and cessation) and 88.73 in temperature) but adaptation much lower (62.56%). Conversely, 84% farmers in Chiredzi study adapted to climate change Jiri et al. (2015). The study however, focused on agronomic and livestock-based agriculture. Nevertheless, these studies are critical to understanding the importance of local perception in climate science. Extension workers are vital in imparting knowledge on adaptation. A study by Bryan et al. (2013) documented that farmers that erroneously described or failed to distinguish climatic changes had no contact with the 'experts' There are many channels through which adaption education is distributed. But, for contexts like Zimbabwe, where there is a dearth of Agricultural Extension

(Agritex) Officers in rural areas. It would be interesting to understand how lack of Agritex services affects the adaptive capacities and perceptions of farmers.

In Zimbabwe, farmers, discernments on climate change and crop production have been dealt with widely (Jiri et al., 2017, Rurinda et al., 2014). Urban studies focusing on food production and climate change on UPA are few (Tawodzera, 2012b). While they elicit the perceptions of farmers, they do so from the rural dynamic. In Zimbabwe, studies addressing both caveats a) the urban and climate change nexus and b) the local perceptions of farmers in climate change are none existent to the author's knowledge. Paradoxically urban dwellers are not immune to climate change and variability. Motivated by the centrality of curbing the effects of climate variability on food security this study attempts to address the deficiency of urban views. This is premised on the recognition that heightening the influence of 'the local'.

The horizontal sharing of knowledge, is a progressive channel towards food security. Valuing and applying locally constructed considerations of climate change works; a) to strengthen self-sufficiency among farmers through integrated knowledge b) to formulate projects and policies that are context-specific and therefore relevant. For this purpose, the study aims to understand not only the functions of adaptation but more importantly the cognitive elements leading to such processes among urban farmers in Harare. By providing input into processes that affect them, farmers not only shape knowledge but also their food production practices; all of which are pivotal to buttressing food security (Schanbacher, 2010). Food security and climate change are crises which can be abated through a reduction in activities that increase the formation of GHGs. Food sovereignty, is proffered as one such approach in the field of agriculture.

2.6.2 Food sovereignty in Zimbabwe

Food sovereignty's purported significance to self-sufficiency and food security has led some governments to uphold this right through legislation. According to Knuth and Vidar (2011), 10 countries¹⁰, all of which are found in developing countries have ratified food sovereignty into their constitutions. In Africa, a few states such as Mali, Ghana, Malawi and South Africa (more so the first

¹⁰ Argentina, Bolivia, Brazil, Ecuador, El Salvador, Guatemala, Indonesia, Nicaragua, Peru and Venezuela

two) have begun to embrace the concept of food sovereignty through advocacy (Wittman, 2010). It, however, is still in its embryonic stages.

As acknowledged in literature, theory does not automatically translate to practice. More so, the ratification of its principles is not a reflection of reality. Cuba, as highlighted above epitomises agroecologically based food systems, making food sovereignty a relevant concept in its food systems. An important observation by Beauregard and Gottlieb (2009) is that despite the adoption of food sovereignty laws and decrees, Cuba's agricultural performance continues to surpass these and other countries agriculturally. This critique does not intend to moderate the importance of ratification but serves to highlight that identifying food sovereignty requires amalgamating nuances of its principles. More importantly, the coverage of the concept is not as prevalent as the practice. In view of this, this study aims to glean out principles of food sovereignty from the practices of urban households.

To the author's knowledge no studies based in Zimbabwe drawn on any structured research into the opinions and attitudes of farmers on the concept of food sovereignty. This can be attributed to the dominance of the food security approach in both the discipline and practice of agriculture. While a plethora of studies on UPA, the majority of these are preoccupied with its merits and demerits (Gondo et al., 2017, Mubvami and Toriro, 2011, Pedzisai et al., 2014). Thus, scholarship that explores the relationship between power dynamics and food insecurity are limited. At best, they provide a cursory analysis of the vulnerabilities in the context of challenging environments. While these studies are important in understanding the vulnerabilities of urban households, they are centred on stringent economic crisis conditions and how households respond them. Also, the Harare based studies by focus broadly on informal sector activities engaged in by urban dwellers. The current study focuses distinctly on UPA for an in-depth exploration of its role in enhancing the food security status of the urban poor. Beyond the activities of households, it adopts a wider purview by exploring how broader power dynamics affect the 'inventiveness' of urban farmers.

As highlighted above, only one study on UPA in Zimbabwe (Mudimu, 1997) explores the RTTC. Other than this example, literature that remotely explore the concept of food sovereignty is relatively thin. Possibly, illuminating the application of food sovereignty among poor urban farmers support restoring or enhancing the productive capacities of urban farmers and consequently reduce household food insecurity. Therefore, there is need to explore this concept in the context of poor households who are increasingly grappling with food provisioning challenges because of worsening economic condition and the heightened negative effects of climate variability on food production.

2.7 Conclusion

Considering increasing calls for sustainability due to worsening food insecurity, this study emphasises the need to situate UPA in the wider remit of the production of space and the food sovereignty canon. The significance of the concept of food sovereignty among farmers, can only be refuted or substantiated by the farmers. Therefore, in addition to the use of focus groups discussions and key informant interviews, the study will buttress the qualitative findings with quantifiable data drawn from questionnaires. Although the concept is in its embryonic stages on the continent and little so in Zimbabwe, the study seeks to identify nuances of the practice from the perceptions of urban farmers as they create edible landscapes within and beyond their environs. It is through gaining understanding from a holistic perspective the politics of space and production practices of farmers in relation to how these are shaped by food sovereignty can we fully comprehend the appropriate avenues to take in tackling food insecurity.

Access to nutritious, healthy, organic and sustainably grown food is borne out by research that shows the merits of espousing food sovereignty. Beyond obtaining food, the concept entails assuming control over one's consumptive needs despite challenges and constraints ranging from policy, socio-economic or socio-political spheres. A description of methodological procedures and challenges encountered in the field is provided in the next chapter.

References

- AFARI-SEFA, V., RAJENDRAN, S., KESSY, R., KARANJA, D., MUSEBE, R., SAMALI, S. & MAKARANGA, M. 2016. Impact of nutritional perceptions of traditional African vegetables on farm household production decisions: a case study of smallholders in Tanzania. *Experimental Agriculture*, 52, 300-313.
- ANYANE, S. L. 1963. Vegetable gardening in Accra. *The Ghana Farmer*, 1, 228-230.
- BARRETT, C. B. & CONSTAS, M. A. 2014. Toward a theory of resilience for international development applications. *Proceedings of the National Academy of Sciences*, 111, 14625-14630.
- BATTERSBY, J. 2011. Urban food insecurity in Cape Town, South Africa: An alternative approach to food access. *Development Southern Africa*, 28, 545-561.
- BATTERSBY, J. 2012. Urban food security and the urban food policy gap. *Strategies to Overcome Poverty and Inequality: Towards Carnegie 3 Conference*. Cape Town.
- BATTERSBY, J. & CRUSH, J. Africa's urban food deserts. *Urban Forum*, 2014. Springer, 143-151.
- BEAUREGARD, S. & GOTTLIEB, R. 2009. Food policy for people: incorporating food sovereignty principles into state governance. Case studies of Venezuela, Mali, Ecuador, and Bolivia. *Urban and Environmental Policy Department, Occidental College, Los Angeles*.
- BELLWOOD-HOWARD, I., AMOAH, P., ZAKARIA, R. & VAN VEENHUIZEN, R. 2015. Urban and Peri-urban Agriculture in Tamale: A Policy Narrative.: URBANET, UrbanFood Plus, RUAF Foundation, Ghana WASH Programme, University for Development Studies, and International Water Management Institute.
- BEZNER-KERR, R., BERTI, P. R. & SHUMBA, L. 2011. Effects of a participatory agriculture and nutrition education project on child growth in northern Malawi. *Public health nutrition*, 14, 1466-1472.
- BEZNER-KERR, R., NYANTAKYI-FRIMPONG, H., LUPAFYA, E. & DAKISHONI, L. 2016. Food Sovereignty, Agroecology and Resilience: Competing or Complementary Frames. *Global Governance/Politics, Climate Justice and Agrarian/Social Justice: Linkages and Challenges. An international colloquium 4-5 February* The Hague, Netherlands: International Institute of Social Studies.
- BOILLAT, S. & BERKES, F. 2013. Perception and interpretation of climate change among Quechua farmers of Bolivia: indigenous knowledge as a resource for adaptive capacity. *Ecology and Society*, 18, 2-13.
- BOONE, K. & TAYLOR, P. L. 2016. Deconstructing homegardens: food security and sovereignty in northern Nicaragua. *Agriculture and human values*, 33, 239-255.
- BORRAS JR, S. M., FRANCO, J. C. & SUÁREZ, S. M. 2015. Land and food sovereignty. *Third World Quarterly*, 36, 600-617.
- BOWYER-BOWER, T. & DRAKAKIS-SMITH, D. 1996. The needs of the urban poor versus environmental conservation: conflict in urban agriculture, Final Report of ODA Project R5946. London: Overseas Development Administration.
- BRAZIER, A. 2012. Conflicts over urban agriculture in Harare, Zimbabwe *African Arguments* [Online]. Available: <http://africanarguments.org/2012/07/10/conflicts-over-urban-agriculture-in-harare-zimbabwe/> [Accessed 23-11-2015].
- BROWN, D., CHANAKIRA, R. R. & CHATIZA, K. 2012. *Climate change impacts, vulnerability and adaptation in Zimbabwe*, London, United Kingdom, International Institute for Environment and Development.
- BRYAN, E., RINGLER, C., OKOBA, B., RONCOLI, C., SILVESTRI, S. & HERRERO, M. 2013. Adapting agriculture to climate change in Kenya: Household strategies and determinants. *Journal of Environmental Management*, 114, 26-35.
- BRYCESON, D., MAUNDER, D., MBARA, T., KIBOMBO, R., DAVIS, A. & HOWE, J. 2003. Sustainable livelihoods, mobility and access needs. *TRL Report*. Berkshire, England: Transport Road Laboratory.
- BRYLD, E. 2003. Potentials, problems, and policy implications for urban agriculture in developing countries. *Agriculture and human values*, 20, 79-86.

- CABANNES, Y. 2012. *Pro-poor legal and institutional frameworks for urban and peri-urban agriculture*, Rome, Italy, Food and Agriculture Organization of the United Nations.
- CARNEY, M. 2016. " Food Security" and" Food Sovereignty": What Frameworks Are Best Suited for Social Equity in Food Systems? *Journal of Agriculture, Food Systems, and Community Development*, 2, 71-87.
- CHANZA, N. & MAFONGOYA, P. 2017. Indigenous-based climate science from the Zimbabwean experience: From impact identification, mitigation and adaptation. In: AJAYI, O. C. & MAFONGOYA, P. L. (eds.) *Indigenous Knowledge Systems and Climate Change Management in Africa*. Wageningen, Netherlands: Technical Centre for Agricultural and Rural Cooperation.
- CISSÉ, J. D. & BARRETT, C. B. 2016. Estimating development resilience: A conditional moments-based approach. *African Development Bank Group, Working Paper*. Abidjan, Côte d'Ivoire: African Development Bank.
- CLAPP, J. & COHEN, M. J. 2009. *The global food crisis: Governance challenges and opportunities*, Ontario, Canada, Wilfrid Laurier University Press.
- COLLIER, P. 2008. The politics of hunger: How illusion and greed fan the food crisis. *Foreign Affairs*, 67-79.
- COOK, J., OVIATT, K., MAIN, D. S., KAUR, H. & BRETT, J. 2015. Re-conceptualizing urban agriculture: an exploration of farming along the banks of the Yamuna River in Delhi, India. *Agriculture and Human Values*, 32, 265-279.
- CROWDER, D. W. & REGANOLD, J. P. 2015. Financial competitiveness of organic agriculture on a global scale. *Proceedings of the National Academy of Sciences*, 112, 7611-7616.
- CRUSH, J. & FRAYNE, B. 2010. *The invisible crisis: urban food security in Southern Africa*, Cape Town, Unity Press.
- CRUSH, J. & FRAYNE, B. 2014. Feeding African cities: The growing challenge of urban food insecurity. *Africa's urban revolution*, 120-132.
- CRUSH, J., HOVORKA, A. & TEVERA, D. 2011. Food security in Southern African cities: the place of urban agriculture. *Progress in Development Studies*, 11, 285-305.
- CRUSH, J. S., HOVORKA, A. & TEVERA, D. 2010. *Urban food production and household food security in southern African cities*, Ontario, Canada, Kingston University.
- DE BON, H., PARROT, L. & MOUSTIER, P. 2010. Sustainable urban agriculture in developing countries. A review. *Agronomy for sustainable development*, 30, 21-32.
- DRESCHER, A., HOLMER, R. & IAQUINTA, D. 2006. Urban homegardens and allotment gardens for sustainable livelihoods: Management strategies and institutional environments. *Tropical homegardens*. Springer.
- ELLIS, F. & SUMBERG, J. 1998. Food production, urban areas and policy responses. *World Development*, 26, 213-225.
- ENDA-ZIMBABWE 1994. Urban agriculture in Harare: report on an IDRC supported project.: ENDA (Environment and Development Activities)-Zimbabwe (Unpublished Report).
- FAO 2012. *Growing greener cities in Africa: first status report on urban and peri-urban horticulture in Africa*, Food and Agriculture Organization of the United Nations. Rome, Italy.
- FAO 2014. The state of food insecurity in the world: Strengthening the enabling environment for food security and nutrition. Rome, Italy: FAO.
- FAO, IFAD & WFP 2013. The State of Food Insecurity in the World. The multiple dimensions of food security. *Food and Agricultural Organisation of the United Nations. Rome, Italy*.
- FOEKEN, D. 2006. To Subsidise My Income. Urban Farming in an East-African Town *Kenya Coast Handbook: Culture, Resources and Development in the East African Littoral*.
- FRAYNE, B., CRUSH, J. & MCLACHLAN, M. 2014a. Urbanization, nutrition and development in Southern African cities. *Food Security*, 6, 101-112.
- FRAYNE, B., MCCORDIC, C. & SHILOMBOLENI, H. 2014b. Growing Out of Poverty: Does Urban Agriculture Contribute to Household Food Security in Southern African Cities? *Urban Forum*. Springer.
- GALLAHER, C. M., KERR, J. M., NJENGA, M., KARANJA, N. K. & WINKLERPRINS, A. M. 2013. Urban agriculture, social capital, and food security in the Kibera slums of Nairobi, Kenya. *Agriculture and human values*, 30, 389-404.

- GBETIBOUO, G. A. 2009. *Understanding farmers' perceptions and adaptations to climate change and variability: The case of the Limpopo Basin, South Africa*, Washington DC, USA, Intl Food Policy Res Inst.
- GERSTER-BENTAYA, M. 2013. Nutrition-sensitive urban agriculture. *Food security*, 5, 723-737.
- GLASSER, R. 2017. The Farm in the City in the Recent Past: Thoughts on a more inclusive urban historiography. *Journal of Urban History*, 4, 1-18.
- GODFRAY, H. C. J. & GARNETT, T. 2014. Food security and sustainable intensification. *Philosophical transactions of the Royal Society B: biological sciences*, 369, 1-10.
- GONDO, R., MADIGELE, P. K., MOGOMOTSI, G., TOKWE, T., CHAKAUYA, J. & CHIREFU, H. 2017. Sustainability of Urban Agriculture under economic and political instability in Karoi, Zimbabwe. *Global Journal of Advanced Research*, 4, 52-62.
- HEADEY, D. & FAN, S. 2008. Anatomy of a crisis: the causes and consequences of surging food prices. *Agricultural Economics*, 39, 375-391.
- HECKELMAN, A. & WITTMAN, H. 2015. Food sovereignty: A framework for assessing agrarian responses to climate change in the Philippines. *Austrian Journal of South-East Asian Studies*, 8, 87-94.
- HILLBRUNER, C. & EGAN, R. 2008. Seasonality, household food security, and nutritional status in Dinajpur, Bangladesh. *Food and Nutrition Bulletin*, 29, 221-231.
- HOLT-GIMÉNEZ, E. & ALTIERI, M. A. 2013. Agroecology, food sovereignty, and the new green revolution. *Agroecology and sustainable Food systems*, 37, 90-102.
- HWALLA, N., EL LABBAN, S. & BAHN, R. A. 2016. Nutrition security is an integral component of food security. *Frontiers in Life Science*, 9, 167-172.
- JELLIFFE, D. B. 1967. Parallel food classifications in developing and industrialized countries. *The American Journal of Clinical Nutrition*, 20, 279-281.
- JIRI, O., MAFONGOYA, P. & CHIVENGE, P. 2015. Smallholder farmer perceptions on climate change and variability: A predisposition for their subsequent adaptation strategies. *Journal of Earth Science & Climatic Change*, 6, 1-7.
- JIRI, O., MTALI-CHAFADZA, L. & MAFONGOYA, P. L. 2017. Influence of smallholder farmers' perceptions on adaptation strategies to climate change and policy implications in Zimbabwe. *Change and Adaptation in Socio-Ecological Systems*, 3, 47-55.
- JOHNSON, R. B. & ONWUEGBUZIE, A. J. 2004. Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33, 14-26.
- JONES, A. D., NGURE, F. M., PELTO, G. & YOUNG, S. L. 2013. What are we assessing when we measure food security? A compendium and review of current metrics. *Advances in Nutrition: An International Review Journal*, 4, 481-505.
- KENNY, M. 2014. *Exploring Karen Experiences of Urban Agriculture in Ottawa: The Importance of Place-Making, Agriculture and Cultural Identity*. Master of Arts, Carleton University Ottawa.
- KIMANI-MURAGE, E. W., SCHOFIELD, L., WEKESAH, F., MOHAMED, S., MBERU, B., ETTARH, R., EGONDI, T., KYOBUTUNGI, C. & EZEH, A. 2014. Vulnerability to food insecurity in urban slums: experiences from Nairobi, Kenya. *Journal of Urban Health*, 91, 1098-1113.
- KNUTH, L. & VIDAR, M. 2011. *Constitutional and Legal Protection of the Right to Food around the World*, Rome, Italy, Food and Agriculture Organization of the United Nations.
- KUTIWA, S., BOON, E. & DEVUYST, D. 2010. Urban agriculture in low income households of Harare: an adaptive response to economic crisis. *Journal of Human Ecology*, 32, 85-96.
- LA VIA CAMPESINA 2007. Nyéléni declaration. Sélingué, Mali: Forum for Food Sovereignty. *Declaration of the Forum for Food Sovereignty*. Selingue, Mali.
- LA VIA CAMPESINA 2008. Food Sovereignty now! Unity and struggle of the people! Declaration of Maputo. *Fifth International Conference of La Vía Campesina October 16th to 23rd, 2008* Maputo, Mozambique.
- LEFEBVRE, H. 1991. *The Production of Space*, Oxford, United Kingdom, Blackwell.
- LERNER, A. M. & EAKIN, H. 2011. An obsolete dichotomy? Rethinking the rural–urban interface in terms of food security and production indeveloping countries . *The Geographical Journal*, 177, 311-320.

- MARSH, R. 1998. Building on traditional gardening to improve household food security. *Food Nutrition and Agriculture*, 22, 4-14.
- MARTENS, J. 2012. How Zimbabwe lost its food sovereignty and food security. Rosa Luxemburg Stiftung. Available: www.rosalux.co.za/wp-content/uploads/2012/09/2012-Zimbabwe-SD-012012.pdf.
- MAXWELL, D., LEVIN, C. & CSETE, J. 1998. Does urban agriculture help prevent malnutrition? Evidence from Kampala. *Food policy*, 23, 411-424.
- MAXWELL, D. & ZZIWA, S. 1992. Urban agriculture in Africa: the case of Kampala Uganda. *African Centre for Technology Studies*, . Nairobi, Kenya.
- MAXWELL, D. G. 1995. Alternative food security strategy: A household analysis of urban agriculture in Kampala. *World Development*, 23, 1669-1681.
- MBIBA, B. 1995. *Urban agriculture in Zimbabwe: The implications for urban management, urban economy, the environment, poverty and gender*. , Brookfield, Vt., U.S.A., Ashgate Publishing Co.
- MBIBA, B. 2000. Urban agriculture in Harare: between suspicion and repression. In: BAKKER, N., DUBBELING, M., GUENDEL, S., SABEL KOSCHELLA, U. & DE ZEEUW, H. G. C., GROWING FOOD, URBAN AGRICULTURE ON THE POLICY AGENDA. DSE, PP. 285-301. (eds.) *Growing Cities, Growing Food, Urban Agriculture on the Policy Agenda* Feldafing, Germany: Feldafing: Deutsche Stiftung für international Entwicklung (DSE).
- MKWAMBISI, D. D., FRASER, E. D. & DOUGILL, A. J. 2011. Urban agriculture and poverty reduction: evaluating how food production in cities contributes to food security, employment and income in Malawi. *Journal of International Development*, 23, 181-203.
- MOORE, S. 2006. Forgotten roots of the green city: Subsistence gardening in Columbus, Ohio, 1900-1940. *Urban Geography*, 27, 174-192.
- MOUGEOT, L. J. 1994. Urban food production: evolution, official support and significance. *Cities Feeding People Report 8*. Ottawa, Canada: International Development Research Centre (IDRC).
- MREMA, M. & CHITIYO, F. 2011. Home gardening as a coping strategy for Urban and Peri Urban households: The case of Mutare City, Manicaland province, Zimbabwe during the 2008 hyperinflation period. *Proceeding of IFPRI conference on Agricultural productivity and food Security, 1st-3rd November*. Mutare, Zimbabwe.
- MUBVAMI, T. & MUSHAMBA, S. 2004. Mainstreaming gender in urban agriculture: Application of gender analysis tools: A case study of Musikavanhu Project, Harare. Municipal Development Partnership, Harare Zimbabwe. *Women Feeding Cities, Accra, Ghana, Sept*, 20-23.
- MUBVAMI, T. & TORIRO, P. 2011. Food Security and Infrastructure in Urban and Peri-Urban Agriculture in Harare, Zimbabwe Macro-economic survey. Harare, Zimbabwe.
- MUDIMU, G. D. 1997. Urban agricultural activities and women's strategies in sustaining family livelihoods in Harare, Zimbabwe. *Singapore Journal of Tropical Geography*, 17, 179-194.
- MUDZENERERE, F. H. 2012. The contribution of women to food security and livelihoods through urban agriculture in the city of Bulawayo, Zimbabwe. *Zimbabwe Journal of Science and Technology*, 7, 1-15.
- NCUBE, N. & NCUBE, D. 2016. Urban agriculture and food security: a case study of Old Pumula suburb of Bulawayo in Zimbabwe. *Global Journal of Advanced Research*, 8, 771-782.
- NGCOYA, M. & KUMARAKULASINGAM, N. 2016. The Lived Experience of Food Sovereignty: Gender, Indigenous Crops and Small-Scale Farming in Mtubatuba, South Africa. *Journal of Agrarian Change*, 17.
- NISBETT, N., VAN DEN BOLD, M., GILLESPIE, S., MENON, P., DAVIS, P., ROOPNARAIN, T., KAMPMAN, H., KOHLI, N., SINGH, A. & WARREN, A. 2017. Community-level perceptions of drivers of change in nutrition: Evidence from South Asia and sub-Saharan Africa. *Global Food Security*, 13, 74-82.
- OGUNDARI, K. & AWOKUSE, T. 2016. Assessing the Contribution of Agricultural Productivity to Food Security levels in Sub-Saharan African countries. *2016 Annual Meeting, July 31-August 2, 2016*. Boston, Massachusetts: Agricultural and Applied Economics Association.
- OJIEWO, C., KEATINGE, D. J., HUGHES, J., TENKOUANO, A., NAIR, R., VARSHNEY, R., SIAMBI, M., MONYO, E., GANGA-RAO, N. & SILIM, S. 2015. The role of vegetables and

- legumes in assuring food, nutrition, and income security for vulnerable groups in sub-Saharan Africa. *World Medical & Health Policy*, 7, 187-210.
- ONYANGO, C. L. 2010. *Urban-urban and peri-urban agriculture as a poverty alleviation strategy among low income households: The case of Orange Farm, South Johannesburg*. Master of Arts, University of South Africa, CapeTown.
- OPITZ, I., BERGES, R., PIORR, A. & KRIKSER, T. 2016. Contributing to food security in urban areas: differences between urban agriculture and peri-urban agriculture in the Global North. *Agriculture and Human Values*, 33, 341-358.
- PADGHAM, J., JABBOUR, J. & DIETRICH, K. 2015. Managing change and building resilience: A multi-stressor analysis of urban and peri-urban agriculture in Africa and Asia. *Urban Climate*, 12, 183-204.
- PATEL, R. 2009. Food sovereignty. *The Journal of Peasant Studies*, 36, 663-706.
- PEDZISAI, E., KOWE, P., MATARIRA, C. H., KATANHA, A. & RUTSVARA, R. 2014. Enhancing food security and economic welfare through urban agriculture in Zimbabwe. *Journal of Food Security*, 2, 79-86.
- PEREIRA, H. M., NAVARRO, L. M. & MARTINS, I. S. 2012. Global biodiversity change: the bad, the good, and the unknown. *Annual Review of Environment and Resources*, 37, 25-50.
- PIERCE, L. C. 1987. *Vegetables: Characteristics, production and marketing*. John Wiley.
- PIETERS, H., VANDEPLAS, A., GUARISO, A., FRANCKEN, N., SARRIS, A., SWINNEN, J., GERBER, N., VON BRAUN, J. & TORERO, M. 2012. Perspectives on relevant concepts related to food and nutrition security. LEI Wageningen UR.
- PRAIN, G. & DUBBELING, M. 2011. *Urban Agriculture: A Sustainable Solution to Alleviating Urban Poverty, Addressing the Food Crisis, and Adapting to Climate Change. Synthesis report on five case studies prepared for the World Bank. Leusden: RUAF Foundation.*
- PRAIN, G., GONZALES, N., ARCE, B. & TENORIO, J. 2009. Organic vegetable production on the peri-urban interface: helping low income producers access high value markets in Lima, Peru. *II International Conference on Landscape and Urban Horticulture 881*.
- PREMAT, A. 2009. State power, private plots and the greening of Havana's urban agriculture movement. *City & Society*, 21, 28-57.
- PUDUP, M. B. 2008. It takes a garden: Cultivating citizen-subjects in organized garden projects. *Geoforum*, 39, 1228-1240.
- QUON, S. 1999. Planning for urban agriculture: A review of tools and strategies for urban planners. *Cities feeding people series; rept. 28*.
- REGANOLD, J. P. & WACHTER, J. M. 2016. Organic agriculture in the twenty-first century. *Nature Plants*, 2, 1-8.
- REZAI, G., SHAMSUDIN, M. N. & MOHAMED, Z. 2016. Urban agriculture: a way forward to food and nutrition security in Malaysia. *Procedia-Social and Behavioral Sciences*, 216, 39-45.
- RUEL, M. T. 2003. Operationalizing dietary diversity: a review of measurement issues and research priorities. *The Journal of Nutrition*, 133, 3911S-3926S.
- RURINDA, J., MAPFUMO, P., VAN WIJK, M. T., MTAMBANENGWE, F., RUFINO, M. C., CHIKOWO, R. & GILLER, K. E. 2014. Sources of vulnerability to a variable and changing climate among smallholder households in Zimbabwe: A participatory analysis. *Climate Risk Management*, 3, 65-78.
- SAWIO, C. J. 1993. *Feeding the urban masses?: towards an understanding of the dynamics of urban agriculture and land-use change in Dar-Es-Salaam, Tanzania*. PhD, Clark University Worcester.
- SCHANBACHER, W. D. 2010. *The politics of food: The global conflict between food security and food sovereignty*, ABC-CLIO.
- SEN, A. 1981. *Poverty and Famines: An Essay on Entitlement and Deprivation*, Oxford, Clarendon Press.
- SHACKLETON, C. M., PASQUINI, M. W. & DRESCHER, A. W. 2009. *African indigenous vegetables in urban agriculture*, New York, USA, Earthscan.
- SIMATELE, D. M. & BINNS, T. Motivation and marginalization in African urban agriculture: The case of Lusaka, Zambia. *Urban Forum*, 2008. Springer, 1-21.

- SITHOLE, M., NKALA, P. & DUBE, N. 2012. Do Urban Community Gardens Matter?: The Case of Bulawayo Metropolitan Province in Zimbabwe. *Mediterranean Journal of Social Sciences*, 3, 249-257.
- SMART, J., NEL, E. & BINNS, T. 2015. Economic crisis and food security in Africa: Exploring the significance of urban agriculture in Zambia's Copperbelt province. *Geoforum*, 65, 37-45.
- SONWA, D. J., DIEYE, A., EL MZOURI, E.-H., MAJULE, A., MUGABE, F. T., OMOLO, N., WOUAPI, H., OBANDO, J. & BROOKS, N. 2017. Drivers of climate risk in African agriculture. *Climate and Development*, 9, 383-398.
- STEWART, R., KORTH, M., LANGER, L., RAFFERTY, S., DA SILVA, N. R. & VAN ROOYEN, C. 2013. What are the impacts of urban agriculture programs on food security in low and middle-income countries? *Environmental Evidence*, 2, 1-7.
- STREN, R. E. 1986. *The ruralization of African cities: learning to live with poverty*, Institute for Environmental Studies, University of Toronto.
- SWINDALE, A. & BILINSKY, P. 2006. Household dietary diversity score (HDDS) for measurement of household food access: indicator guide. *Washington, DC: Food and Nutrition Technical Assistance Project, Academy for Educational Development*.
- TAMBWE, N., RUDOLPH, M. & GREENSTEIN, R. 2011. "Instead of begging, I farm to feed my children": urban agriculture – an alternative to copper and cobalt in Lubumbashi. *Africa: Journal of the International African Institute*, 81, 391–412.
- TAWODZERA, G. 2012a. Urban household survival and resilience to food insecurity in crisis conditions: The case of Epworth in Harare, Zimbabwe. *Journal of Hunger & Environmental Nutrition*, 7, 293-320.
- TAWODZERA, G. 2012b. Urban household vulnerability to food security and climate change: Experiences from urban areas Zimbabwe. In: FRAYNE, B., MOSER, C. & ZIERVOGEL, G. (eds.) *Climate change, assets and food security in Southern Africa*. New York: Earthscan. New York, USA: Earthscan.
- TAWODZERA, G., RILEY, L. & CRUSH, J. 2017. Following the Crisis: Poverty and Food Security in Harare, Zimbabwe. *Journal of Food and Nutritional Disorders*, 1-14.
- TAWODZERA, G., ZANAMWE, L. & CRUSH, J. 2012a. The state of food insecurity in Harare, Zimbabwe. . *Urban Food Security Series No. 13*. Kingston: Queens University and AFSUN.
- TAWODZERA, G., ZANAMWE, L. & CRUSH, J. 2012b. The state of food insecurity in Harare, Zimbabwe. *Urban Food Security Series No. 13*. Queen's University and AFSUN: Kingston and Cape Town.
- THORNTON, A. 2008. Beyond the metropolis: Small town case studies of urban and peri-urban agriculture in South Africa. *Urban Forum*, 243-262.
- THORNTON, A. J., LEIBBRANDT, M. & ARDINGTON, C. 2016. Pathways to food security in South Africa: Food quality and quantity in NIDS Wave 1. *A Southern Africa Labour and Development Research Unit Working Paper Number 190*. Cape Town, South Africa: University of Cape Town.
- UPTON, J. B., CISSÉ, J. D. & BARRETT, C. B. 2016. Food security as resilience: reconciling definition and measurement. *Agricultural Economics*, 47, 135-147.
- VAN VEENHUIZEN, R. & DANSO, G. 2007. Profitability and sustainability of urban and periurban agriculture. *Agricultural Management, Marketing and Finance Occasional Paper* Rome, Italy: Food and Agriculture Organisation
- WEZEL, A., CASAGRANDE, M., CELETTE, F., VIAN, J.-F., FERRER, A. & PEIGNÉ, J. 2014. Agroecological practices for sustainable agriculture: A review. *Agronomy for Sustainable Development*, 34, 1-20.
- WFP 2014. *Adapting to an Urban World: Urban food security pilot assessment*, Harare, Zimbabwe. World Food Programme
- Wittman, H. 2010. *Food Sovereignty: Reconnecting food, Nature & Community*, Winnipeg , Canada, Fernwood Publishing.
- YAP, C. 2013. *Urban Food Sovereignty: Food, Land and Democracy in Kampala*, Development Planning Unit, Bartlett, University College London.

- ZASADA, I., FERTNER, C., PIORR, A. & NIELSEN, T. S. 2012. Peri-urban agriculture and multifunctionality: urban influence, farm adaptation behaviour and development perspectives. *Danish Journal of Geography*, 111, 59-72.
- ZERBE, N. 2012. The Global Politics of Local Food: Community Resistance and Resilience in Durban, South Africa. *Association Of Concerned Africa Scholars* [Online].
- ZEZZA, A. & TASCIOTTI, L. 2010. Urban agriculture, poverty, and food security: empirical evidence from a sample of developing countries. *Food Policy*, 35, 265-273.
- ZIMVAC 2006. Urban Assessment Report. *Urban Report No. 2*. Harare: Zimbabwe National Vulnerability Assessment Committee.
- ZIMVAC 2011. Urban Livelihoods Assessment April 2011 Report” (Harare, 2011). Harare: Zimbabwe National Vulnerability Assessment Committee.

CHAPTER 3

URBAN AND PERI-URBAN AGRICULTURE (IN)SIGNIFICANCE TO FOOD SECURITY AND NUTRITION AMONG LOW-INCOME HOUSEHOLDS IN HARARE.

Abstract

Food insecurity and poor nutrition in low-income urban spaces are attracting academic interest due to urbanisation and related challenges. Yet, scientific enquiry and resultant programming retain a rural focus. Using a mixed methods approach, the researcher evaluated urban and peri-urban agriculture utility in enhancing food security and nutrition among low-income households in Harare. A meta-inference of the results indicated a high prevalence of severe food insecurity and low dietary diversity. Benefits derived from the practice were modest due to a myriad of constraints and by no means addressed all the consumptive needs of households. Land size, frequent access to extension services were positive indicators of food security ($P \leq 0.05$). Income was not a significant indicator of both household food security and household dietary diversity. Diverging with literature, households that did not practice crop diversification were associated with higher odds of being food secure ($P \leq 0.05$). Females and staple food production was widely reflected in the consumption patterns of the sampled population. Dietary intake mainly consisted of carbohydrates and leafy vegetables with a low intake of protein-rich foods. Evidently, households that reported UPA as a main food source had more varied diets. Notably, there was comparative difference in food security and nutrition temporally (age of settlement) rather than settlement type. The findings outline the urgency to streamline the urban dynamic into food security and nutrition programming which is centred on improving dietary diversity. Such an approach provides a possible avenue to improve food security not only at household level but also at national level in the long term.

Keywords: household dietary diversity, food security, urban and peri-urban agriculture, nutrition, low-income households

3.1 Introduction

Poor nutritional status and food insecurity among low-income groups are deep-rooted concerns in developing countries. Globally, 870 million individuals suffered from malnutrition between 2010-2012 and a significant proportion of these were resident in Africa (FAO, 2012b). Urbanisation, climate change and financial instability are some of the key factors that contribute to this concern (Satterthwaite et al., 2010, Wheeler and

Von Braun, 2013). A fluctuation of these factors, singly or in combination impede the ability of such households to attain and sustain nutritionally balanced diets. Food insecurity in this paper is defined as the unstable access, availability and utilisation of adequate amounts of nutrient-rich foods (FAO, 2015) Hence, food security embodies the ability to suppress the occurrence of such episodes for sustained periods. To avert food insecurity, urban households have resorted to different coping strategies which include urban and peri-urban agriculture (UPA). However, akin to any strategy, UPA is not immune to sceptics. The practice is beset by divergent views in terms of its significance. Scholars (Frayne et al. (2014b), Battersby and Crush, 2014, Crush et al., 2017) posit that yields obtained have been magnified and question its capacity to increase nutrition.

Conversely, other scholars (Tasciotti and Wagner, 2015, Thompson and Meerman, 2014, Zezza and Tasciotti, 2010, Rezai et al., 2016) maintain that UPA expands food options for the urban poor in two distinct ways; directly through self-production and indirectly through income. A meta-analysis of urban agriculture's significance in developing countries between 1998 and 2005 by Zezza and Tasciotti (2010) also indicated that self-production exposed the urban poor to a wide range of food choices. More so, it enhanced household dietary diversity (HDD) and calorie intake in 10 out of 15 countries from Africa, Asia, Eastern Europe and Latin America. Drawing on a national data set (2008-2011) surveying poor urban communities in Tanzania Tasciotti and Wagner (2015) reported an increase in the consumption of animal based products (10%), milk based products (16%) and fruit and vegetables (9%) as a result of engagement in UPA.

Growing food, according to Thompson and Meerman (2014), not only responds to issues of availability and accessibility but promotes HDD through utilisation, which, if sustained over a long period enhances nutrition and overall well-being. This is illustrated in Fig 3.1, which demonstrates the link between UPA, HDD and all dimensions of food security (availability, access, utilisation and stability). Bennet's law, demonstrates that as income increases, households consume a more varied diet which consists of reduced cereal portions. Conversely, limited income increases the likelihood of a 'starch' heavy based food basket (Timmer et al., 1983). Confirming this assertion (Drimie et al., 2013) demonstrated how 21.9% of households from informal settlements compared to 74.6% of households in high density areas had high HDD scores Drimie et al. (2013). Inversely, (Crush et al., 2012, Battersby, 2012, McCordic and Frayne, 2017) argued that while income plays a pivotal role in HDD, it is only one of many contributing factors to food security. To illustrate, (Crush et al., 2012) argue that a variance of 11% between the food secure and insecure households across African cities indicates that income does not inevitably translate to food security.

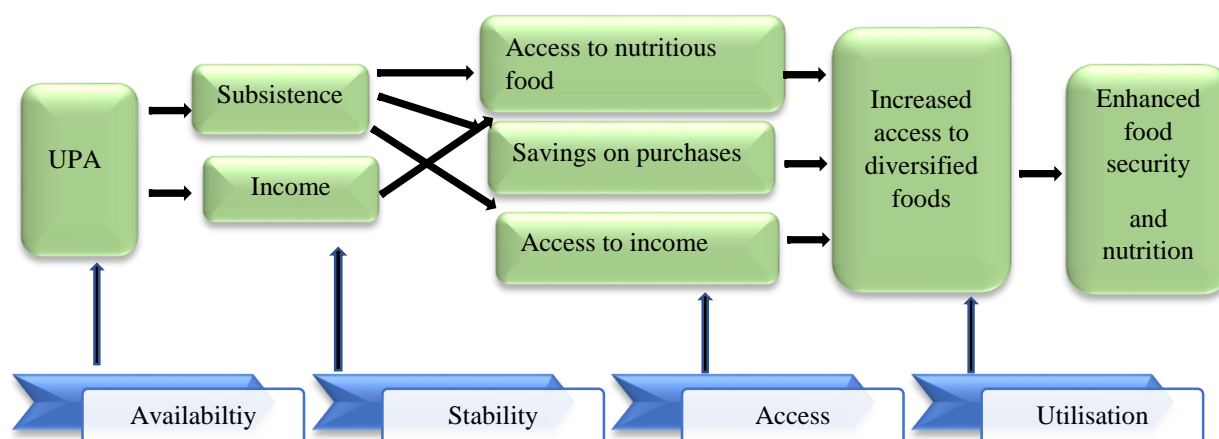


Figure 3. 1 Projected impact of UPA on HDD against dimensions of food security
Source: Author - adapted from Jones et al. (2013) and Montfort (2015)

The association between HDD and food security is well documented. Scholars have demonstrated that the dietary intake of poor households consists of large quantities of starch based foods and deficient in protein rich foods (Battersby, 2011, Ochieng et al., 2017, Tawodzera et al., 2012b, Drimie et al., 2013, Shone et al., 2017). Using HDD as a proxy for food security, Shone et al. (2017) demonstrated how the dietary diversity of poor households in West Abaya district, Ethiopia was restricted to cereals, vegetables and fruits. A meagre 3.9% of the households had moderate (3.3%) or high dietary diversity (0.6%). In Manyara and Dodoma regions in Tanzania, Ochieng et al. (2017) confirmed the dominance of grain based foods (99%), vegetables (90%), oil based foods (88%) and spices (79%). While both studies are rural based, they illuminate the monotony in the diets of low-income households and the importance of socio-economic status in measuring dietary diversity.

Literature has established a nexus between crop diversity and HDD (Jones et al., 2014, Kavitha et al., 2016, Rajendran et al., 2017). Using the ecologically based Simpson's Index of Diversity¹¹ Jones et al. (2014) reported a positive correlation by modelling diversified farming and dietary diversity among farmers in Malawi. Of note is that high dietary diversity was recorded among more affluent households. However, the study had two caveats; a) it is drawn from a national survey that mask an accurate depiction of the urban dynamic. b) enumerating food consumption experiences conceals in-depth consumption patterns and other contextual factors (Yin, 2017). Relatedly, literature (Rajendran et al. (2017), Kavitha et al., 2016) highlighted the non-linearity between crop diversity and dietary diversity. In their analysis of the association between crop diversity and HDD in 6 villages within semi-arid regions of India, bivariate analysis by Kavitha et al. (2016)

¹¹ An index which measures the quantity of species and the abundance of that species

indicates an insignificant relationship between crop diversity and HDD suggesting that other factors also contribute to HDD. Using two regression models, Rajendran et al. (2017) posit that income, education and nutrition training are key determinants of dietary diversity.

Household dietary diversity in Zimbabwe remains untenable. A more disconcerting trend is that research has a rural, child or gendered bias (Chiruvu et al., 2017, Murendo et al., 2018). Yet literature has provided evidence of differential challenges faced by urban households; a) insecurity of tenure and smaller land sizes (Cook et al., 2015, FAO, 2012a) b) stronger dependence on markets (Cohen and Garrett, 2010). Zimbabwe has experienced a patent decay in the agricultural economy since the 1990s, making it particularly difficult for 'market dependent' poor households to evade food insecurity. Instabilities borne in the 1990s, in combination with more recent national and global financial crises led to in a meagre 20% of the population indexed as living above the poverty datum line (\$1.25 per day) in 2008 (Getu and Devereux, 2013). Justifiably, UPA has been on the rise (Mbiba, 1995) and as projected by Masvaure (2016) inability to address poverty will lead to further expansion of the practice. It remains to be seen, what fraction of urban households live on the total consumption poverty line (TCPL) of \$502.90 pegged as at May 2017 given the sustained poor economic performance (ZimStat, 2017). For the authors, such an economy, provides fertile ground for investigating how UPA shapes urban food security and nutrition.

Research on UPA in Zimbabwe has been growing. A number of studies have focused on the urban dynamic, however, they make a stunted analysis to motivation for the practice or its merits and demerits (Dube, 2017, Kutiwa et al., 2010, Tawodzera et al., 2012b, Mujere, 2017, Masvaure, 2016). While findings from all studies reinforce the importance of UPA as a survival strategy, Kutiwa et al. (2010) question its significance. Instead, findings from their investigation on UPA's impact among resource constrained households in Harare underscores its small contribution to food security and caution against exaggerated claims of benefits derived from the practice. It is also mostly dominated by women (Kutiwa et al., 2010)

Despite calls by Webb (2000) for rigorous empirical evidence on the association between nutrition and urban cultivation in sub-Saharan Africa (SSA), the gap remains (Frayne et al., 2017). Except for Tawodzera et al. (2012a), other studies in Zimbabwe focus on the contribution of the practice to food security. Using a combination of three food security indicators¹² Tawodzera et al, 2012b used a mixed methods assessment of food insecurity in Harare (Mabvuku, Tafara and Dzivarasekwa) indicated that almost three quarters (72%) were food insecure. A meagre 2% of the households were food secure (Tawodzera et al., 2012b). Lived

¹² The indicators, Household Food Insecurity Access Prevalence Indicator; HDDS; and Months of Adequate Household Food Provisioning were used.

Poverty Index (LPI) which measures annual access to basic goods and services, reflected that residents of Harare scored highest (2.2/4) out of ten other cities in SSA. Correspondingly, Harare also recorded the poorest HDD. Collected in 2008, the African Food Security Urban Network (AFSUN) data employed by the study indicates a significant relationship between the financial crises, which led to a surge in food prices. Commodity inflation meant that more than half of the respondents reduced expenditure on high-priced food groups. The following food groups remained within reach for a small proportion of the households; dairy products, roots and eggs (<13%) meat, fruits, legumes and fish >23%. Conversely, maize (99%) and vegetables (92%) were accessible to most households (Tawodzera et al., 2012b). A similar consumption pattern is mirrored in Epworth. Almost three quarters (74.5%) of the households consumed 4 or less food groups (Tawodzera, 2011). The use of mixed methods to investigate the inventiveness of poor households in crises periods makes the study compelling. However, it broadly focuses on the various paths of income diversification. While UPA is included as one of the income-generating activities, its impact on dietary diversity is deflected by focus on other activities.

Beyond, UPA's contribution to food, the paper attempts to afford equal weight to all food security pillars as they relate to UPA. It is important to note that this study does not view UPA as a panacea for poverty and food insecurity (Haysom and Battersby (2016), McClintock, 2017). Instead, its purpose was to examine UPA utility in terms of both food provisioning and more pointedly, dietary diversity. Drawing on findings from developing countries, the paper reinforces the importance of understanding how UPA shapes the dietary diversity of households. Such an inquiry is critical to not only contributing to the scarce literature in the field but more importantly paving a pathway for the development of urban production and nutrition centred initiatives.

3.2 Materials and methods

3.2.1 Location of the study and sampling strategy

Using mixed methods which involves the use of both quantitative and qualitative data (Creswell and Clark, 2011), a cross-sectional survey, focus group discussions (FGDs) and Key Informant Interviews (KIIs) were used to obtain data from four study sites within the Harare Metropolitan Province which is in Natural Region 2 and is 1494 m above sea level. The sites are located along the following geographical coordinates; Mabvuku (17°53'24"S 31°8'51"E), Epworth (17°53'24"S 31°8'51"E), Ushewokunze (18°10'0" S and 31°13'60" E) and Hatcliffe extension (17° 40' 49"S 31° 5' 52 E) (17.6805° S, 31.0977° E). While the province is endowed with fertile soils and an average annual rainfall ranging from 700 and 1050 mm, recent data shows that there has

been an increase in temperatures, decline in rainfall, delayed onset of the rainy season. Together, these extreme weather occurrences have resulted in increased food insecurity (Manyeruke et al, 2013).

These were demarcated by a) settlement type, urban (Mabvuku and Hatcliffe Extension) and b) peri-urban (Epworth and Ushewokunze). The rationale for analysing UPA type, location, temporal variations was to glean out production and consumption differences and evade a linear analysis of the above phenomenon. The selection of the study sites was influenced by empirical evidence which locates high poverty and food insecurity in poorer segments of the city (Manjengwa et al., 2016, Masvaure, 2016, Tawodzera, 2012a, Tawodzera et al., 2017). This mixed methods study benefits from harmonising methodological strengths, e.g. statistical (quantitative) and perceptions and experiences (qualitative) critical to capturing holistic data on food security (Carletto et al., 2013), is premised on mixed methods. Data collection was divided into two sequential phases. The first phase and second phase were between June and July 2017, which is a lean period for Zimbabwe's farming season. KIIs were conducted within and between November 2017 and March 2018.

Given the different phases of data collection, multi-phase sampling technique was applied. This entails drawing on sub-samples from the same frame using diverse techniques at the different stages of data collection (Lesser, 2014). Purposive sampling was used to select study sites. In the first phase, stratified systematic sampling was employed to select the 400 urban farmers. Each study site was demarcated by existing ward or area boundaries. For example, an average of 14 urban farmers were interviewed in each ward. $\frac{100}{7} = n$. After calculating the step size¹³ of each ward, every n th house (which varied by section of ward) in was sampled. In the second phase, 35 urban farmers were randomly selected from first phase to participate in FGDs conducted within their respective communities. Each session comprised seven to twelve participants. Eight key informants who participated in KIIs were purposively selected based on expertise in the field and direct and indirect experience with UPA.

3.2.2 Data collection

Taking heed of the importance of the inclusion of all pillars of food security (Fig 3.1), three measurement techniques were employed to provide a nuanced reflection of both nutrition and household food security (HFS) status. In the first phase, a survey comprising questions adapted from the Household Hunger Scale (HHS) and Household Food Insecurity Access Scale (HFIAS) was used to collect data on household food security status. A third measure, Household Diet Diversity Scale, was computed to quantify the variation in foods consumed by households. Information on consumption of foods both produced and purchased were critical to

¹³ Interval used to ensure precision in systematic selection.

ascertaining the food security status of households. The contribution of UPA to HDD was further gleaned from this process by comparing foods identified in the 24hr recall to food groups obtained through on-plot or off-plot cultivation. Hence, HDD was employed not as an indicator of nutritional status but the quality of dietary intake (Habte and Krawinkel, 2016)

The FGDs were composed of 21 females and 14 males. Each session comprised nine to thirteen participants, forming part of the 35 respondents. Eight key informants participated in KIIs, conducted during the first phase and between February and March 2018 which formed the last phase of the data collection process. Questions were framed around UPA's contribution to food security and nutrition. The FGD and KII sessions were audio recorded and lasted between 45 to 1 hour 10 minutes and 30 minutes to an hour, respectively. Trained research assistants were encouraged to make a brief note during questionnaire administration when respondents mentioned something of concern or noteworthy. To simplify the recall process, rather than making a direct enquiry about food groups, detailed account of meals consumed by urban farmers were obtained (Kennedy et al., 2009). Taking heed of this, research assistants asked for the type of meat consumed and the quantity of milk consumed to gauge the quality and quantity, respectively. This aided in capturing more precise data on the type of food and its value.

3.2.3 Analysis

Analysis for the quantitative data (summary statistics, correlation and ordinal regression) were conducted with Statistical Package for Social Sciences (SPSS) version 24. NVivo version 12 was employed in the qualitative arm (FGDs and KIIs) to sort, navigate, query and glean patterns from data (Bazeley, 2013). Summary statistics derived from descriptive socio-demographic, economic statistics (frequencies and cross tabulations), food security and nutrition-based indicators were tabulated against HFS and HDD. Intervals for HFS and HDD were guided by the Food and Nutrition Technical Assistance (FANTA) algorithm. Based on a score of 0-6 for HHS (used as a proxy for HFS), households were grouped into terciles based on food security status. For example, food secure (≥ 1), moderately food insecure (2-3), and severely food insecure (4-6). Nutrition status was derived from HDD which is a count of food groups consumed by households the previous day (24hrs). Based on consumption patterns totalling between 0-12, households were indexed into the following categories; (0-4) low, (5-8) medium and high dietary diversity (9-12). Spearman's correlation was used to index the association between HFS and HDD which is a measure of diet quality (Habte and Krawinkel, 2016). Since the relationship between variables was not linear Spearman's rank correlation was used. To appreciate the nature of the variances parameters for HFS and HDD were also forecasted using ordinal regression. The

confidence interval for all statistical tests was at the 95% interval. The final step of the study involved converging analysis from the two research approaches using meta-inference (Teddle and Tashakkori, 2012).

3.3 Results

3.3.1 Participant characteristics

A profile of urban farmers ($n=400$) displaying socio-economic characteristics, production and consumptive practices is provided in Table 3.1. Females dominated the practice of UPA across all sites (66.25%). Four to six household members (69.5%) was the largest household size recorded, followed by seven or more (17.75%) and less than or equal to three (12.75%). Urban farmers within the age group 30-49 years (56.25%) dominated the sample. More than three-quarters of the respondents $n=305$ (90.5%) completed secondary education or a higher level of education. The remaining respondents (9.5%) did not receive any form of schooling ($n=26$) or only attained a primary level certificate ($n=69$). A meagre 3.25% of the households were indexed in the high income tercile, more than four fifths (84%) fell under the low income tercile.

Home gardening ($n=350$) was the predominant type of UPA practiced across all study sites. Garden sizes ranged from $<10\text{m}^2$ to $\geq 40\text{m}^2$. Less than half of the households cultivated on pieces of land larger than ($n=99$). Most of the large gardens were owned by those who engaged in community gardening, one third of the home gardens were weighted towards $<10\text{m}^2$ (33.25%). Crop diversification was practised by less than one third of the households (28.75%). Remaining households planted more than five crops within the same garden or field. An alarming 91.25% of the households stated that they had never received any visits from Agritex which is a department in the Ministry of Agriculture which provides extension services. Prudently, the remaining respondents who stated that they had received information from Agritex (8.75%) stated that these ‘experts’ voluntarily offered to help in their capacity as members of the community garden, relatives or friends.

Table 3. 1 Summary statistics of household and socio-economic characteristics, production practices, dietary diversity and food security status.

	Overall (%)	Ushewokunze n (%)	Hatcliffe Extension n (%)	Mabvuku n (%)	Epworth n (%)
Age					
18-29	18	3	24	25	20
30-49	56.25	65	55	57	48
50-64	20.75	26	21	15	21
65+	5	6	0	3	11
Gender					
Male	33.75	27	38	25	45
Female	66.25	73	62	75	55
Household size					
≤3	12.75	12	13	17	9
4- 6	69.5	80	52	79	67
7+	17.75	8	35	4	24
Education					
No schooling	6.5	16	0	6	4
Primary	17.25	25	16	7	21
Ordinary level	66.75	54	70	82	61
Advanced level	4	2	8	3	3
Technical/vocational college	4.75	3	6	2	8
University degree	0.75	0	0	0	3
Main Income Source					
Urban farming	33.25	22	29	36	46
Formal employment	8.75	13	13	2	7
Vending/ other trades	48	45	43	53	36
None	1.75	2	3	0	2
NSSA	8.25	14	9	2	8
Monthly household income***					
Low income	84	78	83	92	83
Medium income	12.75	17	14	6	14
High income	3.25	5	3	2	3
Land size					
Garden	87.5				
<10m ²	33.25	13	16	70	34
<20m ²	29.5	24	42	21	31
<40m ²	17.5	31	25	6	8
≥40m ²	7.25	8	8	3	10
Field	33.25				
<50m ²	4.5	15	0	2	1
<150m ²	11.5	25	4	7	10
<450m ²	8.3	13	3	1	16
≥450m ²	9	11	5	15	5
Crops/vegetables in same field					
1	28.75	23	23	49	20
2 to 4	66	73	71	48	72
5≥	5.25	4	6	3	8
Household dietary diversity					
Low dietary diversity	64.25	65	47	67	78
Moderate dietary diversity	25	20	46	19	15
High dietary diversity	10.75	15	7	14	7
Household food security**					
Food secure	12	12	19	10	7
Moderately food insecure	33	37	38	33	24
Severely food insecure	55	51	43	57	69

		Ushewokunze	Hatcliffe Extension	Mabvuku	Epworth
	%	n (%)	n (%)	n (%)	n (%)
Visits from Agritex					
Never	91.25	81	94	98	92
Seldom (1-2 times per yr.)	6.75	15	3	2	7
Sometimes (3-4 times per yr.)	2	4	3	0	1

n= number of observations

** = Questions derived from the HHS indicator were computed to approximate HFS

*** = Expressed in the Zimbabwean bond note which is equivalent to the USD\$ according to the Reserve Bank of Zimbabwe.

3.3.2 Production practices of urban farmers

Households produced a range of crops (Table 3.2) both for consumption and sale within their communities and local markets. Matched to their consumption patterns, maize (75.25%) and leafy vegetables (choumoellier, 83%, mustard greens 81% and rape, 76%) were grown by more than three quarters of the respondents. Also, crops and vegetables were produced mainly for household consumption. The excerpt below cements its importance in terms of access to food and income:

It's important because it's a source of income for us as well as a source of nutritious food for our families. Instead of purchasing vegetables or other crops we save money through urban farming. As you can see I planted choumoellier...we no longer use a lot of money on vegetables. All I need to do is reap my own leaves and cook.¹⁴

Relating the importance of UPA in the current economic reality, one key informant appraised its positive impact on food provisioning for urban households:

[...] on a standard ½ acre plot a family can raise about 3-4 bags of 50kg maize which can sustain an average family of 5 for something like 10-12 months. In terms of food security UA is doing quite a lot.

¹⁴ Excerpt 3- FGD conducted in Epworth (04/07/2017)

Table 3. 2 Crops grown by urban farmers disaggregated by motivation for their production

Names		Shona	Frequency		
English	Scientific		Subsistence (n)	Income (n)	Total (%)
Choumoellier-	<i>Brassica oleracea</i>	“Covo”	247	85	83
Mustard greens	<i>Brassica juncea</i>	Tsungu	242	82	81
Rape	<i>Brassica napus</i>	Repi	222	82	76
Maize	<i>Zea mays</i>	Chibage	301	0	75.25
Onion	<i>Allium cepa</i>	Hanyanisi	219	58	69.25
Tomatoes	<i>Solanumlycopersicum</i>	Matomatsi	194	38	58
Pumpkin leaves	<i>Cucurbita moschata</i>	Muboora	179	21	50
Sweet Potatoes	<i>Ipomoea batatas</i>	Mbambaira	175	8	45.75
Spinach	<i>Spinaciaoleracea</i>	“Spinachi”	112	64	44
Black jack	<i>Bidenspilosa</i>	Mutsine	145	22	41.75
Sugar beans	<i>Phaseolus vulgaris.</i>	“Bhinzi”	99	27	31.5
Pumpkin	<i>Cucurbita maxima</i>	Nhanga	97	0	24.25
Okra	<i>Abelmoschusesculentus</i>	Derere	69	0	17.25
Cow peas	<i>Vignaunguiculata</i>	Nyemba	56	4	15
Groundnuts	<i>Arachishypogaea</i>	Nzungu	50	2	13
Cabbage	<i>Brassica oleracea var. capitata</i>	“Kabheji”	22	29	12.75
Roundnuts	<i>Vignasubterranea</i>	Nyimo	26	3	7.25
Potatoes	<i>Solanumtuberosum</i>	Mbatatsi	19	2	5.25

3.3.3 Nutrition and consumption patterns of urban farmers

Figure 3.2 draws on the computation of a 24hr recall of food groups consumed by households. Only 10.75% of all households had high dietary diversity, with the majority 64.25% falling under the low dietary diversity tercile. Twelve percent of all respondents were food secure. Of those who were food insecure (88%), just under one third (33%) were moderately food insecure and more than half (55%) were severely food insecure. Out of maximum score of 6 (indicating severe food insecurity) using the HHS score, households from Epworth (*n* 69) and Mabvuku (*n* 59) were severely food insecure.

Figure 3.2 and Table 3.3 provide a graphical and tabular presentation of household consumption patterns. None of the respondents consumed foods from all 12 food groups. However, a cumulative of 4.25% scoring 9 (4%) and 10 (0.25%) out of a possible score of 12 were classified under high dietary diversity. Just under a quarter (22.25%) of the households consumed foods from 7 groups or more. The rest of the households (77.75%) consumed foods from half of the recommended 12 groups; cereals; (97.75%), leafy vegetables (92.5%), oil-based foods (79.75%), sugar or honey (58.75%) condiments (53.25%). Markedly, six food groups were consumed by a few households e.g. dairy products (29.25%), fruit (21.5%), eggs (14.75%) and fish (7.5%) 24 hours to the field survey (Fig 3.2). Failure of most households to partake in nutrient-rich diets was expressed during informal discussions and in detailing meals consumed during the survey. For instance, milk

was overwhelmingly consumed in small quantities in tea. Also, as illustrated in the excerpt below, households resorted to purchasing chicken and beef bones because meat was beyond their reach.

There are some things we just must buy. The problem is the cash; they make it worse by charging extra percentages if you do not have hard cash. We also want to eat ‘proper’ meat but we end up mixing beef or chicken bones with vegetables for the meaty taste.¹⁵

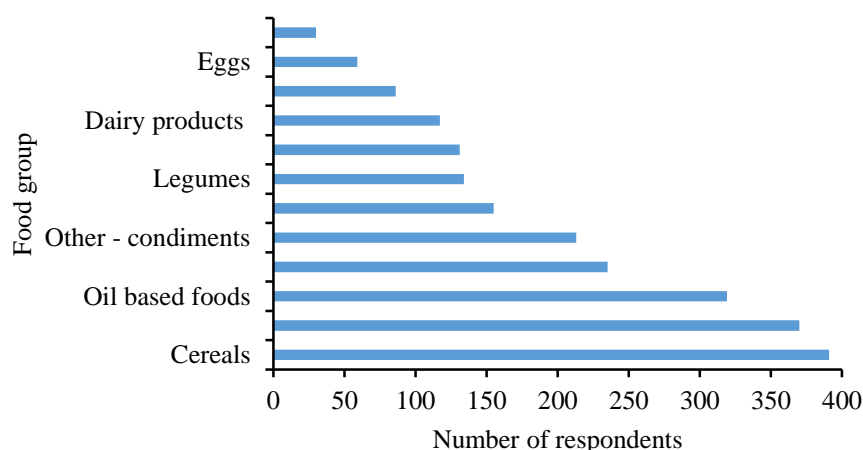


Figure 3. 224-hour recall of food groups consumed by urban households in Harare

Table 3. 3HDD score of food groups consumed by households in Harare

Number of groups consumed	%
1	-
2	0.75
3	10.25
4	23.75
5	17
6	26
7	12
8	6
9	4
10	0.25
11	-
12	-

3.3.4 UPA's contribution to HFS and HDD

Parameter estimates of the association between UPA and food security (Table 3.4) indicate an insignificant and weak relationship. Despite the importance attached to UPA by households, the majority were food insecure. Households in Epworth were more food insecure than households in Ushewokunze (OR =

¹⁵ Excerpt 1- FGD conducted in Mabvuku (10/07/2017)

3.228, 95% CI = 1.437 – 7.249) Hatchliffe Extension (1.928, 95% CI = 1.041 – 4.641) and Mabvuku (OR = 2.198, 95% CI = 0.483 – 1.78). Household Dietary diversity followed the same trend, where households in Epworth were more likely to have lower dietary diversity scores compared to households in the remaining three sites. Albeit, all dietary intakes of households were weighted towards cereal and leafy vegetables (Fig. 3.1). Income and household size were not statistically significant under the predicted odds of both HFS and HDD. However, gender was a significant predictor of HFS and HDD. Male farmers were less likely to be food secure in comparison to females (OR = 0.505, 95% CI 0.3 – 0.8, $P \leq 0.05$). Inversely, males were more likely to have more varied diets (OR = 2.598, 95% CI 1.307 – 5.162, $P \leq 0.05$). While age was a strong predictor of HFS, the same did not hold for HDD. Age related negatively with HFS in younger age groups experiencing food insecurity, particularly the middle-aged cohort, 30-49 years (OR 0.061, 95% CI 0.001 – 0.394, $P \leq 0.05$). Notably, households that cited UPA as the main source of food (OR = 1.281, 95% CI = 0.247 – 6.646, $P \leq 0.05$) were 28% more likely to have more diversified diets than households who relied mainly on purchasing and external networks (Table 3.4).

Households who received more frequent visits (3-4 times per year) from Agritex Officers were more likely to be food secure compared to households that never (OR = 6.942, 95% CI 4.299 – 6.767, $P \leq 0.05$) or seldom (OR = 5.005, 95% CI 2.917 – 7.179, $P \leq 0.05$) received visits from Agritex Officers. There was however, strong negative correlation between visits from Agritex and HDD. Land size was a significant contributor of HDD on bigger parcels of land in both gardens and fields (Table 3.4). For example, farmers cultivating in fields $<150\text{m}^2$ had lower odds of attaining higher levels of dietary diversity (OR = 0.268, 95% CI = 0.094 – 0.767, $P \leq 0.05$) compared to farmers with larger spaces for UPA $<400\text{m}^2$ (OR = 2.429, 95% CI = 0.908 – 6.498, $P \leq 0.05$) and $\geq 400\text{m}^2$ (OR=1.820, 95% CI=0.336-2.000, $P \leq 0.05$). A significant relationship was established between garden size and HFS. The third largest garden size category ($<40\text{m}^2$) recorded a negative association with HFS and (OR = 0.333, 95% CI 0.118 – 0.941, $P \leq 0.05$). Conversely, households with gardens $\geq 40\text{m}^2$ displayed a positive association (OR = 1.168, 95% CI = 0.206 – 2.386, $P \leq 0.05$) with HFS (Table 3.4). The excerpt below cements these findings. It illustrates two points central to the paper which are land scarcity and HDD. Ordinal regression analysis and focus group discussions identified land scarcity as one of the key barriers. A female FGD participant cements this finding;

If I had enough space I would be able to plant different crops, that way I would be able to diversify the different types of foods that my family eats¹⁶

¹⁶ Excerpt 4- FGD conducted in Epworth (04/07/2017)

Table 3. 4 Ordinal regression parameters for HFS and HDD score among urban farmers

Variable	HFSa				HDD			
	Sig	Exp(B)	95% C.I.for Lower	EXP(B) Upper	Sig	Exp(B)	95% C.I.for Lower	EXP(B) Upper
Area of study								
Ushewokunze	0.005	3.228	1.437	7.249	0.001	4.188	1.835	9.562
Hatcliffe Extension	0.021	1.928	0.483	1.78	0.001	3.947	1.800	8.655
Mabvuku	0.039	2.198	1.041	4.641	0.001	4.687	2.125	10.338
Gender								
Male	0.028	0.505	0.300	0.850	0.006	2.598	1.307	5.162
Age of respondent								
18-29 years	0.020	0.096	0.013	0.693	0.437	2.022	0.343	11.923
30-49 years	0.003	0.061	0.01	0.394	0.936	0.937	0.189	4.642
50-64 years	0.049	0.192	0.032	1.14	0.948	1.051	0.239	4.623
Household size								
< 3 people	0.360	1.549	0.607	3.954	0.905	0.937	0.324	2.709
4-6 people	0.109	0.561	0.276	1.138	0.901	0.951	0.427	2.116
Main source of income								
Urban farming	0.359	0.656	0.267	1.612	0.183	1.973	0.725	5.365
Formal employment	0.137	0.430	0.141	1.307	0.984	0.988	0.296	3.301
Vending/other trades	0.300	0.624	0.255	1.523	0.246	1.771	0.674	4.651
None	0.113	6.502	0.642	65.801	0.999	0.193	0.976	1.564
Household income								
Low income	0.138	1.895	0.813	4.416	0.713	0.801	0.246	2.606
Moderate income	0.489	1.382	0.553	3.456	0.460	0.630	0.185	2.149
Garden size								
<10m ²	0.658	0.792	0.283	2.218	0.041	0.335	0.118	0.954
<20m ²	0.149	0.492	0.187	1.29	0.279	0.574	0.210	1.569
<40m ²	0.038	0.333	0.118	0.941	0.398	0.631	0.217	1.834
≥40m ²	0.047	1.168	0.206	2.386	0.011	0.180	0.048	0.675
Field size								
<50m ²	0.265	2.179	0.553	8.583	0.352	0.527	0.136	2.033
<150m ²	0.255	1.731	0.673	4.452	0.014	0.268	0.094	0.767
<400m ²	0.695	0.826	0.318	2.146	0.027	2.429	0.908	6.498
≥400m ²	0.825	1.106	0.453	2.697	0.036	1.820	0.336	2.000
Main source of food								
Self-production	0.798	0.774	0.108	5.523	0.038	1.281	0.247	6.646
Purchase	0.618	0.605	0.084	4.357	0.420	0.844	0.159	4.472
Crop varieties^b								
1	0.011	3.842	1.355	10.895	0.042	0.320	0.107	0.961
2-4	0.435	1.465	0.562	3.822	0.017	0.481	0.099	0.794
Visits from Agritex								
Never	0.003	6.941	4.299	66.767	0.028	0.203	0.034	1.222
Rarely 1-2 times/yr.	0.006	5.005	2.917	77.179	0.019	0.189	0.026	1.382

a. Denotes $P \leq 0.05$

b. Count derived from the total number of varieties cultivated in the same garden or field

A Spearman test was applied to estimate the association between 5 independent variables. Table 3.5 shows a statistically positive but weak correlation between HDD and crop diversification $r = 0.061$ ($P \leq 0.05$); and Agritex Services $r = 0.101$ ($P \leq 0.05$). Results also show weak and negative relationship $r = -0.314$ ($P \leq 0.05$) between HSS (used as a proxy for food security) and HDD. As mentioned in the analysis section, Spearman's correlation output does not determine the cause. Further, it is plausible that the relationship that exists between variables is non-linear. Controlling for other indicators, ordinal regression analysis produced

diverging results between the association between HDD and crop diversification. Regression output reflects that the odds of being food secure among households that did not practice crop diversification were higher than those that did. Further, there was no significant relationship between HDD and crop diversification.

Table 3. 5 Spearman's correlation of food security indicators (HHS, Crop diversification, Agritex Services, HDD and Income)

Variable	HDD(p)	Crop diversity(p)	Agritex(p)	HSS(p)	Income(p)
HDD	1				
Crop diversity	0.061 (0.221)	1			
Agritex Services	0.101 (0.045) *	0.046 (0.362)	1		
HSS	-0.314 (0.000) *	-0.074 (0.138)	-0.091 (0.068)	1	
Income	0.064 (0.203)	0.045 (0.370)	0.038 (0.445)	0.188 (0.000) *	1

(p) = denotes significance level

*Correlation significant at the 0.05 probability level.

3.4 Discussion

A meta inference of quantitative and qualitative data was drawn on in order to obtain robust projections of UPA's contribution to food security and nutrition we drew on. This discussion assists in making a connection to the research questions (Chapter 1) and results provide in the previous section (Jensen and Laurie, 2016). Food insecurity was extremely high among the sampled population. In a study on food insecurity in high density areas within Harare, 98% of the households were food insecure, with 72% of these experiencing chronic food insecurity Tawodzera et al. (2012b) In this study, only 12% of the households were food secure. The remaining households (88%) were food insecure, of these 55% experienced acute food insecurity. Apart from this slight non-alignment, which can be attributed to differences in period of study and study sites these findings provide confirmation of severe food insecurity in Harare's urban spaces. According to parameter estimates, the association between UPA and food security was insignificant and weak, supporting claims by several authors (Frayne et al. (2014b), Battersby and Crush, 2014, Crush et al., 2017). However, qualitative data partially digress from these results.

Supporting emerging research (Tasciotti and Wagner, 2015, Thompson and Meerman, 2014, Zezza and Tasciotti, 2010, Rezai et al., 2016), FGD excerpts emphasised that UPA was an invaluable means of sustenance, particularly for the poor who have limited disposable income to diversify their diets. A possible explanation supporting the digression in results were barriers which hampered their ability to enhance their food security status. Consistent with literature biophysical constraints such as limited land for cultivation, water scarcity and socio-economic factors such as lack of Agritex services and lack of capital (Satterthwaite et al., 2010, Masvaure, 2016) were cited as some of the main barriers to averting food insecurity. The liquidity

crisis and a dearth in lucrative income earning prospects were cited as confounding barriers that led to deteriorating food security and nutrition among urban households. Thus, reinforcing the view that the waning political economy of Zimbabwe has made the urban poor particularly vulnerable to food insecurity (Getu and Devereux, 2013).

The study established that land size was a significant indicator of food security. Household food security and HDD increased positively along a land size gradient. These findings comparatively support previous studies (Cook et al., 2015, Ochieng et al., 2017) which established that access to larger farming spaces heighten prospects for high productivity. In investigating the determinants of HDD in two semi-arid districts of Tanzania Ochieng et al. (2017) affirm a significant relationship between land size and HDD. Similarly, households in Harare with access to smaller parcels of land had lower odds of being food secure or consuming more diverse diets. Hence, dietary intake of urban farmers with larger land parcels were moderately richer due to the utilisation of an increased variety of produce. Relatedly, regression analysis indicated that there was an inverse relationship between crop diversification and HFS (Table 3.4). Households that limited themselves to cultivating a single crop in the same garden or field per period were more food secure than those that planted more varieties ($P \leq 0.05$). It can therefore be inferred that indicators other than crop diversity influence HFS (Kavitha et al., 2016, Rajendran et al., 2017). This can be explained by the fact that by cultivating large quantities, households would derive income from production to address their consumptive needs. A significant number of these households were participants of community gardens in their respective communities. Also, the lack of sufficient space deterred households from cultivating different types of crops within the same space.

Agricultural extension (Agritex) services have a positive influence on food security and nutrition. As reflected in a study by Rajendran et al. (2017) high HDD scores were attained by farmers who received training on food and nutrition security from Agritex Officers. Parameter estimates drawn from ordinal logistic regression show that urban farmers who had the most frequent access to their extension services had higher odds of attaining a higher level of food security than those that seldom or never received any visits. An alarming 91.25% did not receive any visits from extension services. Excerpts from urban farmers and KIIs ascertain the non-existence of official Agritex officers in urban areas. The few households cited that they benefited from information provided by persons with agricultural extension expertise stated that the officers provided their services on a voluntary basis. Such services afford farmers with agricultural skills and technology which together with their indigenous knowledge, can help improve their food systems. Clearly, deploying extension personnel in urban spaces has the potential to improve food security through information dissemination and development of agricultural skills. However, both correlation results and OLR model projected insignificance between Agritex and HDD.

Ordinal regression analyses indicate that UPA and its association HFS and HDD is non-linear. The association draws on diverse indicators. Results show that Household dietary diversity had a significant correlation with land size, Agritex Extension visits and socio-demographic and economic characteristic of urban farmers profiled in Table 3.1. Consistent with literature (Kutiwa et al., 2010), UPA was a female domain. The highest number of male urban farmers was recorded in Epworth (45%) and the lowest in Mabvuku (25%). Gender was a strong predictor of both HFS and HDD. Female urban farmers were more food secure than their male counterparts. This relationship can be explained by the fact that women in developing countries are actively engaged in urban cultivation. Age was a weak indicator of HFS, Severe food insecurity was commonly observed from younger age cohorts, particularly 30-49 years ($P \leq 0.05$). A large proportion of food secure households were from the older age cohort (50-64 and 65+). A conceivable distinction between the age groups is farming experience.

Results obtained from this study share similarities with these other UPA studies in Zimbabwe (Kutiwa et al., 2010, Masvaure, 2016, Mujere, 2017, Tawodzera et al., 2012b). Firstly, Food insecurity was prevalent across all sites. Secondly, UPA was practiced mainly for household consumption. A prominent result that emerged from the data is that respondents that cited UPA as their main source of food with minimum purchase had higher odds of consuming a more varied dietary diet compared to households who mainly purchased or relied on social networks. Another important finding is that dietary intake was directly linked to production. For instance, maize and leafy vegetables were grown by more than three quarters of the urban farmers, correspondingly their meals were carbohydrate (*sadza*¹⁷) and leafy vegetable dense. While this finding unearths poor dietary diversity among urban farmers, it also reinforces the importance of UPA to urban households and uncovers the modest contribution of UPA to both food security and nutrition. A sizeable proportion (64.25%) of the sampled households consumed monotonous diets.

An analysis of the dietary intake of households in Cape Town by Battersby, 2011 also parallel Shone et al, 2017 and Ochieng et al.2017. Low nutrient foods consumed by a sizeable proportion of households e.g. tea, sugar or honey and oil-based foods were consumed by more than seven tenths of the households. Only 6.8% of households in Cape Town did not consume cereals. (Battersby, 2011). Analysis of the food groups showed that even for households than reported from eating six groups, which appears to be a good score, the predominant foods among these cereals and vegetables (<92.5%), oil-based foods (79.75%), sugar or honey and condiments (<53.25%). Additionally, a close comparison of the food group list and actual meals consumed, particularly, meat and dairy products were of concern. Milk was consumed by less than two-thirds

¹⁷ Thick and solid starch-based Zimbabwean staple food made from ground maize kernels.

of the households (29.25%). Twenty percent consumed milk in tea, the remaining 9.25% consumed sour milk with *sadza*. Also, bones (beef or chicken) were often mixed with vegetables to acquire meaty taste. The component of vital nutrients is low. As evidenced in both the FGDs and informal discussions, failure to purchase lean meat was cited as a direct consequence of low purchasing power related to the country's poor economic performance (Masvaure, 2016). There was low consumption of these foods both in quantity and quality. This finding is potent because it not only cements the severity of poor dietary diversity among households in Harare but also underscores importance of meticulously examining meal content to avoid overstated reports of food consumption and deceptively higher diet quality (Battersby, 2011).

Less than 10.75% of the households were classified under high dietary diversity. More than 50% of the households consumed less than 5 groups out of a possible score of 10. No respondent reported consuming 11 or 12 food groups the previous day. Only one household consumed 10 groups. This further points to the notion that high dietary diversity remains remote for poor urban households. Such consumption patterns as documented in SSA studies (Battersby, 2011, Tasciotti and Wagner, 2015, Ochieng et al., 2017, Shone et al., 2017, Tawodzera et al., 2012b) lead to micronutrient deficiencies. Albeit the rural orientation of the study by Ochieng et al., 2017 on HFS in two Tanzanian districts, it provides two important findings. The dietary intake of households lacked protein-based foods such as meat, fish and poultry. Secondly, self-production expanded food options for households. Findings show that the cultivation of maize and vegetables provided households in all four sites with micronutrients and phytochemicals allowing them some form of diversity. Further, a reduction in expenditure on crops and vegetables through cultivation, even in small amounts, meant that households could siphon supplementary income to purchase foods they are unable to produce. Although dietary intake was poor and food security was high, UPA afforded households access to fresh vegetable and income which also expanded their narrow food options. This finding parallel a Tanzanian based study on study on the nexus between UA and HDD. Instead of consuming monotonous starch based foods, urban households in Tanzania increased intake of protein, vegetable, fruit and dairy based products by 9% or more per food group (Tasciotti and Wagner, 2015). Together with scholarship from SSA, these findings point to the need to recast UPA, as a practice from which households can draw multiple benefits.

Income and dietary diversity were not strong indicators of food security or dietary diversity. Contrary to Bennet's law (Timmer et al., 1983) and (Drimie et al., 2013) high income was not associated with both high food security or high dietary diversity. Households in low-income terciles were also able to diversify their diets through direct or indirect means. A comparative analysis of dietary diversity in Johannesburg by (Drimie et al., 2013) suggests that households in informal settlements had a less varied diet compared to high density households. Unfortunately, their analysis does not consider the contribution of UPA to HDD nor does it examine other barriers other than income. As highlighted above, the findings affirm that income is only one

of the indicators of food security (Crush et al., 2012, Jones et al., 2013, Battersby, 2012, McCordic and Frayne, 2017). Relatedly, this study confirms, as in other studies (Masvaure, 2016, Mujere, 2017, Tawodzera, 2012a, Thompson and Meerman, 2014) that UPA is one of the non-monetary ways to expand food options. It is an avenue through which even those with low purchasing power could access food.

Findings from the four study sites diverge from this finding. There were no significant differences in dietary diversity and food security noted between urban and peri-urban settlements. However, we captured variances based on temporal grounds. Food insecurity and low dietary diversity in older settlements (Epworth and Mabvuku) than recent settlements (Hatcliffe Extension and Ushewokunze). Epworth ($n = 78$) and Mabvuku ($n = 67$) recorded the highest proportion of households with the most compromised diets. Corresponding with these statistics, HDD regression parameters presented in Table 3.4, show that households from Epworth had significantly lower odds of attaining high dietary diversity than households from Ushewokunze, Hatcliffe and Mabvuku ($P \leq 0.05$). Notably, Mabvuku and Epworth are older settlements and land scarcity was more potent issue in both areas. A plausible explanation is that population growth has led to a shrinking of spaces available for cultivation affecting both food security and HDD among the two populations.

3.5 Conclusion

Household food insecurity and low dietary diversity is pervasive among low-income populations. Based on a meta-inference of the results, food insecurity was high and dietary intake was poor. This was attributed to constraints such as limited availability of land, water scarcity, lack of extension and income poverty. Diets of the urban poor were deficient in protein-rich, animal and dairy based foods and mainly comprised of grain and vegetables obtained from self-production. Notably, regression calculations show that households whose main food source was UPA had relatively more diverse diets. Thus, not engaging in UPA would increase the odds of weightier forms of food insecurity and low dietary intake for urban households, particularly those with low purchasing power. Relatedly, there was no strong association between UPA and household income. Albeit its modest contribution, UPA enabled low-income households to cushion themselves against the vagaries of the market. Secondly, no distinct differences in food insecurity and nutrition were established by settlement type, but temporal differences were distinguished. Older settlements were more food insecure and recorded lower dietary diversity scores. This illuminates that while, biophysical, socio-demographic, economic constraints were universal, the extent of the constraints result in different experiences of both food security and nutrition. In pursuing a holistic analysis of urban food security, this paper illuminates the importance of integrating all pillars of food security as it relates to both production and consumption. The findings reinforce the argument that UPA is a feasible avenue for expanding food options. It requires concerted efforts to facilitate the provision of designated areas for UPA; implement nutritional programmes that promote the

production and consumption of nutrient-rich and diverse foods; and finally reinforce these strategies with the provision of agricultural extension services. Implications of this entails addressing the two-pronged gap of quantity and quality.

References

- BATTERSBY, J. 2011. Urban food insecurity in Cape Town, South Africa: An alternative approach to food access. *Development Southern Africa*, 28, 545-561.
- BATTERSBY, J. 2012. Urban food security and the urban food policy gap. *Strategies to Overcome Poverty and Inequality: Towards Carnegie 3 Conference*. Cape Town.
- BATTERSBY, J. & CRUSH, J. Africa's urban food deserts. *Urban Forum*, 2014. Springer, 143-151.
- BAZELEY, P. A. J., K. (EDS.) 2013. *Qualitative Data Analysis with NVivo*, London, United Kingdom, Sage Publications
- CARLETTO, C., ZEZZA, A. & BANERJEE, R. 2013. Towards better measurement of household food security: Harmonizing indicators and the role of household surveys. *Global Food Security*, 2, 30-40.
- CHIRUVU, T., KANENGONI, B., MUNGATI, M., TAFARA, G., T, BANGURE, D., TSHIMANGA, M. & MHLANGA, M. 2017. Analysis of trends in nutritional status and morbidity of under-fives among internally displaced persons at Chingwizi, Mwenezi District, Zimbabwe 2014-2015. *International Journal of Innovative Research and Development*, 6, 117-125.
- COHEN, M. J. & GARRETT, J. L. 2010. The food price crisis and urban food (in) security. *Environment and Urbanization*, 22, 467-482.
- COOK, J., OVIATT, K., MAIN, D. S., KAUR, H. & BRETT, J. 2015. Re-conceptualizing urban agriculture: an exploration of farming along the banks of the Yamuna River in Delhi, India. *Agriculture and Human Values*, 32, 265-279.
- CRESWELL, J. W. & CLARK, V. L. P. 2011. *Designing and Conducting Mixed Methods Research*, Carlifonia, USA, Thousand Oaks.
- CRUSH, J., FRAYNE, B. & PENDLETON, W. 2012. The crisis of food insecurity in African cities. *Journal of Hunger & Environmental Nutrition*, 7, 271-292.
- CRUSH, J., HOVORKA, A. & TEVERA, D. 2017. Farming the city: The broken promise of urban agriculture. In: FRAYNE, B., CRUSH, J. & MCCORDIC, C. (eds.) *Food and Nutrition Security in Southern African Cities*. London: Routledge.
- DRIMIE, S., FABER, M., VEAREY, J. & NUNEZ, L. 2013. Dietary diversity of formal and informal residents in Johannesburg, South Africa. *BMC Public Health*, 13, 911.
- DUBE, E. 2017. Urban agriculture as a food security strategy for urban dwellers: a case study of Mkoba residents in the city of Gweru, Zimbabwe. *PEOPLE: International Journal of Social Sciences*, 3, 26-45.
- FAO 2012a. *Growing greener cities in Africa: first status report on urban and peri-urban horticulture in Africa*, Food and Agriculture Organization of the United Nations. Rome, Italy.
- FAO 2012b. The State of Food Insecurity in the World. Economic growth is necessary but not sufficient to accelerate reduction of hunger and malnutrition Rome, Italy: Food and Agricultural Organisation Of the United Nations.
- FAO 2015. The State of. Food and Agriculture. Social protection and agriculture: breaking the cycle of rural poverty. Italy, Rome: Food and Agricultural Organization (FAO).
- FRAYNE, B., CRUSH, J. & MCCORDIC, C. 2017. Divorcing food and agriculture: towards an agenda for urban food security research. In: FRAYNE, B., CRUSH, J. & MCCORDIC, C. (eds.) *Food and Nutrition Security in Southern African Cities*. London, United Kingdom: Routledge.
- FRAYNE, B., MCCORDIC, C. & SHILOMBOLENI, H. 2014. Growing Out of Poverty: Does Urban Agriculture Contribute to Household Food Security in Southern African Cities? *Urban Forum*. Springer.
- GETU, M. & DEVEREUX, S. 2013. *Informal and formal social protection systems in Sub-Saharan Africa*, Kampala, Uganda, African Books Collective.
- HABTE, T. & KRAWINKEL, M. 2016. Dietary Diversity Score: A measure of nutritional adequacy or an indicator of healthy diet. *Journal of Nutrition and Health Science*, 3, 303.

- HAYSOM, G. & BATTERSBY, J. 2016. *Africa: Why urban agriculture isn't a panacea for Africa's food crisis* [Online]. The Conversation. Available: <https://theconversation.com/why-urban-agriculture-isnt-a-panacea-for-africas-food-crisis-57680> [Accessed 17-06-2018].
- HODDINOTT, J. & YOHANNES, Y. 2002. Dietary diversity as a food security indicator. *Food consumption and nutrition division discussion paper*, 136, 2002.
- JENSEN, E. & LAURIE, C. 2016. *Doing real research: A practical guide to social research*, London, Sage.
- JONES, A. D., NGURE, F. M., PELTO, G. & YOUNG, S. L. 2013. What are we assessing when we measure food security? A compendium and review of current metrics. *Advances in Nutrition: An International Review Journal*, 4, 481-505.
- JONES, A. D., SHRINIVAS, A. & BEZNER-KERR, R. 2014. Farm production diversity is associated with greater household dietary diversity in Malawi: findings from nationally representative data. *Food Policy*, 46, 1-12.
- KAVITHA, K., SOUMITRA, P. & PADMAJA, R. 2016. Understanding the linkages between crop diversity and household dietary diversity in the semi-arid regions of India. *Agricultural Economics Research Review*, 29, 129-137.
- KENNEDY, G., FANOU-FOGNY, N., SEGHERI, C. & BROUWER, I. D. 2009. Dietary diversity as a measure of the micronutrient adequacy of women's diets: results from Bamako, Mali site. Washington DC, USA: Academy for Educational Development:(Food and Nutrition Technical Assistance II Project (FANTA-2), FHI 360.
- KUTIWA, S., BOON, E. & DEVUYST, D. 2010. Urban agriculture in low income households of Harare: an adaptive response to economic crisis. *Journal of Human Ecology*, 32, 85-96.
- LESSER, V. M. 2014. Multiphase sampling. *Statistics Reference Online* [Online]. Available: <https://onlinelibrary.wiley.com/doi/abs/10.1002/9780470057339.vam041>.
- MANJENGWA, J., MATEMA, C. & TIRIVANHU, D. 2016. Understanding urban poverty in two high-density suburbs of Harare, Zimbabwe. *Development Southern Africa*, 33, 23-38.
- MASVAURE, S. 2016. Coping with food poverty in cities: The case of urban agriculture in Glen Norah Township in Harare. *Renewable Agriculture and Food Systems*, 31, 202-213.
- MBIBA, B. 1995. *Urban Agriculture in Zimbabwe: The Implications for Urban Management, Urban Economy, the Environment, Poverty and Gender* Vermont, USA, Ashgate Publishing Co.
- MCCLINTOCK, N. 2017. (Preface). In: WINKLERPRINS, A. (ed.) *Global Urban Agriculture*. Oxfordshire CAB International
- MCCORDIC, C. & FRAYNE, B. 2017. Household vulnerability to food price increases: the 2008 crisis in urban Southern Africa. *Geographical Research*, 55, 166-179.
- MANYERUKE, C., HAMAUSWA, S. & MHANDARA, L. 2013. The effects of climate change and variability on food security in Zimbabwe: a socio-economic and political analysis. *International Journal of Humanities and Social Science*, 3, 270-286.
- MONTFORT, P. 2015. *Focus of issues. Food Security: A Timely Political Issue* [Online]. MOMAGRI (Movement for a World Agricultural Organization),. Available: http://www.momagri.org/UK/focus-on-issues/Food-Security-A-Timely-Political-Issue_471.html [Accessed 13 February 2018].
- MOVEMENT FOR AGRICULTURE. 2015.
- MUJERE, N. 2017. The Contribution of Smallholder Irrigated Urban Agriculture Towards Household Food Security in Harare, Zimbabwe. In: WINKLERPRINS, A. (ed.) *Global Urban Agriculture*. Oxfordshire, United Kingdom: Centre for Agriculture and Bioscience International
- MURENDO, C., NHAU, B., MAZVIMAVI, K., KHANYE, T. & GWARA, S. 2018. Nutrition education, farm production diversity, and commercialization on household and individual dietary diversity in Zimbabwe. *Food & nutrition research*, 62, 1-12.
- OCHIENG, J., AFARI-SEFA, V., LUKUMAY, P. J. & DUBOIS, T. 2017. Determinants of dietary diversity and the potential role of men in improving household nutrition in Tanzania. *PloS one*, 12, 1-18.
- RAJENDRAN, S., AFARI-SEFA, V., SHEE, A., BOCHER, T., BEKUNDA, M. & LUKUMAY, P. J. 2017. Does crop diversity contribute to dietary diversity? Evidence from integration of vegetables into maize-based farming systems. *Agriculture & Food Security*, 6, 1-13.

- REZAI, G., SHAMSUDIN, M. N. & MOHAMED, Z. 2016. Urban agriculture: a way forward to food and nutrition security in Malaysia. *Procedia-Social and Behavioral Sciences*, 216, 39-45.
- SATTERTHWAITE, D., MCGRANAHAN, G. & TACOLI, C. 2010. Urbanization and its implications for food and farming. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365, 2809-2820.
- SHONE, M., DEMISSIE, T., YOHANNES, B. & YOHANNIS, M. 2017. Household food insecurity and associated factors in West Abaya district, Southern Ethiopia. *Agriculture and Food Security*, 6, 1-9.
- TASCIOTTI, L. & WAGNER, N. 2015. Urban agriculture and dietary diversity: Empirical evidence from Tanzania. *The European Journal of Development Research*, 27, 631-649.
- TAWODZERA, G. 2011. Vulnerability in crisis: urban household food insecurity in Epworth, Harare, Zimbabwe. *Food Security*, 3, 503-520.
- TAWODZERA, G. 2012. Urban household survival and resilience to food insecurity in crisis conditions: The case of Epworth in Harare, Zimbabwe. *Journal of Hunger & Environmental Nutrition*, 7, 293-320.
- TAWODZERA, G., RILEY, L. & CRUSH, J. 2017. Following the Crisis: Poverty and Food Security in Harare, Zimbabwe. *Journal of Food and Nutritional Disorders*, 1-14.
- TAWODZERA, G., ZANAMWE, L. & CRUSH, J. 2012a. The state of food insecurity in Harare, Zimbabwe. . *Urban Food Security Series No. 13*. Kingston: Queens University and AFSUN.
- TAWODZERA, G., ZANAMWE, L. & CRUSH, J. 2012b. The state of food insecurity in Harare, Zimbabwe. *Urban Food Security Series No. 13*. Queen's University and AFSUN: Kingston and Cape Town.
- TEDDLIE, C. & TASHAKKORI, A. 2012. Common “core” characteristics of mixed methods research: A review of critical issues and call for greater convergence. *American Behavioral Scientist*, 56, 774-788.
- THOMPSON, B. & MEERMAN, J. 2014. Towards Long-term Nutrition Security: The Role of Agriculture in Dietary Diversity. In: THOMPSON, B. & AMOROSO, L. (eds.) *Improving diets and nutrition: food-based approaches*. Rome, Italy: Food and Agriculture Organization of the United Nations,.
- TIMMER, C. P., FALCON, W. P., PEARSON, S. R., AGRICULTURE, W. B., ECONOMICS, R. D. D. & DIVISION, P. 1983. *Food Policy Analysis*, Maryland, USA, Johns Hopkins University Press
- WEBB, N. L. 2000. Food-gardens and nutrition: Three Southern African case studies. *Journal of Family Ecology and Consumer Sciences*, 28, 62-67.
- WHEELER, T. & VON BRAUN, J. 2013. Climate change impacts on global food security. *Science*, 341, 508-513.
- YIN, R. K. 2017. *Case study research and applications: Design and methods*, California, Thousand Oaks, Sage Publications.
- ZEZZA, A. & TASCIOTTI, L. 2010. Urban agriculture, poverty, and food security: empirical evidence from a sample of developing countries. *Food Policy*, 35, 265-273.
- ZIMSTAT 2017. Poverty Analysis Poverty Datum Lines –May 2017. Harare, Zimbabwe: Zimbabwe National Statistics Agency (ZimStat).

CHAPTER 4

CULTIVATING AGAINST THE BIAS: INSTITUTIONAL ARRANGEMENTS AND THEIR IMPLICATIONS ON URBAN FOOD SECURITY

Abstract

The susceptibility of low-income urban households to food insecurity has been ascribed to urbanisation, deteriorating socio-economic conditions and stringent controls on food production. Yet, institutional arrangements governing urban and peri-urban agriculture (UPA) remain, at best, ambivalent. The paper considers a critique of such predispositions. Using mixed methods, a cross-sectional survey ($n = 400$), focus group discussions and key informant interviews the researcher aimed to establish whether systems and processes governing off-plot production in Harare reinforce or suppress the practice. To reinforce analyses, Henri Lefebvre's *Right to the City*, which illuminates the political nature of space. A meta inference of the findings shows that the informal economy, within which the practice is couched is a key livelihood system, yet policies and official attitudes remain ambivalent to UPA. Secondly, incongruity between existing prohibitive by-laws and ambivalent attitudes of municipal officials casts regulatory uncertainty on the practice. Notably, realising the right to food through UPA is set against observing the technicalities of sustainability and aesthetic appeal. Relatedly, land scarcity was a key constraint for both urban farmers and key informants, albeit at opposing rationales. Other pertinent constraints were lack of water, absence of extension services, lack of credit and pest management. Together, the analyses propose that efforts to addressing urban food security without appreciating the political economy are not meaningful. Reflecting on the production of space and institutional arrangements paves a pathway for the co-creation of sustainable solutions by all stakeholders and credibly addressing food insecurity.

Keywords: institutional arrangements, informal economy, Right to the City, urban and peri-urban agriculture, food security

4.1 Introduction

Off-plot cultivation has been globally projected as a subversive practice. The practice, according to municipal authorities is subversive of city planning and environmental sustainability (Mudimu, 1997, Taru and Basure, 2013). At the same time, such attitudes have constantly undervalued the importance of the practice to urban households. Unlike other forms of UPA which involves production within one's backyard or in places with requisite land tenure or permission, off-plot cultivation involves production in 'vacant spaces' without consent from the proprietor (Mbiba, 1994). Over the decades cultivating in open spaces has attracted fines or slashing by municipal officials (Mbiba, 2000, Taru and Basure, 2013, Chimedza, 2015). The practice as highlighted above has not only been traditionally regarded as informal but also 'illegal' yet informal food systems are the backbone of low-income households in developing countries. In a Cape Town based study Battersby (2012) critiques the continued bifurcation of formal and informal ways of enhancing food security. Bifurcation creates barriers for households to enjoy their constitutional right to food, particularly for the urban poor who strongly rely on informal methods of procuring food. In casting the informal nature of the practice, Mugumbate et al. (2013) use the concept 'ruralisation' to describe its regressive impact on the 'modern' city. Such language not only illuminates the political nature of space and production as promulgated by Henri Lefebvre (Brenner et al., 2012) but also highlights pervasive attitudes towards the practice. Interestingly, diverging views of the practice reflect Lefebvre's analysis of space which includes perceived, conceived and lived space which highlight inclusivity (Lefebvre, 1991). Extending Lefebvre's argument, (Brenner et al., 2012) calls for structuring urban spaces which respond to the welfare of all citizens.

Conflict between municipal officials in developing countries, and in Zimbabwe as highlighted in the previous section is not new (Mbiba, 1994). What makes this five decade-long debate more topical are shifting demographics, socio-economic and political conditions (Bandaiko and Mandisvika, 2015). Such changes have, in some cases altered its subversive nature. Depreciating economics have seen the exponential rise in the practice e.g. ESAP in the 1990s, *Operation Murambatsvina* (OM) in 2005¹⁸ and hyperinflation (Masvaure, 2016, Tawodzera et al., 2012b) amplified negative externalities such as cash shortages (Hanke and Kwok, 2009, Mangudya, 2016). For Marquette (1997) to fully capture the stringent effects of ESAP on the poor, there is need to consider its co-occurrence with the drought of 1991/92. Together, these events started the country off on the road to food insecurity. Nevertheless, these informal activities which include UPA have been resurgent since, owing to recurrent financial instability (Dube and Chirisa, 2012, Makochehanwa, 2016). Insinuating sustained instability, Makochehanwa (2016) highlighted that the recent adoption of a pseudo-

¹⁸ A clean-up campaign instigated in 2005 by the Zimbabwean government to rid cities of informal unplanned housing and economic activities Potts 2006

currency¹⁹ paves way for depreciation of industrial activity and exports which fuels the black-market economy.

Describing the level of the informality in Harare (Dube and Chirisa, 2012, Kamete, 2012, Jones, 2010) concede that the city is indeed informal and describe efforts at constricting informality as “myopic”. Critiquing negative attitudes towards informality, McClintock et al. (2017) suggested that advocate for regulations to permit informal enterprises such as UPA. However, despite established support for UA in legislature, there is limited traction in policies and by-laws that reinforce the practice. The ‘luke-warm’ attitude of city officials towards the practice in Blantyre and Lilongwe and many other cities in developing countries is reflected in lack of execution which creates ambiguity among practising households (Mkwambisi et al., 2011). This creates challenges for households that view UPA as an avenue to address their household’s nutritive needs. One of the most prominent examples of flourishing UPA is from Cuba. Using Lefebvre’s framework to analyse ethnographic research from 1997-2007, Premat (2009) presented the state’s supportive role. In hindsight, despite challenges related to lack of funds and equipment, this study shows that state support is critical addressing food insecurity and correspondingly easing the government’s fiscal burdens.

Support for UPA in Zimbabwe in the past decades has shifted from prohibitive to discouraging. While municipal officials in Zimbabwe overturned the resolve to destroy crops and are conceivably less repressive towards the practice of slashing crops (Chideme, 2017) an official authorisation or prohibition of the practice is non-existent (Masvaure, 2016). There have been no official efforts to readjust institutional arrangements in order to authorise the practice or create other strategies that permit households to actively control household food security (Dube, 2017). For instance, by-laws enacted by the colonial administration in 1953 and 1975 (Mbiba, 1994), still hold. Further, official acts associated with UPA The Natural Resources Act of 1952 (Government of Zimbabwe, 1952) and the Municipality Act of 1973 (Government of Zimbabwe, 1973) which inform the more recent Urban Councils Act, Regional Town Planning Act, Environmental Management Act (CAP 20:27), Statutory Instrument 7 of 2007) are unsupportive of the practice. Reasons are collectively based on planning and conservation. As highlighted by Sedze (2006) by-laws stipulate that cultivation is prohibited less than 20 metres from a major highway and less than 30 metres from streams or water bodies. While Section 77a of the Constitution of Zimbabwe, acknowledges the right to sufficient food, it also dismisses UPA in Section 72 1(b) “or land within the boundaries of an urban local authority or within a township established under a law relating to town and country planning or as defined in a law relating to land survey” (Government of Zimbabwe, 2013).

¹⁹ In 2010 the RBZ introduced the Bond note whose exchange rate parallels the USD according to official records.

Studies (Katanda et al., 2007, Sotamenou and Parrot, 2013) demonstrated that urban water bodies and soils are prone to contamination through the disposal of industrial waste which has traces of heavy metals and the eutrophication of synthetic fertilisers and chemicals. As such, UPA directly contributes to nutrient pollution through the addition of toxic by-products to the food system. Evidently, a study by Katanda et al. (2007) on the effect of industrial waste water on leafy vegetables plants in Crowborough and Firle farms showed that lettuce (*Lactucasativa*), mustard rape (*Brassica juncea*) contained lethal concentrations of zinc (Zn) and copper (Cu). Together with aesthetic appeal, nutrient pollution is one of the core reasons curators of the city in the form of local governments and environmental based organisations have challenged the significance of urban and peri-urban agriculture (UPA). In critiquing the notion of sustainability, McClintock et al. (2017) illuminates the predisposed nature of the concept in its promotion of ecological functions and conservative outlook on consumptive needs. Such concerns are echoed in Henri Lefebvre's seminal work on the production of space. The notion of production of space refutes the maligning of the right to food over aesthetic appeal of the neoliberal city by advocating for the appropriation of spaces for cultivation (Lefebvre, 1991). It illuminates the political nature of space, and as this paper will illustrate, the political nature of food is an important dimension to understanding food security.

Studies on UPA Zimbabwe, with the exception of Taru and Basure (2013) tend to focus on the merits and demerits of the practice as well as vulnerability to food insecurity. Even so, they focus on how urban farmers navigate the various conflicts such as land acquisition. Land for residential or business construction takes precedence as they have a stronger robust fiscal backing, creating land tenure insecurities among farmers (Badami and Ramankutty, 2015). Re-affirming this, the Food and Agricultural Organisation (FAO) notes that UPA is predisposed to rapidly changing land rights, uses, values and limited (if any) support from legislation (FAO, 2012a). This is particularly true for low-income areas, where there is limited space for cultivation in comparison to middle or high income areas (Mujere, 2017). In addition to land, scholars have cited water, capital, Lack of Agricultural Technical and Extension (Agritex) services and pest management (Mujere, 2017, Manzungu and Machiridza, 2005). Writing on water challenges in the city of Harare Manzungu and Machiridza (2005). attributed Mabvuku's water scarcity to the archaic facilities and highlight that residents have been experienced water challenges since 1998. As outlined earlier, UPA is not supported by policy. This deficiency is also reflected in the lack of Agritex services. Taye (2013) suggested that the proportion of extension workers in Africa is falling. Charting the history of agricultural extension in Zimbabwe, Pazvakavambwa and Hakutangwi (2006) pointed out that since independence there has been a gradual decline in the number of Agritex staff. The scholars furnish us with a starting ratio of 1Agritex Officer to 800 rural farmers in 2006. This declining trend is reconfirmed a decade later in a report by Zimbabwe Vulnerability Assessment Committee (ZimVAC, 2017)

As highlighted above urban agriculture scholarship in Zimbabwe neither underscored nor conceived the relationship between institutional arrangements from a political economy perspective. According to Mbiba (2000) political economy analysis is centred on contentious ideologies about ‘the urban’ and its development and not delimited to land acquisition and governance. Following this line of thought, this study does not offer *Right to the City* (RTTC) as framework to resolve the urban food security challenge but as a tool to critically assess UPA in Harare. Supplementary questions should shift the focus from conflict resolution mechanisms employed by households to how systems and processes governing the practice affect urban food security. By so doing, inroads to reconfiguring by-laws and legislation are considered. Recent studies (Bandauko and Mandisvika, 2015, Rogerson, 2016) on informalisation in Zimbabwe do take a critical analysis of the political economy. However, they broadly focus on the informal sector. Using RTTC Bandauko and Mandisvika (2015) extended questions of spatial production to informalisation in Harare, reflecting on the importance of the informality to low-income households. They suggest that municipalities find ways to integrate informal enterprises into their systems and processes.

The study counters two colonially engineered beliefs which continue to define the practice of UPA. These are; a) that it is a misplaced activity that disfigures the urban landscape b) its insignificance to food security. The study postulates that reviving food security at the national level necessitates an appraisal and enhancement of local structures and processes related to urban cultivation (Tornaghi, 2014). Parallel to RTTC, this study supports the idea that the consumptive needs of citizens should have more precedence over aesthetic appeal (Lefebvre et al., 1996). Using RTTC as an organising principle this paper goes beyond previous studies by unpacking the outcomes of the practice as governed by the institutional arrangements. It emphasises the need to appraise the extent to which various stakeholders and entities enable or disable the practice. Such an enquiry paves way for diagnosing existing by-laws and aligning them with the prevailing context.

4.2 Methods

4.2.1 Study area and sampling

Data collection was conducted in four study sites within Harare Metropolitan Province which is also the capital city of Zimbabwe. The geolocation of the city extends from 17.8252°S to 31.0335° E. It is sited in Natural Region II whose annual rainfall pattern fall is between 700 and 1050 mm (Ministry of Agriculture, 2017). Prior to entering the respective sites City of Harare, Epworth Local Board and ward councillors were approached to obtain ethical clearance. Using a Mixed Methods Approach, quantitative and qualitative data were collected from 400 urban households and 8 key informants between June and July 2017. Mixed methods not only provides more accurate measures of the phenomenon, but is grounded in the lived experiences of households,

approximating contextualised and relevant solutions to the challenges (Teddlie and Tashakkori, 2012). Quantitative measures of food issues which are not supplemented with a qualitative assessment would be out of sync with reality and the politics of food.

Owing to the multiple stages of data collection, sampling was conducted in multiple phases. Firstly, study sites were purposively selected based on the prevalence of poverty and geographic location (Manjengwa et al., 2016, Tawodzera et al., 2012b, Bvochora and Kusena, 2018). A key characteristic of these urban spaces is that they vary in terms of age (old; Mabvuku and Epworth and new; Hatcliffe Extension and Ushewokunze). This permits for the identification of variations across the study sites. Thereafter, stratified sampling was employed. To establish the number of households to survey, a sample size of 100 households per site was divided by the number of wards sections in the area to ensure proportionate coverage in each area. Thereafter, 35 urban farmers from the survey were randomly selected to participate in a focus group discussion (FGD). Then, key informant interviews (KIIs) were also conducted with key 'experts' related to the field of UPA. Key informants from agricultural departments and environmental agencies were purposively selected by the researcher, based on their ability to contribute meaningfully to the subject of UPA as it relates to policy (Jensen and Laurie, 2016).

4.2.2 Data acquisition

Using pre-tested questionnaires, FGDs and KIIs, three trained research assistants collected data on household demographics the importance of UPA, food security status, how institutional arrangements contribute to UPA and constraints faced by urban farmers. The data collection process was divided into two phases. In Phase 1, a survey was conducted on 400 urban farmers in Ushewokunze, Hatcliffe, Mabvuku and Epworth. A survey permits for the collection of large amounts of data within a moderately short time (Fowler Jr, 2013) this response to the breadth or coverage aspect of the study. Self-administration was avoided to curb non-responses and ensure that the questions are well understood. For in-depth accounts of the experiences of urban farmers and KIIs, FDGs and KIIs were employed in the second phase of the study. To collect information on monthly household income the prevailing rate of 25% was used, i.e. US\$1 was equivalent to \$1.25 Zimbabwean bond note. Monthly household income was defined as total amount generated from both formal and informal activities.

Focus group discussions consisting of 8-13 participants were conducted in each study site. These were conducted in *Shona*²⁰, which is the language that most inhabitants comprehended. The use of FGDs permitted the capturing of a range of experiences and perceptions of diverse urban farmers. Further, the interactive nature

²⁰ The most widely spoken vernacular language in Zimbabwe

of the discussion stimulated in-depth discussions which might not have been captured by one on one interviews with households (Liamputtong, 2011) Eight KII's were conducted. This number was guided by data saturation, where accounts provided lacked variation (Fusch and Ness, 2015). Also, the use of multiple methods allowed for triangulation, which Jensen and Laurie (2016) concede are valuable to ascertaining the reliability of the information provided by a respondent.

4.2.3 Data management and analysis

Quantitative data were entered SPSS version 24 by the researcher and two trained research assistants. Prior to analysis, quantitative data were checked (for completeness and precision) and irregularities were adjusted. Household demographics, socio-economic and food security status indicators were analysed using descriptive statistics. The association between HFS and constraints faced by urban farmers was examined using Chi-square test. Cross-tabulations of the same indicators were computed to approximate the distribution of constraints against food security status. For the qualitative data, NVivo version 12 was employed for data organisation. The researcher, thematically coded excerpts from transcripts. To account for anomalies themes were compared to that of two independent analysts. Political economy is a useful tool to analyse systemic process shape local processes thus, RTTC was employed. In the production of space the three-dimensional model consisting of the perceived (visualised space), lived (physical use of space/ the actual) and conceived (discernment of how others should use space) spaces (Lefebvre, 1991). For Lefebvre, this model accounts for different views on phenomenon which also explains the pragmatic use of mixed methods (Section 4.2.1). For a holistic analysis, quantitative and qualitative results were merged. These are presented in the section that follows.

4.3 Results

4.3.1 Impact of the practice of UPA

UPA activities identified varied in spatial size and location. Open space cultivation was the second most dominant activity (34.75) after backyard cultivation (72.75%) across all four sites. The highest number of households engaged in open space cultivation was in Ushewokunze (59%). Backyard gardening provided sustenance for more than three quarters of households in Hatcliffe Extension (78%), 89% in Mabvuku (89%) and Epworth (77%). Forty-one percent urban farmers cumulatively engaged in off-plot or stream bank/wetland cultivation. A small proportion of all households (6.3%) practiced wetland/stream bank cultivation. A small variance in the number of households engaging in the activity was recorded across all sites (Table 4.1). Types

of UPA that were of concern to KII's were open space cultivation and stream bank cultivation based on negative effects on ecological functions of the eco-system and the city's aesthetics. Images of both types of UPA are displayed in Plate 4.1. Mixed concerns regarding the cultivation of crops on open spaces belonging to the city council land are presented in the excerpts below:

[...] legal is backyard. Illegal (open space cultivation) is the challenge. It is detrimental to environment, it contributes in a small way and is not environmentally friendly.²¹

[...] if its uncontrolled it can be messy but also, I think it's a natural and efficient way for people to want to find some food for themselves and be self-sufficient, but I feel it should be controlled so that it's not messy.²²

In direct contrast on key informant dismissed the lack of support for the practice based on aesthetic grounds. He however pointed out that while environmental protection was important. The sustenance of urban households was equally important:

[UPA] doesn't make any place an eyesore, there is nothing like that. It's not a dumping area where you dump trash, its people's livelihood that gives them sustenance. We cannot all live on produce from Mbare, our population is just too much. The law is there to also protect the environment. The law however, is right, it's a challenge within communities, if you tell them to stop, tomorrow you will find them in the same field.

Farming practices such as stream bank and wetland cultivation (Plate 4.2) according to key informants resulted in loss of biodiversity, siltation and eutrophication. As stated by one key informant, "*cultivating in wetlands raises the issue of pollution caused by fertilisers and agricultural chemicals*" Relatedly, in offering a recommendation for the food insecurity challenge, one key informant (Excerpt 1), suggested that the solution to food insecurity lay not in UPA but "*rectifying rural farming*". Such attitudes illuminate two challenges; negative attitude towards the practice and the issue of land scarcity, which as will be discussed below is a key challenge faced by a large proportion of the respondents. Highlighting negative attitudes towards the practice,

²¹ Excerpt 1- KII (07/03/2018)

²² Excerpt 2- KII (18/07/2017)

expressed by various authorities, one respondent cited that the key challenge deterring her from producing sufficient food was the land:

*Vanoti vanoda kurima endai kumusha*²³. (They say, those that want to cultivate should go to their rural homes). I do not have a rural home, I am an urbanite and I need to farm to sustain my family, but I do not have enough space to practice it.²⁴

Table 4. 1UPA activity disaggregated by study site

		Ushewokunze	Hatcliffe Ext.	Mabvuku	Epworth
	Overall %	n	n	n	n
Backyard	72.75	47	78	89	77
Open space	34.75	59	17	31	31
Community Garden	8.25	19	6	2	6
Stream bank/Wetland	6.25	5	6	8	6

*More than one response for type of UPA practised was permitted, therefore the percentage of households exceeds 100%

Informal economic activities characterised the substantive number of farmers' livelihoods. More than four fifths (81.25%) obtained their income from informal jobs (Table 4.2). Overall, vending and other trades *n* 192 (48%), were the most dominant forms of employment. The second most important income source for the households was UPA (33.25%), of these more than one third were from Epworth. A small proportion of the respondents had either no means of earning any income (*n* 1.75%) or relied on a state managed pension scheme (*n* 8.25%).

Table 4. 2Main source of income for urban households.

		Ushewokunze	Hatcliffe Extension	Mabvuku	Epworth
	Overall %	n (%)	n (%)	n (%)	n (%)
Urban farming	33.25	22	29	36	46
Formal employment	8.75	13	13	2	7
Vending/ other trades	48	45	43	53	36
None	1.75	2	3	0	2
NSSA	8.25	14	9	2	8

4.3.2 Policies and regulations governing the practice

All key informants stated that there was no policy that sought to promote UPA but by-laws prohibiting its practice. Plate 4.1 displays two images of off-plot cultivation less than 10 meters from the highway and

²³ Verbatim direct quote in Shona (the vernacular language) for emphasis

²⁴ Excerpt 3- FGD conducted in Epworth (04/07/2017)

cultivation within a wetland. Two issues were raised by key informants regarding the regulations governing the practice. According to respondents, the Harare City Council had stringent controls against the cultivation of crops in undesignated spaces. This was expressed in the following excerpt from a KII:

[...] nobody should be practicing UA within the areas under the jurisdiction of the city of Harare. Regulations were done in the 60s or 70s and things have changed (pause) but we cannot enforce it because of the challenges on the ground.²⁵

Considering food insecurity among low income households one key informant stated that while he acknowledged that the poor economic conditions, climate change and poverty had spurred on the proliferation of UPA, he emphasised the importance of adhering to principles governing environmental protection. In providing reference to legal provisions that prohibit cultivation in open spaces, he pointed out how these provisions were disregarded. One anomaly he pointed out was that:

In the context of City of Harare, “Operation Maguta” input scheme was even in urban areas. [...] once you go to command (agriculture) it’s illegal there are by-laws.



Plate 4.1 Types of open space cultivation in Harare

a) Cultivation on road edges in Mabvuku b) Stream bank cultivation in Hatcliffe Extension

Photo credit: Researcher

²⁵ Excerpt 4- KII (27/02/2018)

4.3.3 Constraints faced by urban farmers

To investigate the association between constraints faced by urban farmers and food security status, Chi-Square test of independence was computed. Severely food insecure households ($n = 216$) were more likely than moderate and food secure households to experience more constraints to the practice of UPA. Displaying UPA constraints disaggregated by study site, Table 4.3 provides a tabular representation of the five constraints experienced by urban farmers. A small proportion, 28 (7%) of households stated that they had not experienced any constraints to UPA. Approximately 372 (93%) of the households stated that they had experienced challenges.

Table 4. 3 Household food security^a and UPA constraints

	Access to land	Extension	Credit	Water	Pests	Total
Food secure	19	5	1	16	5	46
Moderately food	71	7	8	33	1	120
Severely food	129	18	15	45	9	216
Total	209	30	34	94	15	372

a. Questions derived from the HHS indicator were computed to approximate household food security status

As illustrated in Figure 4.1 the odds of households citing land scarcity as a barrier was significantly greater than water scarcity, unavailability of Agritex, lack of credit, water scarcity and pests. Land scarcity was cited as a significant challenge by more than half of the respondents (52.25%) and all key informants. In fact, one key informant dismissed the notion of ‘vacant spaces’ by stating that there were no spaces at all available to farmers, as all spaces are either reserved for future developments or prohibited on ecological grounds. Off-plot cultivation was practiced on municipal land, and within homesteads (owned or rented). The excerpts below illuminate the land challenges faced by both conservationists and urban farmers:

[By-laws] they don’t allow UA. There are no free spaces, they are left for a purpose²⁶

[land scarcity]it is now worse because we used to farm in other places e.g. wetlands so since these spaces have been occupied by people who need them for stands we then started producing vegetable and crops in smaller spaces.²⁷

²⁶ Excerpt 5- KII (07/03/2018)

²⁷ Excerpt 6- FGD conducted in Epworth (04/07/2017)

Water scarcity was the second most pertinent challenge faced by respondents (Figure 4.1). Thirty-three percent of households who cited water as a key challenge were based in Epworth (33%) and the lowest were in Mabvuku (16%). The water challenge was clearly visible from observations made by researcher assistants during the survey. While most gardens had crops and vegetables at varying degrees of lushness and coverage most beds were parched. The water challenge was particularly acute for community gardeners who had large swaths of land to water. Plate 4.2 shows a garden in Epworth, which the gardeners watered using water from a borehole 500m from the site. Facilities for water were mainly communal wells; farmers used buckets and canisters to water their gardens. Urban farmers indicated that spaces left fallow have been left deliberately because of inadequate water. In Hatcliffe, one respondent stated that water was a key barrier to production:

[...] *kaprofit kanobva kaperera mumvura*, (the little profit earned is used to pay for water services). Water is a big challenge, if I had water I would plant on a much bigger space. [...] because of water scarcity we plant on smaller spaces and plant those that do not require a lot of water.



Plate 4.2 Wilting spinach at a community garden in Epworth

As displayed in Table 4.3 lack of extension Services was a major challenge to a limited number of households (7.5%). However, more than four fifths of the respondents across all sites had never received any form of extension services; Ushewokunze (80%), Hatcliffe Extension (90%), Mabvuku (98%) and Epworth (95%). Those that rarely or sometimes received visits from Agritex pointed out that these individuals were trained personnel who voluntarily assisted their relatives or neighbours. This was pointed out by one , FGD respondent “*We do have an Agritex Officer who gives us farming advice, but he is a volunteer.*”²⁸ Thus, there were no Agritex Officers deployed to serve the needs of those growing food in cities. This was also confirmed by a key informant

²⁸Excerpt 7- FGD conducted in Mabvuku (10/07/2017)

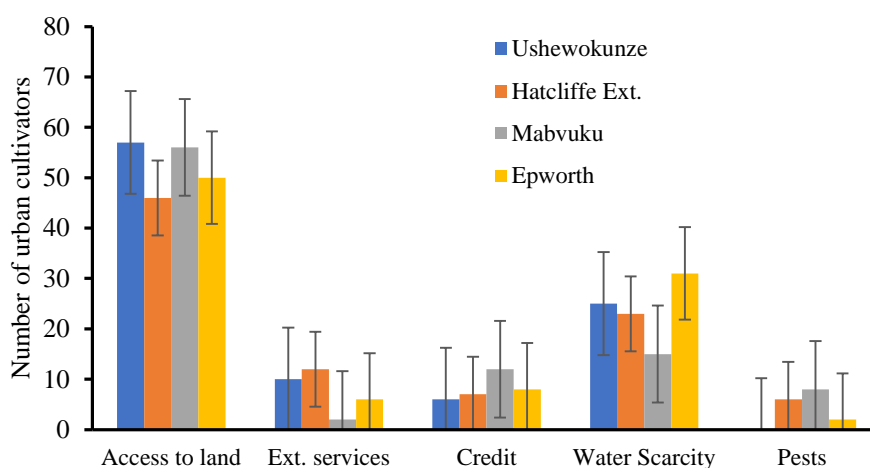


Figure 4. 1 Main constraints faced by urban cultivator disaggregated by study site

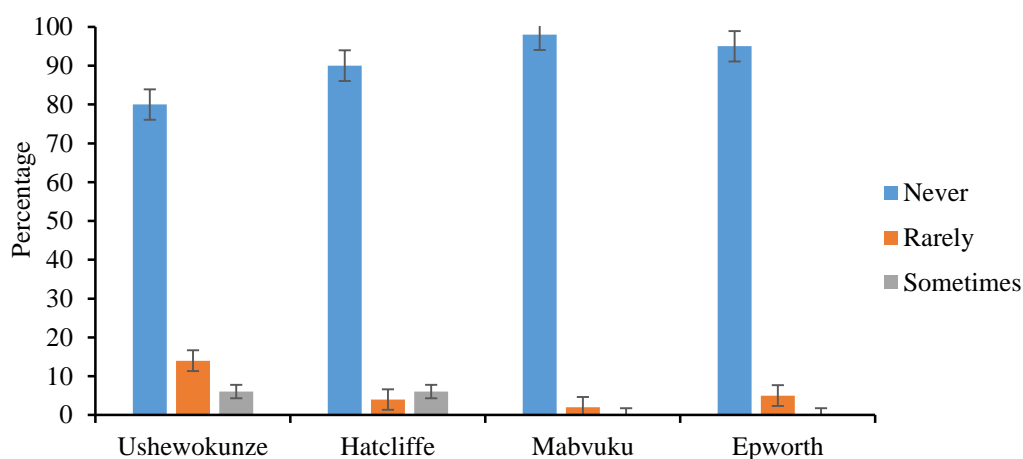


Figure 4. 2 Frequency of Agritex Visits across study sites

Related to the land scarcity, FGDs highlighted undefined markets as a key concern for community gardeners. While UPA was not a significant income source for home production, community gardeners could salvage enough income to support household members. However, due to water scarcity and insufficient growing space, respondents in community gardens in Epworth highlighted failure to meet viable market demands. This is evidenced in the excerpt below;

we are failing to supply them [supermarkets] with vegetables because they require at least 200 bundles per day. Because of the small spaces 200 is too steep for us. We can only reach that target in a week or two weeks maximum.²⁹

Inversely, one gardener from a community garden in Ushewokunze highlighted that they produced large quantities, such that the markets they identified did not meet their needs. The largest market they supplied is Mbare. However, they cited a host of market insecurities within Mbare such as touts who harass suppliers. This challenge was confirmed by one respondent stated that the markets were *“not conducive, for example in Mbare there are barriers. The middlemen do not treat us well. They steal vegetables. If you are not alert you will lose all your produce”*.³⁰

4.4 Discussion

Before inferring from the results, it is essential to reaffirm the purpose of this paper. Firstly, this paper aims to examine how legislative mechanisms and processes affect UPA. Secondly, it unearths how urban farmers articulate their relationship with stakeholders and the constraints faced by urban farmers in their everyday experiences. While these findings, as highlighted in Section 4.1 are not new, the use of RTTC provides an intersecting and holistic analysis of power dynamics and the impact, thereof on food production in Ushewokunze, Hatcliffe Extension, Mabvuku and Epworth.

Urban and peri-urban agriculture took on many forms, e.g. home gardening/on plot cultivation, community gardening, off-plot cultivation, stream bank/wetland cultivation. Several scholars (Battersby, 2017, Masvaure, 2016, Tawodzera et al., 2017) have underscored its positive contribution to food and nutrition security, income. Contrary to the Cuban context (Premat, 2009) UPA is still not officially assimilated into legislation. This explains why attitudes towards the practice in Harare, were not unanimous. UPA's negative externalities also framed KII sessions. The appropriation of open spaces as evidenced by a plethora of studies (Masvaure, 2016, Taru and Basure, 2013), creates competing interests such as food security versus construction and ecological sustainability. Consistent with literature externalities of off-plot cultivation, which is the more visible and widely debated form of UPA attracted mixed reactions from KIIs. Six out of eight KIIs depicted UPA as an inconsequential practice with regards to both food security and income. More importantly, it defaced the aesthetic appeal of the city and negatively affected sensitive ecologies. As reflected in other

²⁹ Excerpt 8- FGD conducted in Epworth (04/07/2017)

³⁰ Excerpt 7 FGD conducted in Ushewokunze (12/07/2017)

African cities (Battersby, 2012, Crush and Riley, 2017) UPA remains largely classified as an illegal due to its informal³¹ status. Yet together with its informal nature and the practice within its own right suffered from double pronged ‘invisibility’. Its permanence in the city, however demonstrates that attempts to regulate the informal daily practices of the urban poor vis-a-vis the waning Zimbabwean economy, remain futile (Dube and Chirisa, 2012, Bandaiko and Mandisvika, 2015, Kamete, 2012). The continued resilience of urban farmers regardless of harassment from municipality officials has heightened awareness of its importance and permanence in the urban landscape. Writing on the need to rethink power dynamics between the regulatory systems of the state and ‘(ab)users’ of open spaces, Kamete (2012) asserts that this confrontation, streamlines into existing problems such as inequality and exerts greater strain on wider political issues. As confirmed by the results, this ‘invisibility’ (in both policy and practice) is the source of constraints faced by urban farmers.

Paralleling responses provided by urban farmers, key informants who supported the practice highlighted that considering the prevailing economic system and its impact on the poor, notions related to curbing or abolishing UPA were irrational. The ‘deviance’ displayed by those engaging in off-plot cultivation was viewed as an attempt by the urban poor to become self-reliant producers who either supplement their diets or earn profits through the practice. Such ‘deviance’ is supported in RTTC which promotes the appropriation of spaces as a livelihood option (Lefebvre et al., 1996). For the majority of KIIs the reasoning behind engaging in UPA was well-merited. However, they underscored the importance of adhering to by-laws and related environmental laws. Such concerns have been widely documented in literature on urban planning and UPA (White and Hamm, 2017). For example, out of the 8 KIIs, 6 (consisting of environmental agency practitioners and key agricultural experts, used words such as messy and illegal to describe the practice. They point out that cultivation near water bodies promotes siltation and contaminates water sources both of which lead to shrinking water bodies and are toxic to well-being (Katanda et al., 2007).

Studies have shown that agricultural inputs such as synthetic fertiliser, pesticides and other chemical residues broadcast in fields and gardens have a negative impact on both soil and produce. As evidenced in a study by Katanda et al. (2007) industrial effluent released into urban water bodies resulted in concentration of toxic metals in plants. Such concerns were raised by KIIs citing the uncontrolled use of fertilisers and improper soil management practices in the case of wetland or stream bank cultivation. Urban and peri-urban agriculture therefore posed a threat to the ecological functions of the ecosystem. Further, through the use of untreated waste water, urban farmers placed others at risk of ingesting contaminated produce. Relatedly, contradicting stipulated by-laws, more than two-fifths of the sampled households (41%) cultivated in vacant spaces including wetlands and stream banks (Plate 4.1). Confirming the concerns of KIIs, urban farmers engaged in

³¹ Potter 1998- In light of underemployment, informal sector refers to unaccountable and unregistered activities which are found in most countries of the world

wetland cultivation (Plate 4.1b) and off-plot cultivation less than 20 metres from a major highway and less than 30 metres from wetland or streams as stipulated in by-laws (Sedze, 2006). In fact, some fields and gardens were less than 5 metres from major road ways or stream banks (Plate 4.1a) By doing so, urban households contravened by-laws put in place to conserve biodiversity.

Space is embedded in political nuances (Lefebvre, 1991). Hence, UPA was explored through his triad of lived, perceived and conceived spaces. This was achieved by drawing data from multiple actors using diverse methodology as highlighted in Section 4.2.1. The excerpts illuminate competing interests between curators of the city and urban farmers, confirming that the multi-decadal challenge continues to plague food production in cities. A retort by one key informant on UPA suggests that rural and not urban farming is the solution to national food security. Such attitudes were confirmed by a female urban cultivator during a FGD; she stated that cynics of the practice suggested that they relocate to their rural homes. As Crush and Frayne (2010) pointed out, the assumption seems to be that developing rural agriculture will solve the food problems of the urban poor by reducing the cost of food. This assumption is problematic, given that urban food security involves not only food supply issues, but also issues of access and entitlements. Secondly, Lefebvre, 1996 provides a critique of viewing production as a preserve of rural. Cities should serve the interests as those who inhabit it. Confirming conviction to their right to food, respondents displayed continued resistance to by-laws to access food through urban cultivation.

Findings demonstrate constrictive attitudes informed by by-laws created by the colonial administration which consign agriculture to rural areas shape current thinking. Continuity of colonial ideology is echoed in phrases such as the “ruralisation” of the modern city (Mugumbate et al., 2013). Although KIIs acknowledged the importance of urban agriculture, it remains to be assimilated into legal and statutory provisions of Zimbabwe. The results confirm that the condescending attitudes and responses are residual of ordinances drawn by the colonial administration in the 1950s and 1970s. Contemporary policies and laws specifically dedicated to enhancing and monitoring urban agricultural activities are glaringly absent. In good agreement with literature (Masvaure, 2016), KIIs confirmed that there was a shift in municipal attitudes towards the practice over the past decades. Stringent laws and hostility applied to the practice e.g. slashing of crops and penalising were replaced by ambivalence and uncertainty. For the majority of KIIs, this trajectory was disagreeable to statutory laws. By extension, one KII questioned the pronouncement of programmes such as *Operation Maguta* and Command Agriculture in cities on the back of the instruments such as the Constitution which prohibits it (Government of Zimbabwe, 2013). This anomaly coupled with ambivalence which is not supported by legal instruments adds to the uncertainty to the status of UPA.

Ambivalent attitudes towards the practice is problematic on two grounds. Firstly, it alludes to invisibility or lack of recognition, secondly the term points to inconsistent execution both of which demonstrate that off-plot cultivation is still viewed as subversive. Only two KII proposed a revision of archaic by-laws governing UPA to accommodate urban farmers. In line with McClintock et al. (2017) who negates the neutrality of 'sustainability', As reflected in the RTTC, orderly planning synonymous with modernist ideology cannot take precedence over hunger (Lefebvre et al., 1996). In view of the paradox where institutional arrangements remain ambivalent towards the practice in a depressed economy, this study illuminates the need to revisit institutional arrangements as they have a profound effect on household food security.

A meta inference of the findings shows that institutional arrangements have a direct and significant bearing on constraints faced by urban farmers. As postulated by Battersby (2012) informality of the practice renders it invisible to both research and policy. Naturally this invisibility amplifies constraints faced by urban farmers. Also, contrast with the study by Kutiwa et al. (2010) which points to the insignificance of the practice. This study found that although the merits were modest they were invaluable to farmers. Importantly, what emerged from the, FGDs, was that the invisibility of the practice caused by multiple constraints was pivotal to its modest contribution to household food security. Constraints faced by urban farmers decreased as food insecurity improved, i.e. food secure households recorded the lowest number of constraints. An implication of this finding is that there is need to revisit instruments governing UPA and align them to prevailing socio-demographic and economic conditions.

Identified constraints were prevalent in all study sites (95.25%). They were experienced at varying degrees. Constraints were weighted based on either gravity or frequency. Access to land (n= 204) was unanimously the biggest challenge faced by urban farmers across all sites, followed by water scarcity (n=94). The gravity of the remaining constraints (access to credit, access to extension services and pest management) varied by site. Moreover, Chi square computation between constraints and food security status show that households in the lowest income quintile experienced more constraints. This finding suggests that constraint factors associated with engaging in UPA decrease along the income gradient. Also, despite experiencing confluence of constraints, households exhibited resoluteness in their quest to appropriate land to address food and household needs.

Land is central to food security concerns. Concurring with other studies (Badami and Ramankutty, 2015, Taru and Basure, 2013), land scarcity was a universal constraint across all sites (Table 4.5 and Fig 4.5). There were two spatial related challenges, which directly affect the stability of food provisioning. Firstly, by-laws restricted cultivation due to planning laws which prohibit it according to written by-laws and the somewhat

permissive attitude coupled with increasing land unavailability negatively affected the practice. In addition, none of the households practicing off-plot cultivation had legal tenure of the land. This confirms the fact that UPA practitioners produced food under precarious and uncertain tenurial arrangements. Also, inadequate land within stands made it impermissible for some tenants to own home gardens (Horn 1994). This type of occupancy reduced the odds of households owning a garden due to space. They instead practised UPA on municipal land (open spaces or streambanks/wetlands). Challenging the notion of ‘open spaces’, KIIs reveal the political nature of UPA (Taru and Basure, 2013). Diverging views of land use reinforce Lefebvre’s argument on the vicissitudes of hunger versus technocratic/aesthetic appeal (Lefebvre et al., 1996). As such the land constraint presents itself at two levels (household and municipal) explaining the urgency in resolving UPA’s legislative position. Unlike other constraints which could potentially be addressed at the local level, the land issue presented itself as a municipal level issue.

In addition to land, water was a cross-cutting constraint. Water scarcity was listed as a constraint by 23.5% of the respondents. Water scarcity not only reduced the odds of obtaining tangible produce but also an expensive enterprise for community gardeners who paid for pumping services. Because of this constraint some households cultivated on smaller pieces of land. Households in peri-urban sites (Epworth and Ushewokunze) recorded the highest number of reports on water scarcity. Consistent with literature, low-income urban and peri-urban areas are plagued with water shortages (Manjengwa et al., 2016, Manzungu and Machiridza, 2005). As highlighted in Section 4.2 old urban settlements also suffer from critical water shortages because of dilapidated water infrastructure last serviced during the colonial period. From observations made by the researcher, urban farmers, except for households involved in a community garden in Ushewokunze and Epworth (Fig 5.3), did not have water points near their gardens. Of note however, is that the researcher observed that the water used by one group of community gardeners was greyish/black substantiating evidence provided earlier on the dangers of using untreated domestic or industrial effluent. Rightly so, the call by experts on the use of water sources which plausibly contained heavy metals are well merited

Agricultural extension services were negligible across all sites. Returning to the earlier point on the marginalisation of UPA, it therefore suffices to conclude that extension services in urban areas are in a worse off state given the precedence of rural agriculture in the Zimbabwean context. Illuminating the gravity of the challenge, earlier findings on rural agriculture report a decline in the farmer extension ratio on the continent making extension inefficient (Taye, 2013, ZimVAC, 2017). However, having noted that some urban farmers received voluntary advice from trained personnel, the impact of these services on overall food security status was also incorporated in the analysis. The informal status of UPA and absence in the planning structures, as explained by KIIs explains the lack of extension officers manning urban areas. The fact that urban farmers do not have associations also makes obtaining credit a challenge. Even more contentious is the availability of

collateral in a depreciating economy. Given the importance of extension services to developing agricultural skills, the invisibility of the 'urban dynamic' is presented through this constraint. Improper soil and input management, which contaminates and deplete natural resources can be curbed through deploying Agritex officers. Also, extension services are the conduits for policy recognition and obtaining inputs or credit. The paradox however is that the extension services constraint, like the land issue, are is hinged on legislature and by-laws. Until policy is revised, very little can be done to address the concerns of both curators of the city and urban farmers.

4.5. Conclusion

By employing RTTC, this paper has unearthed the extent to which institutional arrangements support or constrict the practice of UPA and how urban farmers organise themselves around these systemic challenges. As articulated in RTTC, cities are sites of production meant to serve the interests of their inhabitants. However as reflected in the study, institutional arrangements were identified as playing a constricting role to food production and consumption. The informal nature of the practice rendered it invisible to both policy and practice across all sites. Another interesting finding was that this invisibility also contributed to a host of constraints faced by urban farmers on their everyday experiences. Institutional arrangements governing UPA were characterised by ambiguities emanating from incompatibility between colonial by-laws/ordinances and contemporary food challenges.

The conflict between outmoded colonial ordinances and the right to food provided strong evidence for the continued maligning and invisibility of UPA, yet there is a denotation that the practice is invaluable to low-income households. Low-income households demonstrate the significance of the practice through their continued resilience in circumventing municipal by-laws and regulations prohibiting the practice. The flouting of by-laws and ordinances by cultivating in undesignated areas has however been met with less stringent control in comparison to previous years. Also, the absence of ordinances supporting the practice means that the issue of the legality of the practice remains unresolved. Water scarcity, absence of Agritex, lack of capital and pest management were also cited as key constraints. Notably, older settlements, Mabvuku and Epworth reported water as a key challenge.

In view of UPA's begrudging permanence and deteriorating economic condition in the city, austere measures towards the practice of UPA are seemingly dissipating. But, if regulatory documentation remains non-existent, ambivalence and uncertainty will continue to describe UPA. To transform deteriorating food provisioning

landscape there is need to create systems, processes which promote autonomous production which adheres to sustainability principles The scale of informality is too wide to ignore the modest merits of UPA. Based on these findings the paradox of upholding the right to food for all and suppressing UPA can only be logically addressed at policy level. This study, therefore underscores that a revision of institutional arrangements is a prerequisite to addressing urban food insecurity.

References

- BADAMI, M. G. & RAMANKUTTY, N. 2015. Urban agriculture and food security: A critique based on an assessment of urban land constraints. *Global food security*, 4, 8-15.
- BANDAUKO, E. & MANDISVIKA, G. 2015. Right to the City: An Analysis of the criminalisation of the informal sector in Harare, Zimbabwe. *Journal of Advocacy*, 4, 184-191.
- BATTERSBY, J. 2012. Urban food security and the urban food policy gap. *Strategies to Overcome Poverty and Inequality: Towards Carnegie 3 Conference*. Cape Town.
- BATTERSBY, J. 2017. Cities, planning and urban food poverty in Africa. *The Routledge Companion to Planning in developing countries*. Routledge.
- BRENNER, N., MARCUSE, P. & MAYER, M. 2012. *Cities for people, not for profit: Critical urban theory and the right to the city*, Routledge.
- BVOCHORA, K. & KUSENA, B. 2018. The Political Economy of Land and Urban Development: The Case of Epworth, Zimbabwe, 1980-2012. *Handbook of Research on Urban Governance and Management in the Developing World*. IGI Global.
- CHIDEME, M. 2017. *Message on urban Agriculture* [Online]. Available: <http://www.hararecity.co.zw/index.php/message-on-urban-agriculture/> [Accessed 29 June 2018].
- CHIMEDZA, A. 2015. *Crop destruction angers Mabvuku residents* [Online]. Available: <http://www.herald.co.zw/crop-destruction-angers-mabvuku-residents/> [Accessed 20/04 2017].
- CRUSH, J. & RILEY, L. 2017. Urban food security, rural bias and the global development agenda. In: PARTNERSHIP, H. C. (ed.) *Hungry Cities Partnership Discussion Paper No. 11*. Ontario, Canada: Wilfrid Laurier University.
- DUBE, D. & CHIRISA, I. 2012. The informal city: Assessing its scope, variants and direction in Harare, Zimbabwe. *Global Advanced Research Journal of Geography and Regional Planning*, 1, 016-025.
- DUBE, E. 2017. Urban agriculture as a food security strategy for urban dwellers: a case study of Mkoba residents in the city of Gweru, Zimbabwe. *PEOPLE: International Journal of Social Sciences*, 3, 26-45.
- FAO 2012. *Growing greener cities in Africa: first status report on urban and peri-urban horticulture in Africa*, Food and Agriculture Organization of the United Nations. Rome, Italy.
- FOWLER JR, F. J. 2013. *Survey research methods*, Thousand Oaks Sage publications.
- FUSCH, P. I. & NESS, L. R. 2015. Are we there yet? Data saturation in qualitative research. *The Qualitative Report*, 20, 1408-1416.
- GOVERNMENT OF ZIMBABWE 1952. The Natural Resources Act. Harare, Zimbabwe: Government Printers.
- GOVERNMENT OF ZIMBABWE 1973. The Municipal Act. Harare: Government Printers.
- GOVERNMENT OF ZIMBABWE 2013. Constitution of Zimbabwe Amendment (Number 20) Act. Harare, Zimbabwe: Government Printers.
- HANKE, S. H. & KWOK, A. K. 2009. On the measurement of Zimbabwe's hyperinflation. *Cato Journal*, 29, 353.
- JENSEN, E. & LAURIE, C. 2016. *Doing real research: A practical guide to social research*, London, Sage.
- JONES, J. L. 2010. Nothing is straight in Zimbabwe – The rise of the kukiya-kiya economy, 2000–2008. *Journal of Southern African Studies*, 36, 285–299.
- KAMETE, A. Y. 2012. Interrogating planning's power in an African city: Time for reorientation? *Planning Theory*, 11, 66-88.
- KATANDA, Y., MUSHONGA, C., BANGANAYI, F. & NYAMANGARA, J. 2007. Effects of heavy metals contained in soil irrigated with a mixture of sewage sludge and effluent for thirty years on soil microbial biomass and plant growth. *Physics and Chemistry of the Earth, Parts A/B/C*, 32, 1185-1194.
- KUTIWA, S., BOON, E. & DEVUYST, D. 2010. Urban agriculture in low income households of Harare: an adaptive response to economic crisis. *Journal of Human Ecology*, 32, 85-96.
- LEFEBVRE, H. 1991. *The Production of Space*, Oxford, United Kingdom, Blackwell.

- LEFEBVRE, H., KOFMAN, E. & LEBAS, E. 1996. *Writings on cities*, Blackwell Oxford.
- LIAMPUTTONG, P. 2011. *Focus group methodology: Principle and practice*, Sage Publications.
- MAKOCHEKANWA, A. 2016. Zimbabwe to introduce Zimbabwe Bond Notes: reactions and perceptions of economic agents within the first seven days after the announcement. *Munich Personal RePEc Archive MPRA* [Online]. Available: <https://mpa.ub.uni-muenchen.de/71695/>. [Accessed 06-07-2018].
- MANGUDYA, J. 2016. Measures to deal with cash shortages whilst simultaneously stabilising and stimulating the economy. Available: <http://www.rbz.co.zw/assets/press-statement-measures-to-deal-with-cash-shortages-04-may-2016.pdf>. [Accessed 14 May 2017].
- MANJENGWA, J., MATEMA, C. & TIRIVANHU, D. 2016. Understanding urban poverty in two high-density suburbs of Harare, Zimbabwe. *Development Southern Africa*, 33, 23-38.
- MANZUNGU, E. & MACHIRIDZA, R. 2005. An analysis of water consumption and prospects for implementing water demand management at household level in the City of Harare, Zimbabwe. *Physics and Chemistry of the Earth, Parts A/B/C*, 30, 925-934.
- MARQUETTE, C. M. 1997. Current poverty, structural adjustment, and drought in Zimbabwe. *World Development*, 25, 1141-1149.
- MASVAURE, S. 2016. Coping with food poverty in cities: The case of urban agriculture in Glen Norah Township in Harare. *Renewable Agriculture and Food Systems*, 31, 202-213.
- MBIBA, B. 1994. Institutional responses to uncontrolled urban cultivation in Harare: prohibitive or accommodative? *Environment and Urbanization*, 6, 188-202.
- MBIBA, B. 2000. Urban agriculture in Harare: between suspicion and repression. In: BAKKER, N., DUBBELING, M., GUENDEL, S., SABEL KOSCHELLA, U. & DE ZEEUW, H. (eds.) *Growing Cities, Growing Food, Urban Agriculture on the Policy Agenda* Feldafing, Germany: Feldafing: Deutsche Stiftung für international Entwicklung (DSE).
- MCCLINTOCK, N., MIEWALD, C. & MCCANN, E. 2017. The politics of urban agriculture: Sustainability, governance, and contestation. *SAGE Handbook on Spaces of Urban Politics*. Thousand Oaks, California: SAGE.
- MINISTRY OF AGRICULTURE. 2017. Rainfall characteristics in the five natural regions of Zimbabwe. Available: <http://www.moa.gov.zw/index.php/zim/>.
- MKWAMBISI, D. D., FRASER, E. D. & DOUGILL, A. J. 2011. Urban agriculture and poverty reduction: evaluating how food production in cities contributes to food security, employment and income in Malawi. *Journal of International Development*, 23, 181-203.
- MUDIMU, G. D. 1997. Urban agricultural activities and women's strategies in sustaining family livelihoods in Harare, Zimbabwe. *Singapore Journal of Tropical Geography*, 17, 179-194.
- MUGUMBATE, J., MAUSHE, F. & NYONI, C. 2013. Ruralisation of urban areas: Reversing development in Zimbabwe. *International Journal of Advanced Research in Management and Social Sciences*, 2, 13-30.
- MUJERE, N. 2017. The Contribution of Smallholder Irrigated Urban Agriculture Towards Household Food Security in Harare, Zimbabwe. In: WINKLERPRINS, A. (ed.) *Global Urban Agriculture*. Oxfordshire, United Kingdom: Centre for Agriculture and Bioscience International
- PAZVAKAVAMBWA, S. & HAKUTANGWI, M. 2006. Agricultural extension. In: RUKUNI, M., TAWONEZVI, P., EICHER, C., MUNYUKI-HUNGWE, M. & MATONDI, P. (eds.) *Zimbabwe's agricultural revolution revisited*. Harare: University of Zimbabwe (UZ) Publications.
- PREMAT, A. 2009. State power, private plots and the greening of Havana's urban agriculture movement. *City & Society*, 21, 28-57.
- ROGERSON, C. M. Responding to informality in urban Africa: Street trading in Harare, Zimbabwe. Urban Forum, 2016. Springer, 229-251.
- SEDZE, V. 2006. An Examination of a Community-Based Urban Agriculture Project: The Case of Musikavanhu in Budiro, Harare. *City Farmer, Vancouver*.
- SOTAMENOU, J. & PARROT, L. 2013. Sustainable urban agriculture and the adoption of composts in Cameroon. *International Journal of Agricultural Sustainability*, 11, 282-295.
- TARU, J. & BASURE, H. 2013. Conflicts, contestation and marginalization in urban agriculture: experiences from Kuwadzana Extension, Harare. *Russian Journal of Agricultural and Socio-Economic Sciences*, 18, 15-26.

- TAWODZERA, G., RILEY, L. & CRUSH, J. 2017. Following the Crisis: Poverty and Food Security in Harare, Zimbabwe. *Journal of Food and Nutritional Disorders*, 1-14.
- TAWODZERA, G., ZANAMWE, L. & CRUSH, J. 2012. The state of food insecurity in Harare, Zimbabwe. Urban Food Security Series No. 13. Queen's University and AFSUN: Kingston and Cape Town.
- TAYE, H. 2013. Evaluating the impact of agricultural extension programmes in sub-Saharan Africa: Challenges and prospects. *African Evaluation Journal*, 1, 1-9.
- TEDDLIE, C. & TASHAKKORI, A. 2012. Common "core" characteristics of mixed methods research: A review of critical issues and call for greater convergence. *American Behavioral Scientist*, 56, 774-788.
- TORNAGHI, C. 2014. Critical geography of urban agriculture. *Progress in Human Geography*, 38, 551-567.
- WHITE, S. A. & HAMM, M. W. 2017. A View from the South: Bringing Critical Planning Theory to Urban Agriculture. In: WINKLERPRINS, A. (ed.) *Global Urban Agriculture*. Oxfordshire: CAB International.
- ZIMVAC 2017. Rural Livelihoods Assessment Urban Assessment Report. Harare: Zimbabwe National Vulnerability Assessment Committee.

CHAPTER 5

MAPPING CLIMATE CHANGE AND VARIABILITY PERCEPTIONS OF URBAN FARMERS AND THEIR APPLICATION OF AGROECOLOGICAL PRACTICES

Abstract

Apprehension over the effects of climate change and variability on food security in sub-Saharan Africa is mounting. Climate research and programming retains a rural and scientific orientation, yet, urban dwellers are equally disposed to its effects and urban food insecurity is endemic. Thus, this paper attempts to map how urban farmers in high density and peri-urban areas in Harare perceive and adapt to climate change and variability as well as explore their agroecological practices. Mixed methods consisting of a cross-sectional survey ($n = 400$), 4 focus group discussions and 8 key informant interviews were employed to collect data. For analysis binary logistic regression, multinomial logistic regression and NVivo were used to forecast data. An approximation of the binary regression revealed that 74.75% urban farmers perceived changes in terms of rainfall and temperature over the past decade. Observation of weather extremes and perceived risk on crop or vegetable production increased the odds of adaptation. Multinomial logistic regression shows that water conservation, crop rotation, change of planting dates and stream bank/wetland cultivation were significant adaptation strategies. Results drawn from the models display that access to extension services, capital, and scale of production significantly impacted adaptation. Lack of information and unsupportive policy environment and water constraints limited the productive and adaptive capabilities. Findings establish the importance of considering the perceptions of urban farmers in climate science. This has the potential to not only enhance adaptation capacities but facilitate their inclusion in policy and planning.

Keywords- agroecological practices, climate adaptation strategies, climate change and variability, perceptions, urban farmers, food security

5.1 Introduction

Variability in seasons creates uncertainty in the timeline of climatic events. Climate change and variability are defined by the Intergovernmental Panel on Climate Change (IPCC) as exponential shifts or variation in extended weather patterns (IPCC, 2014). Perceived anthropogenic shifts in the form of high temperatures and increased precipitation destabilise the hydrological system leading to decreased yield (IPCC, 2014, Altieri et al., 2015). As documented by FAO et al. (2018) agro-based economies mainly dependent on rain-fed agriculture are prone to food insecurity. Zimbabwe aptly fits this description; substantiated evidence (Jayne et al., 2006, Kokera and Ndoma, 2016) confirmed pronounced decline in yields over the past decades resulting

in waning food security at national level. Furthermore, literature is inundated with evidence of the country's suboptimal fiscal performance, dismal employment level and escalating poverty rates since 2000 (Hove, 2017, Rusvingo, 2015). In a resource constrained environment, agricultural productivity is subject to strain, and more markedly so, under climate variability. Also, climate change crisis is not restricted to rural spaces (Tawodzera, 2012b, Bausch et al., 2018). Urban dwellers a) experience high levels of poverty and food insecurity set up against a cash-based system (Satterthwaite, 2004). b) experience more elevated surface temperatures due to the built environment (Mushore et al., 2017). As illustrated in Fig 5.1, the interaction of these crises with climate change translates to weak adaptive capacity for low-income households (FAO, 2016).

Climate change, labelled a “multiplier” of the crises has had devastating effects on food security in developing countries. More-so in sub-Saharan Africa, which is the ‘hotspot’ of climate change and variability (Connolly-Boutin and Smit, 2016, Kotir, 2011, FAO et al., 2016). This assertion is grounded on the conviction that anthropogenic constraints wrought by climate variability affects all pillars of food security, particularly stability, thus intensifying episodes of hunger and malnutrition (Kotir, 2011). For Zimbabwe, oscillations between droughts and flooding over decades explain the episodes of depleted maize reserves, increased imports and food aid due to increased poverty and malnutrition (Manyeruke et al., 2013, Mugandani et al., 2012). Temporal shifts in rainfall and temperature affect all food systems including those in urban spaces. For example, notable events such as the protracted drought of 1991/92 Rukuni (2006) and the tropical depression Dineo reported by the Famine Early Warning Systems Network (FEWSNET) negatively affected and continue to affect food provisioning in all areas FEWS NET (2017). Yet little is known about the agroecological practices and adaptive capabilities of urban dwellers. The study draws out two reasons for this; the invisibility of UPA and resultant occlusion of perceptions in climate science research.

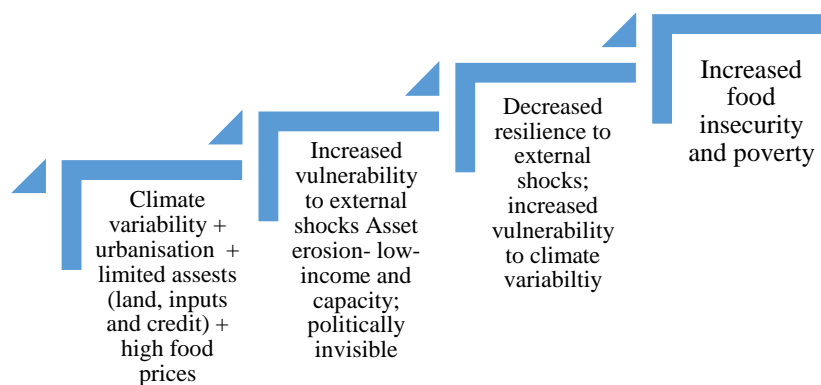


Figure 5. 1 Effects of climate change and variability on urban farmers
Adapted from McKune et al. (2015) and (FAO, 2016)

Agriculture continues to be viewed as a preserve of rural areas yet growing evidence points to food insecurity being gradually transposed to urban spaces (Crush and Riley, 2017, Ziervogel and Frayne, 2011). Urban and peri-urban agriculture (UPA), which is also climate sensitive has been evidenced as playing a critical role for urban households. Yet studies on agriculture and climate change are limited (Ziervogel and Frayne, 2011). Consequently, UPA is absent in Zimbabwe's recently launched a National Climate Policy (Government of Zimbabwe, 2017) and related programming (Mupedziswa and Kubanga, 2017, Tawodzera, 2012b) . In Zimbabwe, as in some countries in developing countries, there is limited literature on urban experiences of climate change. Scholars (Mupedziswa and Kubanga, 2017, Tawodzera, 2012b) focus on the SADC region and the broad effects of climate change. Tawodzera (2012b) provides a cursory account of agricultural experiences of urban farmers by focusing on multiple livelihood enterprises. Both studies fail to consider an in-depth appreciation of agricultural practices and perceptions of the urban farmers on climate change. For Chanza and Mafongoya (2017), this invisibility is also evidenced in the absence of indigenous knowledge to climate science discourses and policies. While these observations are well-merited, the rural orientation towards climate change and its impact on food security means that urban interpretations and experiences remain occluded.

Climate change and variability on agricultural production in Zimbabwe have been well-documented, however, studies are convoluted with scientific analyses (Bhatasara, 2017) yet literature (Belay et al., 2017, Chanza and Mafongoya, 2017, Rurinda et al., 2014, Jiri et al., 2015, Mulenga et al., 2017) shows that indigenous or local perceptions of climate change are critical to climate science. Extending this argument, studies (Jiri et al., 2015, Rukuni, 2006) demonstrate how interpretations presented by farmers were congruent with official climatological assessments. Other important findings show that women's adaptive capacities surpassed that of men (Pérez et al., 2015, Jiri et al., 2015) However other studies (Cassidy and Barnes, 2012, Terry, 2009) contradict this finding. Regular access to agricultural extension services improved adaptation (Jiri et al., 2015) In addition to these determinants (Belay et al., 2017, Connolly-Boutin and Smit, 2016, Getachew et al., 2014)

other contributing determinants are education, farm size, access to capital and access to climate change information. This conforms the findings of Chaudhury et al. (2017) that external networks determines adaptive capacity and strengthen resilience to climate change. More pointedly, Cassidy and Barnes (2012) also established that poor women in developing countries have weaker links to networks. Relatedly, Connolly-Boutin and Smit (2016) states that inadequate income, physical assets and unsupportive institutional arrangements increase the vulnerability of poor households to climate change. Thus, in unearthing how urban farmers perceive and confront climate change and variability, it is vital to understand the extent to which their practices resonate with agroecological principles.

Central to the issue of indigenous knowledge systems is the discipline and practice of agroecology. It not only upholds the local knowledge as fundamental to programming but endorses the application of biological or organic based practices to enhance sustainable agriculture. Some of the practices include crop diversification, crop rotation, minimum tillage, use of organic inputs e.g. bio-pesticides and manure or compost (Altieri et al., 2012, Igalavithana et al., 2017). According to Igalavithana et al. (2017). unlike synthetic fertilisers, bio-fertilisers are critical to attaining sustained soil fertility due to their microbial content. Thus, there is minimal use of conventional based methods or inputs e.g. intensive farming and synthetic fertiliser. Minimal disturbance of the ecological system translates to a lower release of nitrate nitrogen (NO_3-N) from soils. In turn, literature has demonstrated that the application of its principles translates to a food system that is more resilience to the effects of climate change (De Schutter, 2013, Altieri and Nicholls, 2017). In a paper assessing the resilience of traditional agriculture to climate change Altieri and Nicholls (2017). suggest that given the worsening projected forecasts, production systems centred on agroecology provide the only practical path which responds to both ecological sustainability and productivity. These scholars (Altieri and Nicholls, 2017) demonstrate how soil management practices, water conservation and crop diversity provide farmers with a host of benefits including resilience to climate change. The application of agroecological practices is premised on two grounds a) use of natural inputs and soil management practices and relatedly b) the minimal effects of these on ecological systems and greenhouse gas emissions (Holt-Giménez and Altieri, 2013).

Urban and peri-urban agriculture is not inherently sustainable. Literature on UPA in SSA (Cook et al., 2015, Mujere, 2017, Sotamenou and Parrot, 2013) has demonstrated that more farmers use bio-fertilisers in combination with synthetic ones as opposed to the exclusive use of bio-fertilisers. For example, Cook et al. (2015) demonstrated how none of the farmers in eight peri-urban areas in India used bio-fertilisers exclusively. Only 12 out of 35 households used bio-fertilisers in combination with synthetic fertilisers. While most farmers confirmed the importance of bio-fertilisers over synthetic, they state that scale did not allow them to exclusively rely on bio-fertilisers. Using Ordinal logistic regression to assess soil inputs used by 288 Cameroonian urban farmers, Sotamenou and Parrot (2013) reveal synthetic fertiliser was the most widely used input. Less than two-fifths (36%) of the farmers used compost exclusively or in combination with fertiliser Sotamenou and Parrot (2013). Availability was also cited as a deterrent (Cook et al., 2015). The

excessive application of fertilisers and pesticides (De Zeeuw et al., 2011) has elicited concern over its impact on human health and the ecosystem.

As highlighted above, questions surrounding the perceptions of farmers on the impact of climate change on food security has gained scholarly attention. But, these questions make no attempt to investigate the urban dynamic. Yet, (FAO et al. (2018), FAO, 2016) calls for the strengthening of all sectors to adapt and mitigate the increasingly devastating effects of climate change and variability on food security. Urban cultivation remains a neglected area in the field of climate change. Further, perceptions of farmers have been consigned to tributary concerns in the field of food security. The study questions evidence which side-lines local perceptions and responses to climate change. This paper considers the plausibility of producing a resourceful and comprehensive system of knowledge that addresses enquiries from both indigenous and scientific fields. Considering growing food insecurity challenges in urban spaces, the authors posit that an enquiry into how urban farmers perceive and organise themselves around climate change and variability is a well merited enquiry. Understanding the perceptions, adaptive capacities and agroecological practices of urban farmers is essential for the development of inclusive policies and programming on climate change in urban spaces. Thus, the aim of this study is to first, explore the perceptions on climate change and corresponding adaptation strategies of urban farmers in Harare. Secondly, the study examined the extent to which their practices resonate with agroecological principles.

5.2 Methods and materials

5.2.1 Research setting

Four urban and peri-urban study sites (Ushewokunze, Hatcliffe Extension, Mabvuku and Epworth) in Harare province were identified as the research setting. Located in the North Eastern Zimbabwe, Harare falls under AEZ II which has warm and moderate climatic conditions. The city's mean annual temperature is between a minimum of 12.2°C and a maximum of 25.3°C. It's annual precipitation (most of which falls between November to February) is approximately 831 mm (Unganai, 1996) Harare's temperatures, as highlighted above have increased over the past few decades. This thermal rise stems from a 50% decrease in vegetation and corresponding increase in built environment causing the heat island effect (Mushore et al., 2017).

5.2.2 Data collection and management

Multi-phase sampling was used to draw respondents for the study based on the mixed methods design adopted by the study (Creswell and Clark, 2011). Data were collected sequentially. Firstly, purposive sampling was used to select the four study sites. Selection was informed by scholarship which confirms low per capita income, high levels of poverty in low-income areas (Manjengwa et al., 2016). and the reputed ill-adapted status of the country to climate variability (Hertel and Lobell, 2014). For the survey, stratified systematic sampling was employed. As highlighted in the previous section, UPA as a practice is ‘invisible’ and these low-income areas are resource constrained hence registers are unavailable or unreliable; irregular settlements compound this challenge (Pieterse and Parnell, 2014). Thus, existing administrative divisions (e.g. Edson Zvobgo, Rex Nhongo) were employed. Main in-roads as boundaries to dissect the enumerated sections to obtain the step-size (Kondo et al., 2014). The sample for the FGDs was nested in the first phase of the study. Four FGDs consisting of 35 urban farmers (between 8 and 13 per study site) were randomly selected and approached to check for availability and consent. If they were not available, random selection was done until a number sufficient for an FGD was reached. Of the four FGDs, two had both genders and the remaining two were exclusively female. At the third stage, we purposively selected key informants from agricultural departments (3), environmental agencies (3) and councillors from the respective sites (2).

A mixed methods approach consisting of a cross-sectional survey (n= 400) supplemented by four focus group discussions and eight key informant interviews was utilised to examine agroecological practices and perceptions of urban farmers on climate change. A pre-tested questionnaire (controlled for errors) was administered by the researcher and three trained research assistants included questions on agroecological practices, knowledge on climate change and climate adaptation strategies. In addition, FDG and KII guides incorporated more directed questions on practical experiences. By design, questionnaires approximate numerical characteristics which do not adequately capture meanings, experiences and perceptions (Wagoner and Jensen (2014)). Thus, instruments (FGDs and KIIs) designed to elicit in-depth views were used to draw into the realities of respondents and thus off-set the limitations of questionnaires (Creswell and Clark, 2011). The group setting allows for a ‘shared understanding’ of experiences (Morgan, 1996) and is also suited for vulnerable people who feel more comfortable expressing themselves among familiar faces rather than in a one on one interview sessions (Liamputtong, 2011). Key informant interviews focused on policy and planning related questions.

All KIIs and FGDs were audio recorded following the consent of all respondents. Key informant interviews and FGDs lasted between 30 to 45 minutes and 50 minutes to 1 hour 10 minutes respectively. The survey and

FGDs were conducted in Shona³² to ascertain that questions were fully comprehended by all respondents. While the use of mixed methods permits generalisations of agroecological practices and perceptions on climate change and variability, the results are delimited to the four study sites. Thus, they are not generalizable to the city or other areas (Johnson and Onwuegbuzie, 2004).

5.2.3 Data management

To forecast the perceptions of climate change and variability, adaptive capacities and uptake of agroecological practices, analyses were performed using Statistical Package for Social Sciences (SPSS) version 24 (quantitative) and NVivo Version 12 (qualitative). The researcher and two research assistants cross-examined all entries and adjusted anomalies. Hosmer and Lemeshow was primarily used to test the association between climate change perception and ensuing adaptation measures. To examine the uptake of climate adaptation multinomial regression was employed to decipher sources of climate adaptation data. MNR estimates in the NGO category were infinite owing to the low number of respondents citing it as key source of agricultural information. To correct the “sparse data bias”, penalisation estimation³³ which enhances the precision in the mean squared error through “weight estimation process” (Greenland et al., 2016) was used. The application of agroecological practices were analysed using multinomial regression analysis. During the analysis, statistical data and thematic coding were shared with independent reviewers to minimise bias and contribute to the reliability of the analysis (Creswell and Clark, 2011). Interpretations drawn from both quantitative and qualitative analysis were merged to produce a holistic account of phenomena (Teddlie and Tashakkori, 2012).

5.3 Results

5.3.1 Perceived changes and variability in climate

Figure 5.2 presents the distribution of how urban farmers perceived climatic changes over a 10-year period. More than two-thirds of the respondents observed noticeable changes in temperature $n=279$ (69.75%) and rainfall $n=290$ (72.5%) over this period. Of those that noted changes in temperature, 21.8% stated that the level of temperature had increased. This was followed closely by those that perceived that the heat was more extreme (21.75%) and an increase in the number of hot days (21.25%). On the contrary, 4.25% of respondents observed a decline in the number of hot days over the same period. Rainfall patterns were cited as unpredictable (38%). This is followed by respondents who stated that the amount of rainfall had decreased (24.5%) over the past decade. Inversely, 10% of the households observed an increase in rainfall.

³²Vernacular language widely spoken in Harare province

³³ A bias-correcting instrument that enhances the precision in the mean squared error through “weight estimation process”

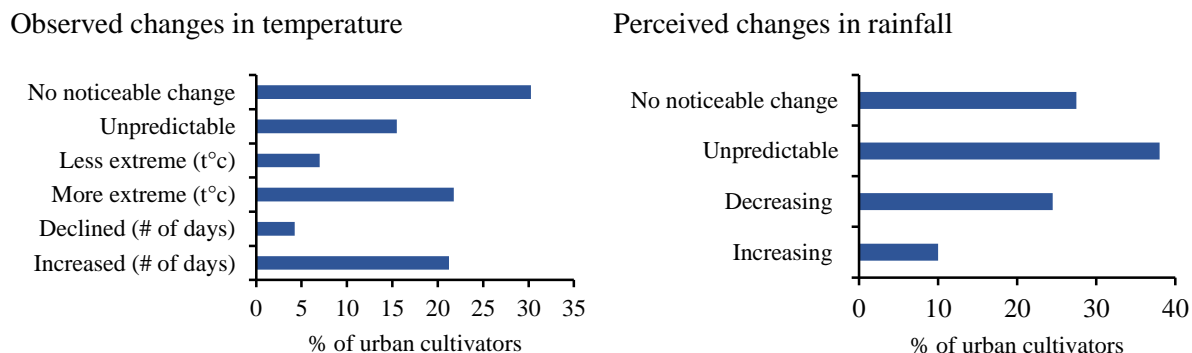


Figure 5. 2 Perceptions of urban farmers on extreme weather patterns over the past decade

5.3.2 Perceptions on the impact of climate change on crop production

Binary logistic regression showed that almost three quarters (74.75%) of the respondents perceived a relationship between climate change and crop production (Table 5.1). Hosmer and Lemeshow Test showed that the prospect of the model $X^2(35.969)$ was statistically significant $P \leq 0.05$ at 5%. As demonstrated in Table 5.1 less than a third of urban farmers failed to notice changes in rainfall (30.25%) or temperature (27.5%) in the past decade. However, those that noted changes stated that it negatively affected food security. One respondent from an Epworth FGD remarked:

[It] strongly affects production because if we look at this period we usually sell spinach in May or June, but this is our first batch of spinach, this is because the rains we received the past months were too much. We do not know how long this winter will last since we received a lot of rains.³⁴

Takatovhiringwanemvuramungadeimusingaonimadzvangamadvzangaichingovagirinhiche te, mvura yakaodza zvinhu. (We were negatively affected by the rains, you would not be seeing patches, it (the garden) would have been all green, rain made crops rot.³⁵

5.3.3 Adaption strategies adopted by urban farmers

Table 5.1 shows descriptive statistics of adaptation disaggregated by household characteristics. Although most of the urban farmers were female (n 265), 54% adapted to climate change. Conversely, almost two-thirds (63%) of the male respondents adapted to climate change. Urban farmers within the 50-64 age group recorded the highest number of adapters (65%) compared to their younger or older counterparts. With regards to

³⁴Excerpt 1- FGD conducted in Epworth (04/07/2017)

³⁵Excerpt 2 FGD conducted in Ushewokunze (12/07/2017)

education, respondents who attended institutions of higher learning were more likely to adapt than those that did not. Also, the urban farmers who had practised for more than 20 years scored the highest number (71%) of those who adapted to climate change (71%).

Table 5. 1 Percentage of urban farmers who effected changes to farming practices because of climate change

		Adaptation (%)	No adaptation (%)
Gender	Male	63	37
	Female	54	46
Age	18-29	53	47
	30-49	56	46
	50-64	65	35
	65+	45	55
Education	No schooling	35	65
	Primary	64	36
	Ordinary level	56	44
	Advanced level	44	56
	Technical/vocational college	79	21
	University	100	0
Period cultivating	≤ 4 years	57	43
	5-10 years	60	40
	11-20 years	36	64
	20 + years	71	29
Monthly income	Low	56	44
	Medium	67	33
	High	38	62

To determine the odds of adapting climate change based on its perception on crop production binary logistic regression was computed. Statistically significant adaptation measures were; increase in water conservation (OR = 4.677, 95% CI 1.348 – 16.229, $P \leq 0.05$) crop rotation (OR = 2.662, 95% CI 0.665 – 10.654, $P \leq 0.05$) change planting dates (OR = 38.310, 95% CI 2.753 – 53.302, $P \leq 0.05$) and stream bank/wetland cultivation (OR = 0.056, 95% CI 0.005 – 0.920, $P \leq 0.05$) (Table 5.2). Respondents that perceived changes on production due to climate variability were more likely than those that did not perceive any change to adapt. For example, the odds of urban farmers who envisaged a relationship between climate change and crop production who reported change planting dates were 38% higher than those that did not perceive an association between climate change and crop production (OR = 38.310, 95% CI 2.753 – 53.302, $P \leq 0.05$). Other significant parameter estimates were increased water conservation (OR = 4.667, 95% CI 1.348 – 16.229, $P \leq 0.05$) crop rotation (OR = 2.662, 95% CI 0.665 – 10.654, $P \leq 0.05$). Urban farmers who perceived an association between climate change and crop production were less likely than those that did not to adapt through stream bank/wetland cultivation (OR = 0.056, 95% CI 0.003 – 0.920, $P \leq 0.05$).

Moving to different site was not a significant adaptation measure among households. Owing to the unavailability of land, the opportunity to move was negligible. This corresponds with the inability of

households to cope with the excessive rainfall they had received in the previous months. Affirming the negative effects of climate change on production, respondents also drew attention to constraints to the meticulous adoption of adaptation measures (Table 5.3). These were ordered as follows; lack of information (50%), lack of access to water (29%) and lack of capital (21%). Epworth recorded the highest number of urban farmers with constraints to adaptation ($n = 81$).

Table 5. 2 Binary logistic regression on adaptation measures relative to perception of the impact of climate change on crop production

Adaptation measures	Sig.	Exp(B)	95% C.I. for EXP(B)	
			Lower	Upper
Change in crop/vegetable variety	0.997	1.599	0.879	6.264
Change in crop/vegetable type	0.331	0.431	0.079	2.348
Change from synthetic to organic fertilisers	0.479	1.713	0.385	7.617
Increase in the amount of land under	0.140	0.031	0.005	3.155
Decrease in the land under cultivation	0.827	0.756	0.062	9.213
Implement soil management techniques	0.563	1.623	0.315	8.366
Move to a different site	0.441	5.295	0.076	36.869
Increase water conservation	0.015	4.677	1.348	16.229
Use of waste water	0.613	0.707	0.184	2.711
Crop rotation	0.026	2.662	0.665	10.654
Change planting dates	0.007	38.310	2.753	53.302
Stream bank/ Wetland cultivation	0.044	0.056	0.003	0.920
Constant	0.121	1.267		

- a. Reference category was households that did not perceive climate change as influencing crop production

Table 5. 3 Major constraint to climate change adaptation

		Ushewokunze	Hatcliffe	Mabvuku	Epworth
Key constraint to adaptation	n (%)	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>
Lack of capital	21	20	14	17	12
Lack of information	50	34	46	35	35
Insufficient water	29	19	11	22	34
Total	100	73	71	74	81

5.3.4 Agroecological practices and sources information for urban farmers

To analyse the impact of different sources of agricultural information on agroecological practices multinomial regression was computed using Agritex services as the reference category (Table 5.4). Parameter estimates show that information dissemination through Agritex officers has a positive association with the adoption of agroecological practices. Respondents that depended on radio and television for agricultural information were less likely to apply artificial fertiliser ($OR = 0.227$, 95% CI 0.072 – 0.714, $P \leq 0.05$), use organic pesticides ($OR = 0.192$, 95% CI 0.066 – 1.072, $P \leq 0.05$), preserve the environment ($OR = 0.677$, 95% CI 0.158 – 1.733, $P \leq 0.05$), compared to those who relied on Agritex Services. The only strongly significant indicator for urban farmers that relied on relatives/neighbours for agricultural information was the use of organic pesticides. However, respondents who had access to Agritex Services had greater odds of using organic

pesticides compared to those relying on social relatives or neighbours (OR = 0.207, 95% CI 0.050 – 0.852, $P \leq 0.05$). Confirming the odds ratio outcome, one respondent who is part of a community gardens FGD displayed wide knowledge on bio-pesticide methods:

There are chillies that you can grind and spray the crops, [...] Organic pesticides do not require waiting periods because they are foods that we eat daily. If I plant vegetables at the edges of the bed *umm..* intercropping e.g. a line of leafy vegetables interspersed with a line of onions. It also helps with the elimination of pests.

Conversely, one member of a community garden stated that she was aware of organic methods, but it was not a feasible option for based on the amount of land she cultivates;

Pests are common in summer; we treat with rogor. If you cultivate in spaces as big as this using ash solution is not practical. It is practical for small spaces. Here [at the community garden] you just need to have your knapsack for spraying.³⁶

As highlighted in Section 5.2 a small number of respondents cited NGO as a key source of information. A large proportion of these households who were involved in community gardens-produced crops and vegetables for sale. According to FGD excerpts the scale of their production prompted most of the households to use fertiliser, particularly for crops, maize. Access to information from NGO's verified that there was a high likelihood that urban farmers adopted used artificial fertiliser (OR = 1.251, 95% CI 0.583 – 5.925, $P \leq 0.05$) and preserved the environment (OR = 7.081, 95% CI 1.982 – 11.911, $P \leq 0.05$) was higher than those with access to information from Agritex. Inversely, the odds that respondents acquiring information from NGO's applied organic fertiliser (OR = 0.285, 95% CI 0.198 – 2.936, $P \leq 0.05$) and used organic pesticides were lower than those that had received information from Agritex Officers. There were variances in fertiliser management choices, mainly influenced by availability, cost and productivity. Respondents from community gardens who used both organic and synthetic fertilisers cited that productivity as the main reason for synthetic fertiliser use. Other respondents stated that the cost of organic manure was more prohibitive compared to fertiliser or compost manure:

³⁶ Excerpt 3- FGD conducted in Ushewokunze (12/07/2017)

[...] it depends on how well endowed you are, some of us use fertiliser because we do not have cattle or poultry which provide us with manure. I usually buy fertiliser because it is, according to me, the cheaper option.³⁷

I do not have money to buy manure and fertiliser. I rarely use them. I rely on compost manure³⁸

The excerpts above are confirmed in Figure 5.4 which graphically presents the agroecological practices employed by urban farmers. Except for awareness of alternative ways of controlling pests (31.5%) and used artificial fertiliser (49.5%), more than half of the households effected or acknowledged the importance of agroecological practices. More than four fifths of the respondents found it important to preserve the environment (94%), were prepared to switch to more organic methods (82%) and used organic fertiliser (89.25%). These results highlight the importance attached to agroecological based methods. It is important to note that in some instances, especially for those involved in community gardening, organic and synthetic fertiliser were used in combination. Although preference for organic fertiliser was frequently expressed by respondents, its availability and prohibitive cost in comparison to other soil enhancing methods deterred them.

³⁷ Excerpt 4 FGD conducted in Epworth (4/07/2017)

³⁸ Excerpt 5 FGD conducted in Mabvuku (10/07/2017)

Table 5. 4 Use of agroecological practices based on key source of agricultural information

Source of information	Radio/TV programs				Relative/neighbour				NGO ^b			
	95% CI-Exp(B)				95% CI -Exp(B)				95% CI-Exp(B)			
	Sig	Exp(B)	Lower Bound	Upper Bound	Sig.	Exp(B)	Lower Bound	Upper Bound	Sig	Exp(B)	Lower Bound	Upper Bound
Intercept	0.977				0.977				0.996			
Crop rotation	0.076	0.146	0.017	1.219	0.342	0.356	0.042	3.002	0.296	2.578	0.926	5.789
Intercropping	0.464	0.633	0.186	2.153	0.136	0.403	0.122	1.331	0.998	0.347	0.039	1.834
Organic fertiliser	0.989	0.578	0.345	2.183	0.029	0.612	0.139	1.698	0.024	0.285	0.198	2.936
Artificial fertiliser ^c	0.011	0.227	0.072	0.714	0.004	0.188	0.061	0.578	0.046	1.251	0.583	5.925
Shallow tillage	0.853	0.876	0.218	3.527	0.428	0.577	0.148	2.245	0.995	1.892	0.793	3.336
Recycle crop	0.334	0.463	0.097	2.211	0.942	1.060	0.221	5.076	0.071	1.057	0.692	1.564
Organic pest	0.042	0.192	0.006	1.072	0.029	0.207	0.050	0.852	0.006	0.023	0.832	0.343
Switch to	0.622	0.389	0.162	2.977	0.871	1.129	0.263	4.853	0.999	4.346	0.273	9.831
Preserve	0.036	0.677	0.158	1.733	0.965	1.854	0.792	2.783	0.009	7.081	1.982	11.911

a. The reference category is Agritex Services.

b. Estimates bias adjusted (sparse data) based using the penalisation

c. The inclusion of artificial fertiliser is based on its use in agroecology (in moderated quantities)

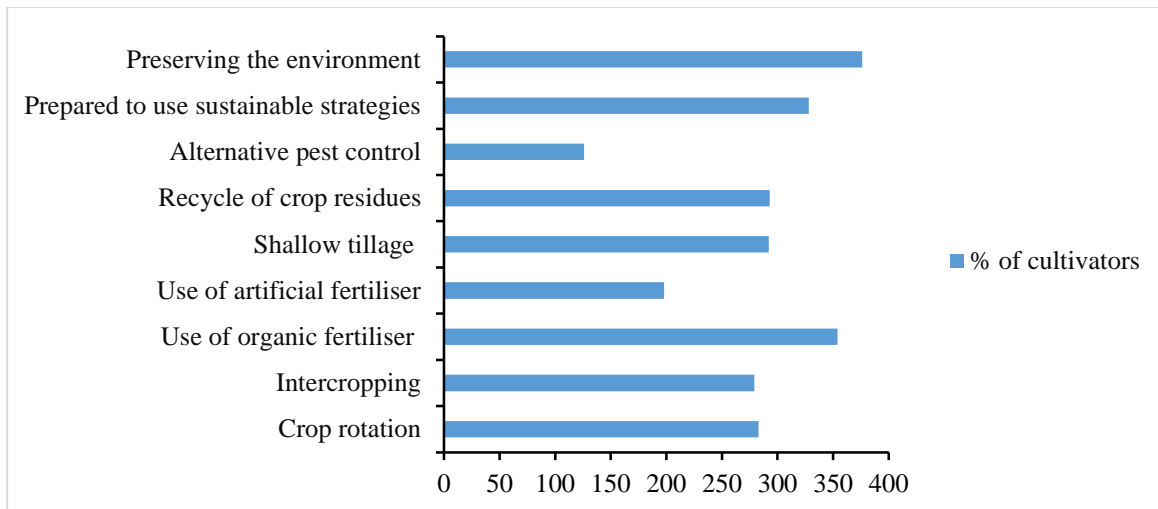


Figure 5. 3 Agroecological practices employed by urban farmers

5.4 Discussion

Urban farmers perceived changes in both rainfall and temperature in the past decade. As in other studies in SSA, more than two thirds of the respondents viewed the variation and unpredictability of both rainfall and temperature with apprehension. Negative rainfall trends were observed. Almost a quarter of the respondents noted that rainfall had decreased, increasing the odds of drought occurrence. Urban farmers that perceived the unpredictability of rainfall stated that its onset has been delayed compared to the past decade and beyond. Conversely, 10% of the respondents reported that rainfall had increased over this period. A plausible explanation for this was reference to the topical atypical precipitation spells a few months prior to the survey (FEWS NET, 2017) which amplified the risk of crop and vegetable loss. Excerpt 1 and 2 as well as observations by research assistants confirmed the extent to which the torrential rains had set urban farmers back in terms of food security. As will be noted in the following sections, comparative literature is drawn from rural-based studies. Such an orientation reinforces elements central to the investigation i.e. the importance of climate information to urban farmers and the invisibility of climate change in UPA.

For urban dwellers who rely on UPA for sustenance, the urban configuration and cash-based systems and services (Satterthwaite, 2004), climate change exacerbated their food provisioning competences (Fig 5.1). As demonstrated in Excerpt 1 the prolonged heavy rains created uncertainty over the duration of winter that year and what it meant for production. In making this connection, two findings emerge; urban farmers noted that climate change had a substantial effect on production one of which was decreased yield (Altieri et al., 2015, IPCC, 2014). Secondly, confirming the findings of Jiri et al. (2015) and Rurinda et al. (2014) the assessment of long-term climate change and variability was broadly consistent with current and historical accounts. A significant implication of

this finding, as pointed out by Chanza and Mafongoya (2017) is that local (including urban) perceptions of climate change are critical to climate change and variability programming and policy formulation.

Observation of weather extremes and perceived risk on crop or vegetable production increased the odds of adaptation. Table 5.4 shows that changing planting dates, increased water conservation, crop rotation and stream/wetland cultivation were significant adaptation measures relative to the perception that climate change had an impact on crop or vegetable production. Failure to adapt ranged from constraints which will be discussed in detail in the following sections and lack of conviction. Those that lacked conviction to adapt to climate change failed to see the nexus between climate variability and crop production. Notably, not all respondents that observed changes in climate actively made efforts to adapt. Also, while most of the adaptation measures resonate favourably with ecological sustainability, stream bank/ or wetland does not. Thus, this shows that not all adaptation measures were motivated by perception of climate change. As underscored by Altieri and Nicholls (2017) improper soil management practices lead to erosion and the subsequent shrinking of water bodies and destruction of biodiversity. improper soil management practices lead to erosion This apparent anomaly can be justified by the fact that, while significant, the odds of engaging in the practice were pointedly higher for those that did not adapt.

Climate change risk has differential effects on households and thus differing capabilities of adaptation existed. Studies assert that women display stronger adaptive behaviours (Jiri et al., 2015, Pérez et al., 2015). In contrast, findings show that men were more likely than women to adapt (Cassidy and Barnes, 2012, Terry, 2009). Despite women's dominance in agricultural activities, there are several explanations for this outcome a) in addition to high incidence of poverty (Manjengwa et al., 2016) women had lower levels of education, access to climate information and were dominant in the low income quintile (Table 5.3). Terry (2009) also identifies these indicators as pivotal to decreasing the odds of women's productive and adaptive potential as far as agriculture is concerned. These multiple vulnerabilities (Fig 5.1) point to the need for concerted efforts to avail information and technology to enable poor communities to respond appropriately to climate risks. As evidenced in Section 4.3, UPA was invisible both in policy and practice (Crush and Riley, 2017, Ziervogel and Frayne, 2011) Urban farmers reported multiple constraints which include lack of information, capital and water. Supplementing their accounts, key informants also stated that by virtue of its illegal status, UPA was not explicitly in the recent National Climate Policy (Government of Zimbabwe, 2017). Its lack of priority in legislature has wide ramifications on the dissemination of agricultural information within urban spaces. Relatedly, despite the mention of some entities or organisations climate change and effects on the practice, none of them actively addressed the concerns of urban farmers.

Source of agricultural information has strong implications on the application of agroecological practices. Scholars (Altieri and Nicholls, 2017) argue that agroecological practices are not only a sound route to sustainable production but also offer farmers enhance the adaptive capacities of farmers to climate change. In good agreement with other studies (Belay et al., 2017, Jiri et al., 2015) households that received frequent visits from Agritex services adapted more efficiently. Our findings also demonstrated that these urban farmers had higher odds of using organic pesticides, conserving the environment and minima use of synthetic fertilisers compared to those that relied on radio and television, social networks and NGOs. Given the strong implication on climate change (Altieri and Nicholls, 2017, De Schutter, 2013), urban farmers who reported Agritex as key sources of information had more capacity to adapt to climate change. The accumulation of knowledge through practical experience garnered over long periods of time consequently leads increased resilience and improved food security. In light of the invisibility of UPA (Crush and Riley, 2017), the deployment of certified Agritex officers to urban spaces has the potential to improve adaptive proficiency and food security. Implicit in this finding is that UPA is not synonymous with sustainability e.g. fertilisers use was common among urban farmers.

As postulated by Cook et al. (2015), UPA farmers use mixture of biological and synthetic inputs depending on scale of production, availability and cost of inputs Mujere (2017), Sotamenou and Parrot (2013) and (Nyikahadzoi et al., 2012, Sibanda et al., 2000) Soil enhancing methods available to urban farmers were manure, compost and synthetic fertiliser. Access to and affordability of these soil enhancing inputs significantly determined its use. According to FGD excerpts, the scale of their production prompted most of the households to use fertiliser, particularly for maize production, where its use is requisite for increasing yield. For example, urban farmers in Ushewokunze, which is a peri-urban area stated that they had access to manure from a nearby cattle farm. For them, the odds of applying fertilisers were reduced. Conversely, households in Epworth, Hatcliffe and Mabvuku applied manure minimally due to lack of access and exorbitant transport costs (Nyikahadzoi et al., 2012). Consistent with findings of Cook et al. (2015) urban farmers in India stated that large scale farming did not permit exclusive reliance on organic or natural-based input. For pest management, discrepancies are based on land size. Urban farmers who exclusively used organic pesticides such as chillies (*Capsicum annuum*) and wood ash had small gardens. Respondents who had much larger gardens (community gardens and open spaces) stated that although organic pesticides were more sustainable, using them was not practical. Instead, they used synthetic pesticides which if used excessively (De Zeeuw, 2011) have negative impact on the environment.

Overall, urban farmers were aware of agroecological methods. However lack of capital as highlighted above, in addition to lack of information, unsupportive policy environment and water constraints have been cited in other studies as limiting productive and adaptive capabilities (Connolly-Boutin and Smit, 2016). This was particularly true for households in the low-income quintile, who demonstrated lower adaptive capacities. Lack of information,

which associated to lack of Agritex officers who are potential channels of climate information was a key impediment across all study sites. Knowledge of climate adaptation information is increasingly becoming a core element of attaining food security. Among the four pillars of food security, observance and adaptation to climate change addresses the stability dimension (Kotir, 2011). Currently, extension services are provided for the rural population. Considering the prevalence of food insecurity in urban spaces there is need to ensure that climate science programming also targets urban farmers.

5.5 Conclusion

Using experiences from low-income urban farmers in Harare, this paper explored perceptions on climate change and variability and agroecological practices. Results show that urban farmers observed climate change and variability. However, noticeable changes in extreme weather events did not automatically translate to adaptation due to constraints or a general lack of conviction of its effects on crop or vegetable production. Adaptation to climate change was mainly driven by access to information, capital and water. In addition to these constraints, UPA practices reflected a mixture of agroecological and conventional principles based on scale and productivity. Another important finding is that climate change will amplify existing adverse socio-economic challenges and food insecurity in resource constraint urban spaces. Together, the invisibility of UPA, unsupportive institutional arrangements and waning economic situation negatively shape food provisioning and are a clear indication of the need for UPA's integration in climate policy and planning. Thus, because of the convergence of these biotic and abiotic stressors, stakeholders should make efforts to disseminate requisite climate information to urban spaces and mobilise local administrations to streamline adaptation strategies into UPA.

References

- ALTIERI, M. A., NICHOLLS, C. & FUNES, F. 2012. The scaling up of agroecology: spreading the hope for food sovereignty and resiliency. *A contribution to discussions at Rio*, 20.
- ALTIERI, M. A. & NICHOLLS, C. I. 2017. The adaptation and mitigation potential of traditional agriculture in a changing climate. *Climatic Change*, 140, 33-45.
- ALTIERI, M. A., NICHOLLS, C. I., HENAO, A. & LANA, M. A. 2015. Agroecology and the design of climate change-resilient farming systems. *Agronomy for sustainable development*, 35, 869-890.
- BAUSCH, J. C., EAKIN, H. C. & LERNER, A. M. 2018. Adaptation for Whom to What? Challenges and Opportunities in Agriculture-Urban Collaboration for Climate Change Adaptation. *Climate Change in Cities*. Springer.
- BELAY, A., RECHA, J. W., WOLDEAMANUEL, T. & MORTON, J. F. 2017. Smallholder farmers' adaptation to climate change and determinants of their adaptation decisions in the Central Rift Valley of Ethiopia. *Agriculture & Food Security*, 6, 1-13.
- BHATASARA, S. 2017. Rethinking climate change research in Zimbabwe. *Journal of Environmental Studies and Sciences*, 7, 39-52.
- CASSIDY, L. & BARNES, G. D. 2012. Understanding household connectivity and resilience in marginal rural communities through social network analysis in the village of Habu, Botswana. *Ecology and Society*, 17, 1-18.
- CHANZA, N. & MAFONGOYA, P. 2017. Indigenous-based climate science from the Zimbabwean experience: From impact identification, mitigation and adaptation. In: AJAYI, O. C. & MAFONGOYA, P. L. (eds.) *Indigenous Knowledge Systems and Climate Change Management in Africa*. Wageningen, Netherlands: Technical Centre for Agricultural and Rural Cooperation.
- CHAUDHURY, A. S., THORNTON, T. F., HELFGOTT, A., VENTRESCA, M. J. & SOVA, C. 2017. Ties that bind: Local networks, communities and adaptive capacity in rural Ghana. *Journal of Rural Studies*, 53, 214-228.
- CONNOLLY-BOUTIN, L. & SMIT, B. 2016. Climate change, food security, and livelihoods in sub-Saharan Africa. *Regional Environmental Change*, 16, 385-399.
- COOK, J., OVIATT, K., MAIN, D. S., KAUR, H. & BRETT, J. 2015. Re-conceptualizing urban agriculture: an exploration of farming along the banks of the Yamuna River in Delhi, India. *Agriculture and Human Values*, 32, 265-279.
- CRESWELL, J. W. & CLARK, V. L. P. 2011. *Designing and Conducting Mixed Methods Research*, Carlifonia, USA, Thousand Oaks.
- CRUSH, J. & RILEY, L. 2017. Urban food security, rural bias and the global development agenda. In: PARTNERSHIP, H. C. (ed.) *Hungry Cities Partnership Discussion Paper No. 11*. Ontario, Canada: Wilfrid Laurier University.
- DE SCHUTTER, O. 2013. Agroecology: a solution to the crises of food systems and climate change. *Making Agriculture Truly Sustainable for Food Security in a Changing Climate*, 19 September 2013. Geneva, Switzerland: UN Conference on Trade and Environment (UNCTAD).
- DE ZEEUW, H. 2011. Cities, climate change and urban agriculture. *Urban Agriculture Magazine*, 25, 39-42.
- DE ZEEUW, H., VAN VEENHUIZEN, R. & DUBBELING, M. 2011. The role of urban agriculture in building resilient cities in developing countries. *The Journal of Agricultural Science*, 149, 153.
- FAO. 2016. Climate Change and Food Security: Risks and Responses. Available: <http://www.fao.org/3/a-i5188e.pdf> [Accessed 25-02-2017].
- FAO, IFAD, UNICEF, WFP & WHO. 2016. The State of Food and Agriculture–Climate Change, Agriculture and Food Security. Available: <http://www.fao.org/3/a-i6030e.pdf>. [Accessed 25-02-2017].
- FAO, IFAD, UNICEF, WFP & WHO 2018. The State of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition

- Italy, Rome: Food and Agricultural Organisation (FAO).
- FEWS NET. 2017. Food insecurity to improve in traditional surplus areas, but persist in marginal production areas. *Food Security Outlook* [Online]. Available: http://fewsn.net/sites/default/files/documents/reports/ZW_FSO_2017_02.pdf [Accessed 06-01-2018].
- GETACHEW, S., TILAHUN, T. & TESHAGER, M. 2014. Determinants of agro-pastoralist climate change adaptation strategies: case of Rayitu Woredas, Oromiya Region, Ethiopia. *Research Journal of Environmental Sciences*, 8, 300-317.
- GOVERNMENT OF ZIMBABWE 2017. National Climate Policy. In: MINISTRY OF ENVIRONMENT, W. A. C. (ed.). Harare, Zimbabwe Government Printers.
- GREENLAND, S., MANSOURNIA, M. A. & ALTMAN, D. G. 2016. Sparse data bias: a problem hiding in plain sight. *British Medical Journal*, 9, 1-14.
- HERTEL, T. W. & LOBELL, D. B. 2014. Agricultural adaptation to climate change in rich and poor countries: Current modeling practice and potential for empirical contributions. *Energy Economics*, 46, 562-575.
- HOLT-GIMÉNEZ, E. & ALTIERI, M. A. 2013. Agroecology, food sovereignty, and the new green revolution. *Agroecology and sustainable Food systems*, 37, 90-102.
- HOVE, M. 2017. Endangered Human Security in Cash Strapped Zimbabwe, 2007-2008. *African Studies Quarterly*, 17, 45-65.
- IGALAVITHANA, A. D., LEE, S. S., NIAZI, N. K., LEE, Y.-H., KIM, K. H., PARK, J.-H., MOON, D. H. & OK, Y. S. 2017. Assessment of soil health in urban agriculture: Soil enzymes and microbial properties. *Sustainability*, 9, 310.
- IPCC 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. In: PACHAURI, R. & MEYER, L. (eds.). Geneva, Switzerland, : IPCC.
- JAYNE, T., CHISVO, M., RUKUNI, M. & MASANGANISE, P. 2006. Zimbabwe's food insecurity paradox: hunger amid potential. In: RUKUNI, M., TAWONEZVI, P., EICHER, C., MUNYUKI-HUNGWE, M. & MATONDI, P. (eds.) *Zimbabwe's agricultural revolution revisited* Harare: University of Zimbabwe (UZ) Publications.
- JIRI, O., MAFONGOYA, P. & CHIVENGE, P. 2015. Smallholder farmer perceptions on climate change and variability: A predisposition for their subsequent adaptation strategies. *Journal of Earth Science & Climatic Change*, 6, 1-7.
- JOHNSON, R. B. & ONWUEGBUZIE, A. J. 2004. Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33, 14-26.
- KOKERA, R. & NDOMA, S. 2016. Facing Drought, Can Zimbabwe Improve on History of Food Shortage, Poor Management. Available: <http://afrobarometer.org/publications/ad114-facing-drought-can-zimbabwe-improve-history-food-shortage-poor-management> [Accessed 18 November 2017].
- KONDO, M. C., BREAM, K. D., BARG, F. K. & BRANAS, C. C. 2014. A random spatial sampling method in a rural developing nation. *BMC Public Health*, 14, 1-8.
- KOTIR, J. H. 2011. Climate change and variability in Sub-Saharan Africa: a review of current and future trends and impacts on agriculture and food security. *Environment, Development and Sustainability*, 13, 587-605.
- LIAMPUTTONG, P. 2011. *Focus group methodology: Principle and practice*, Sage Publications.
- MANJENGWA, J., MATEMA, C. & TIRIVANHU, D. 2016. Understanding urban poverty in two high-density suburbs of Harare, Zimbabwe. *Development Southern Africa*, 33, 23-38.
- MANYERUKE, C., HAMAUSWA, S. & MHANDARA, L. 2013. The effects of climate change and variability on food security in Zimbabwe: a socio-economic and political analysis. *International Journal of Humanities and Social Science*, 3, 270-286.
- MCKUNE, S. L., BORRESEN, E. C., YOUNG, A. G., RYLEY, T. D. A., RUSSO, S. L., CAMARA, A. D., COLEMAN, M. & RYAN, E. P. 2015. Climate change through a gendered lens: Examining livestock holder food security. *Global Food Security*, 6, 1-8.

- MUGANDANI, R., WUTA, M., MAKARAU, A. & CHIPINDU, B. 2012. Re-classification of agro-ecological regions of Zimbabwe in conformity with climate variability and change. *African Crop Science Journal*, 20, 361-369.
- MUJERE, N. 2017. The Contribution of Smallholder Irrigated Urban Agriculture Towards Household Food Security in Harare, Zimbabwe. In: WINKLERPRINS, A. (ed.) *Global Urban Agriculture*. Oxfordshire, United Kingdom: Centre for Agriculture and Bioscience International
- MULENGA, B. P., WINEMAN, A. & SITKO, N. J. 2017. Climate trends and farmers' perceptions of climate change in Zambia. *Environmental Management*, 59, 291-306.
- MUPEDZISWA, R. & KUBANGA, K. P. 2017. Climate change, urban settlements and quality of life: The case of the Southern African Development Community region. *Development Southern Africa*, 34, 196-209.
- MUSHORE, T. D., MUTANGA, O., ODINDI, J. & DUBE, T. 2017. Linking major shifts in land surface temperatures to long term land use and land cover changes: A case of Harare, Zimbabwe. *Urban climate*, 20, 120-134.
- NYIKAHADZOI, K., SIZIBA, S., MANGO, N., MAPFUMO, P., ADEKUNHLE, A. & FATUNBI, O. 2012. Creating food self reliance among the smallholder farmers of eastern Zimbabwe: exploring the role of integrated agricultural research for development. *Food Security*, 4, 647-656.
- PÉREZ, C., JONES, E., KRISTJANSON, P., CRAMER, L., THORNTON, P. K., FÖRCH, W. & BARAHONA, C. A. 2015. How resilient are farming households and communities to a changing climate in Africa? A gender-based perspective. *Global Environmental Change*, 34, 95-107.
- PIETERSE, E. & PARNELL, S. 2014. *Africa's Urban Revolution* London, Zed Books Ltd.
- RUKUNI, M. 2006. Revisiting Zimbabwe's agricultural revolution. In: RUKUNI, M., TAWONEZVI, P., EICHER, C., MUNYUKI-HUNGWE, M. & MATONDI, P. (eds.) *Zimbabwe's agricultural revolution revisited*. Harare: University of Zimbabwe (UZ) Publications.
- RURINDA, J., MAPFUMO, P., VAN WIJK, M. T., MTAMBANENGWE, F., RUFINO, M. C., CHIKOWO, R. & GILLER, K. E. 2014. Sources of vulnerability to a variable and changing climate among smallholder households in Zimbabwe: A participatory analysis. *Climate Risk Management*, 3, 65-78.
- RUSVINGO, S. L. 2015. The Zimbabwe Soaring Unemployment Rate of 85%: A Ticking Time Bomb Not Only for Zimbabwe but the Entire SADC Region *Global Journal of Management And Business Research*, 14, 1-8.
- SATTERTHWAITE, D. 2004. The under-estimation of urban poverty in low and middle-income nations , IIED, London, 71 pages. *Human Settlements Poverty Reduction in Urban Areas Series*. International Institute for Environment and Development (IIED).
- SIBANDA, T., DOBSON, H., COOPER, J., MANYANGARIRWA, W. & CHIIMBA, W. 2000. Pest management challenges for smallholder vegetable farmers in Zimbabwe. *Crop protection*, 19, 807-815.
- SOTAMENOU, J. & PARROT, L. 2013. Sustainable urban agriculture and the adoption of composts in Cameroon. *International Journal of Agricultural Sustainability*, 11, 282-295.
- TAWODZERA, G. 2012. Urban household vulnerability to food security and climate change: Experiences from urban areas Zimbabwe. In: FRAYNE, B., MOSER, C. & ZIERVOGEL, G. (eds.) *Climate change, assets and food security in Southern Africa*. New York: Earthscan. New York, USA: Earthscan.
- TEDDLIE, C. & TASHAKKORI, A. 2012. Common "core" characteristics of mixed methods research: A review of critical issues and call for greater convergence. *American Behavioral Scientist*, 56, 774-788.
- TERRY, G. 2009. No climate justice without gender justice: an overview of the issues. *Gender & Development*, 17, 5-18.
- UNGANAI, L. S. 1996. Historic and future climatic change in Zimbabwe. *Climate Research*, 6, 137-145.

ZIERVOGEL, G. & FRAYNE, B. 2011. Climate change and food security in Southern African cities. *Urban Food Security*. Queen's University and AFSUN: Kingston and Cape Town: African Food Security Urban Network (AFSUN).

CHAPTER 6

THE USE OF FOOD SOVEREIGNTY AMONG URBAN AND PERI-URBAN HOUSEHOLDS IN HARARE

Abstract

The question of how to feed growing populations has attracted debate for decades. Food sovereignty has been purported to alleviate malnutrition and food insecurity. Yet, literature and programming remains fixated on the conventional, food security approach whose capacity to exclusively address the food insecurity has been questioned. Using a cross-sectional survey, focus group discussions, and key informant interviews explored the extent to which productive and consumptive practices of urban farmers in Harare resonated with the food sovereignty principles. To buttress the analysis, Henri Lefebvre's *Right to The City* was employed. Results revealed that food systems of urban farmers resonated with principles of food sovereignty to a limited extent due to systemic barriers. Urban and peri-urban agriculture moderated probable nutritive deficits and episodes of hunger. However, UPA was not synonymous with sustainable practices, most households resorted to synthetic inputs and unsustainable soil practices due to various constraints. Barriers to food sovereignty were lack of attention to UPA, lack of seeds, lack of information, undervalued indigenous crops and inadequate land. Capacity to apply principles of food sovereignty declined with decreasing autonomy over production i.e. unsupportive institutional arrangements and protracted economic challenges. These findings are envisaged to draw municipalities, urban planners and policy makers to a nuanced consideration of UPA as an alternative strategy to tackle food insecurity.

Key words: agroecology, climate change, food security, and sovereignty, right to the city, urban and peri-urban agriculture

6.1 Introduction

Food insecurity in developing countries is unsettling. For sub-Saharan Africa (SSA) is one of the regions where food security and nutrition have been declined significantly (Besada and Werner, 2015, FAO et al., 2017). In SSA, Zimbabwe has one of the highest levels of food insecurity (Crush et al., 2011, Martens, 2012). Large scale production in the country has been declining for decades (Martens, 2012, Rukuni, 2006). More recently, a report by Zimbabwe National Vulnerability Assessment Committee (ZimVAC) reveals how yields from command agriculture failed to reach set targets. Interlocking instabilities in the form of droughts (Kokera and Ndoma, 2016) and protracted economic recession (Dlamini and Mbira, 2017, Sachikonye, 2011) have heightened developmental

challenges. Industrial capacity has been decimated over the past decade. The foreclosure of industries from the 2000s led to the upsurge of the unemployment rate from 12% in 2002 to 88% in 2012 (ZimStat, 2013a). This led to the growth of an informal sector (Jones, 2010, Potts, 2011); a livelihood channel for most citizens. Literature has traditionally characterised rural areas as preserves of food insecurity and marginalised UPA, yet empirical evidence shows that urbanisation constitutes a growing threat to food security (Crush and Riley, 2017, Sonnino et al., 2014). Taken together, these developmental clefts place poor citizens at mercy of the markets into states of food insecurity, particularly those in urban spaces (Ruel et al., 2017, White and Hamm, 2017).

As in most African countries, food production issues in Zimbabwe are oriented towards conventional agriculture. Conventional agriculture which espouses a neoliberal standards translates to unsustainable production, commodification of food and restricted options for the urban poor (Schanbacher, 2010). In addition, multi-decadal evidence shows conventional agriculture's a) increasing inability to sufficiently meet global dietary requirements (Altieri et al., 2012, Holt-Giménez et al., 2012, Sonnino, 2016). and b) fixation on increasing production at the expense of ecological resources e.g. intensified use of synthetic inputs and improper soil management (Godfray et al., 2010, Foley et al., 2011) which in the long-term result in yield decreases soil infertility. For Altieri et al. (2012) protracted global food insecurity can only be solved by transitioning to agroecological and sustainable forms of production. Cementing this assertion, Biswas and Biswas (1979) posited that solutions to food security can only be solved through a consideration of systemic processes. Systemic thinking plays a central role in shaping processes, relationships and possible transformation. Hence, this paper employs political economy (FAO et al., 2017) espoused by the food sovereignty framework and the *Right to The City* allows the identification of inequalities in food provisioning.

Food sovereignty is a recent and developing theme in research on food security borne out of discontent by peasants with the conventional, global approach to agriculture Desmarais (2015). It is defined as the right of peasants to produce and consume preferred and traditionally suitable foods grown using agroecologically centred principles. Extensive principles embedded in the food sovereignty framework include, the acknowledgment of food as a right. Scholars (Carney, 2016, Heckelman and Wittman, 2015, Schanbacher, 2010) have demonstrated how applying the food sovereignty cushions farmers from market failures and enables them, through sustainable and climate smart agricultural practices, to grow crops that are not only healthy but culturally appropriate for their households. As demonstrated in several studies (Ochieng et al., 2018, Schönfeldt and Pretorius, 2011) nutritional component of African indigenous vegetables (AIVs) such as Cowpea (*Vigna unguiculata*), okra (*Abelmoschus esculentus*), sweet potato (*Ipomoea batatas*), pumpkin leaves (*Cucurbita maxima*). Relatedly, scholars (Altieri et al., 2012, van Rensburg et al., 2007) established that organic produce contains higher nutritional content compared to those produced conventionally.

Its second principle, attaches the importance to the contributions of low-income farmers. Food sovereignty and RTTC critique mainstream principles that deride activities considered uncharacteristic of urban spaces and do not value urban farmers (Lefebvre et al., 1996, La Via Campesina, 2007). Similarly, this paper acknowledges the importance of sustainable management principles but challenges mainstream thought which concerns itself with city aesthetics. In Zimbabwe, the scope of existing policy instruments and programming on agriculture and climate change have a rural bias (Tawodzera, 2012b). Also, the Food Security and Nutrition Policy (Food and Nutrition Council, 2012) makes no explicit reference to production in cities but underscores achieving food security for all. Food sovereignty's fourth principle places control locally by emphasising the sustainable production of food within the surrounds of the community. For, Borras Jr et al. (2015) exercising food sovereignty illuminates the association between land and food politics. Relatedly, RTTC advocated for the appropriation of spaces to improve livelihoods (Lefebvre et al., 1996). However, the appropriation of 'vacant' urban spaces for agricultural enterprises by urban households has been queried on the grounds of its detrimental effects on city aesthetics and the environment (McClintock et al., 2017, Katanda et al., 2007, Sedze, 2006)

The fifth principle notes that food sovereignty builds knowledge and skills through sustainable systems and rejects technologies that threaten their development. It underscores co-production of knowledge (Altieri and Toledo, 2011). A key example is seed sovereignty, where breeding of seeds is viewed as a way to strengthen control and self-sufficiency of farmers (Kloppenburger, 2014). Lastly, the sixth principle demonstrates how food sovereignty works with nature by employing resources and techniques that are sustainable and environmentally friendly (La Via Campesina, 2008). Agroecological practices couched under the food sovereignty approach promote the use of organic inputs that incur minimal disruption to the environment. Such an approach not only abates the harmful effects of climate change but also serves to unravel the politics of food holistically (Altieri et al., 2012). Aptly, food sovereignty's ecologically centred steps confront climate change and food insecurity simultaneously. For Boone and Taylor (2016) understanding and promoting local adaptation creates inroads for structuring "resilient food systems" in urban spaces. As insinuated in the second principle addressing food security locally-based perceptions. Disregarding them, leads to maladaptation and heightened food insecurity through the loss or reduction in yield Simelton et al. (2013). While small-scale or subsistence agriculture is associated with agroecological methods, it does not automatically mean that all farmers utilise organic inputs (Clapp, 2017). There is diversity within local or small-scale agriculture.

While the concept of food sovereignty is not new globally, its reception and application in developing countries is in embryonic phase. Yielding to advocacy from food sovereignty movements, a few countries in developing countries have integrated the food sovereignty framework into legislative documents and policies. These countries

include Brazil, Bolivia, Cuba Ecuador, Nicaragua, Mali, Nepal, Senegal, and Venezuela (Giunta, 2014, Peña, 2013, Wittman, 2010). A few studies in developing countries (Boone and Taylor, 2016, Premat, 2009, Yap, 2013) advance UPA and food sovereignty as alternative avenues to food security. Drawing on a case study of UPA in Cuba showed how Havana's application of food sovereignty principles translated to production sustaining half (50%) of the city's vegetable requirements. Sustainable agriculture in Havana is merited to the accord between urban farmers and respective stakeholders. Repealing the food security approach system, adopted by the Cuban state, led to a positive transformation of the food security status of households in Havana (Premat, 2009) Like any other strategy, there are possible challenges to assuming autonomous control over food systems through food sovereignty. Yap's Kampala based study reveals that lack of credit and general provision for UPA were key barriers to food sovereignty (Yap, 2013). Unpacking obstacles to the localisation of food and food sovereignty advocacy (Noll, 2017) suggests that an in-depth comprehension of neoliberal-based institutional arrangements and mechanisms enhances the capacity to (re)instate or restore livelihoods.

In Zimbabwe, food sovereignty is not popular concept. Questions of food sovereignty at the household level warrant significance in Zimbabwe given its waning economic trajectory. The central problem is that although there is recognition that the urban poor are food insecure, most studies are framed by the food security framework (Kutiwa et al., 2010, Pedzisai et al., 2014, Tawodzera, 2014). No study to the authors knowledge exclusively investigates the application of food sovereignty Taru and Basure (2013) engaged discourses of appropriation through the Norman Long's interface analysis to cross-examine conflict resolution by farmers in Kuwadzana Extension. However, like many other studies on UPA in Zimbabwe the study has does not go beyond the mosaic of difficult circumstances that urban farmers face. Understanding how alternatives such as the food sovereignty approach fits into their food systems are questions that are fundamental to addressing food security issues at household level.

This study aimed to fill this conceptual lacuna by extending its purview beyond 'vulnerability' to how communities can take control of their food systems. It challenges the use of food security as an organising principle in the context of a changing locus of poverty, declining economic growth and marginalisation of UPA by local authorities (Masvaure, 2016, Taru and Basure, 2013). The study addresses questions of whether ascribing value to principles of the food sovereignty framework offers grounds for optimism for farmers in resource poor areas. The findings are anticipated to generate innovative lines enquiry that feed into urban food security and bridge the perceived rift between theory and practice.

6.2 Materials methods

6.2.1 Study location

To validate the study's line of enquiry, this study examined UPA in two urban (Mabvuku and Hatcliffe Extension) and two peri-urban (Epworth and Ushewokunze) areas in Harare Metropolitan Province, which is also the capital city of Zimbabwe. The province is in Agroecological region II whose climate is suitable for intensive agricultural production. Endowed with fertile soil and an approximately 750-1000mm of annual rainfall, in 2006 the region accounts for a large proportion 75-80% of cultivated land in the country (Mugandani et al., 2012). The area has since declined by 50% due to the effects of climate change (Manjengwa et al., 2016, Tawodzera et al., 2012b). Study site selection was influenced by the prevalence of poverty and food insecurity in high density and peri-urban areas compared to other areas in the city (Creswell and Clark, 2011, Teddlie and Tashakkori, 2012).

6.2.2 Data collection

The study utilised mixed methods research which simultaneously responds to questions drawn from quantitative and qualitative lines of enquiry (Creswell and Clark, 2011). Quantitative research is formulaic; it therefore eludes prospects of unearthing in-depth or concealed phenomena. Equally, the qualitative approach does not have the capacity of breadth (Shenton, 2004). Thus, data was collected sequentially using a survey, focus group discussion (FGDs), key informant interviews (KIIs) to draw on their strengths and offset distinct limitations (Jensen and Laurie, 2016). Multiphase sampling was employed. For the survey and FGDs, stratified systematic sampling and random sampling were used respectively. Using probability sampling minimised incidences of bias (Yin, 2017)). Key informants were selected using purposive sampling based on their expertise on issues related to the concerns of the study (Marshall et al., 2013). In the initial phase of the fieldwork, the researcher and three trained research assistants administered 400 questionnaires to urban farmers (100 per study site). Questionnaires were used to obtain data on household characteristics, and elements related to food sovereignty principles e.g. productive and consumptive practices, institutional arrangements, climate change and citizen participation.

Thereafter, thirty-five (35) urban farmers who participated in the initial phase were randomly selected to participate in a FGD within their respective sites. The last phase of the data collection process involved drawing on the insights from eight key informants. The number of interviews was determined when data saturation was reached, that is, when no new data was emerging (Tashakkori and Teddlie, 2008).

6.2.3 Analysis

Quantitative data were analysed using SPSS version 24. Computations included frequencies (crops produced, agroecological practices, climate change adaptation, stakeholder engagement, citizen participation and barriers to food sovereignty), cross tabulations (food security status and main source of food). Ordinal regression parameters were estimated for household food security, household dietary diversity. Qualitative data was imported into NVivo 12 for analysis. In the final step a meta inference from both quantitative and qualitative strands (Schanbacher, 2010) were analysed against 5³⁹ out of the 6 principles of the Food Sovereignty Framework and RTTC. This lens provides the study with relevant tool to explore the spatial realities (rights, agency and power) of UPA. Food Sovereignty focuses on the process of sustainable food production to consumption (Purcell, 2002, Lefebvre, 1991) while RTTC exclusively evaluates conceived, perceived and lived spaces of production (Pellegrini and Tasciotti, 2014, Jones et al. (2014)).

6.3 Results

6.3.1 Contribution of UPA to sufficient and appropriate foods

All study sites recorded high levels (88%) of food insecurity. Food insecurity in all study sites was high. Only 12% of the total population were food secure. Epworth had the highest number of food insecure households. Ninety-three percent (93%) of the households in Epworth were food insecure, 69% of these were classified as severely food insecure and the remaining 24% moderately food insecure. There was, however, no distinct and significant variance between urban and peri-urban areas in terms of both food security and dietary diversity. Comparatively, Table 6.1 displays regression parameters of HFS and HDD across the four study sites. These results not only confirm results from Figure 6.1 but they substantiate its findings. Production reflected the diets of households which mainly consisted of *sadza* (thick porridge) and vegetables. Food security was significantly lower in Epworth compared to Ushewokunze ($P < 0.05$) Hatcliffe Extension ($P < 0.05$) and Mabvuku ($P < 0.05$). Similarly, households from the aforementioned study sites were more likely to have more diversified diets; Ushewokunze (OR = 4.188, 95% CI = 1.835 – 9.562 $P < 0.01$) Hatcliffe Extension (3.947, 95% CI = 1.800 – 8.655 $P < 0.01$) and Mabvuku (OR = 4.687, 95% CI = 2.125 – 10.338 $P < 0.01$). Spearman's correlation co-efficient (Table 6.1), showed a weak negative correlation between HFS and HSS. Information obtained from FGDs cements these findings. Respondents mentioned land unavailability, water scarcity and lack of capital as some of the barriers that hampered their ability to produce sufficient food in terms of both quantity

³⁹ Principle 3 was omitted in the analysis because it refers to issues of international trade which are not directly relevant to the household level.

and quality. Regardless, the data collected using questionnaires, FGD guide and KII guide show that UPA was an important food source for urban dwellers, as displayed in Figure 6.2.

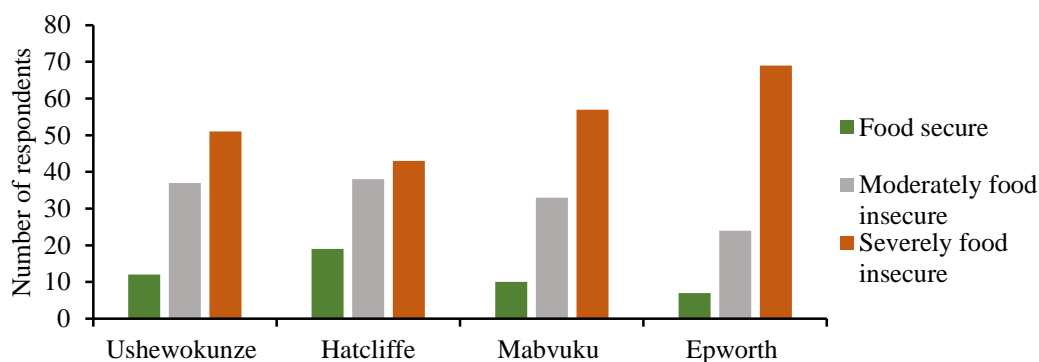


Figure 6. 1 Household food security status of urban households in Harare

Table 6. 1 Ordinal regression parameters for HFS and HDD score disaggregated by study area

Variable	HFSa				HDD			
	Sig	Exp(B)	95% C.I.for Lower	EXP(B) Upper	Sig	Exp(B)	95% C.I.for Lower	EXP(B) Upper
Area of study								
Ushewokunze	0.005	3.228	1.437	7.249	0.001	4.188	1.835	9.562
Hatcliffe Extension	0.021	1.928	0.483	1.78	0.001	3.947	1.800	8.655
Mabvuku	0.039	2.198	1.041	4.641	0.001	4.687	2.125	10.338

*Epworth was used as the base category

Figure 6.2 reveals the importance households attach to UPA. Overwhelmingly, more than four fifths of the households ranked benefits accrued from the practice positively; healthy and nutritious food 98.5% ($n=394$), reduction in food expenditure 96.75% ($n=385$), access to income 82.75% ($n=361$) enhanced food security 94.25% ($n=377$) enhanced bodily function through exercise 81.5% ($n=326$). Most households (94.25%) highlighted the significance of the practice to food security. These were ranked as positive contribution to food security extremely important (46%), important (37.25%), and somewhat important (11%). Only, 5.75% did not perceive its significance to food security. UPA's ability to avail fresh produce (67.25%) and save on purchases (58%) were of prime importance to households.

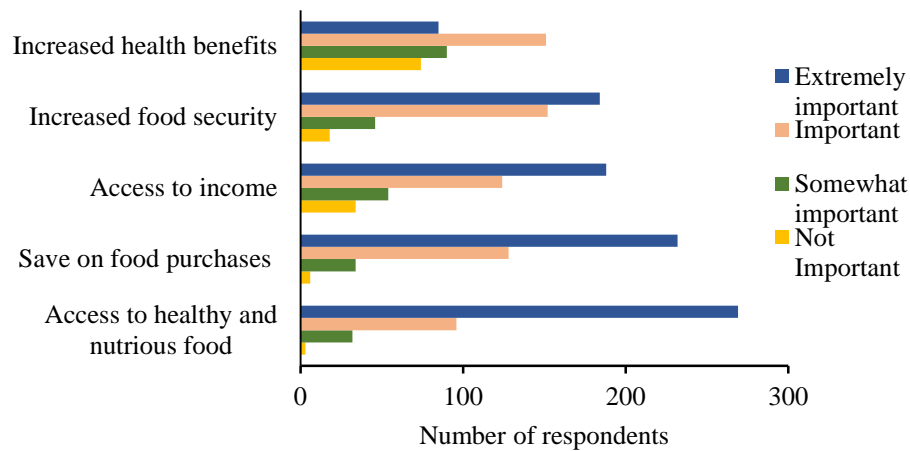


Figure 6. 2 Ranking of UPA benefits based on importance.

Most of the fresh produce was home grown. For foods that they could not produce themselves, they purchased at formal and informal markets. This was evidenced through the survey responses provided by households on crops cultivated and re-confirmed through the FGDs and KIIs. Cumulatively, the results show that UPA is an important strategy for poor urban households particularly in periods of crisis. Excerpts from both urban farmers and KII acknowledge this:

During 2008-2009 period, sweet potato was a substitute for bread.⁴⁰

As you can see here in the cities, for most things you need cash, so it is very important to have a garden or farming space. You will not have a situation where children starve. Vegetables can sustain the household in times of hardship.⁴¹

Respondents unanimously stated that they planted crops or vegetables that they preferred. While those involved in community gardens shared food production ideas, decision-making related to the choice of crops and agricultural practices were entirely up to each individual. Except for pumpkin leaf (50%), less than half of the respondents produced traditional crops such as black jack (41.75%) okra (17.25%) cowpeas (15%) (Figure 6.3). Conventional leafy greens were more popular among urban farmers. Choumoellier, mustard greens, rape and maize (in order of importance) were grown by more than three quarters of the respondents. Expressing the importance of the practice, one respondent stated that “*We do not buy maizemeal, we just take our dried cobs to the mill, it helps us a lot. We only buy what we cannot produce*”⁴² However, constraints such as access to land,

⁴⁰ Excerpt 2- KII (7/03/2018)

⁴¹ Excerpt 3- FGD conducted in Epworth (4/07/2017)

⁴² Excerpt 4- FGD conducted in Ushewokunze (4/07/2017)

extension services, lack of credit, water scarcity and pests impeded the ability of households to produce adequate, nutritious foods to supplement dietary needs. However, from observations, most gardens were small, and the crops or vegetables were sparsely distributed.

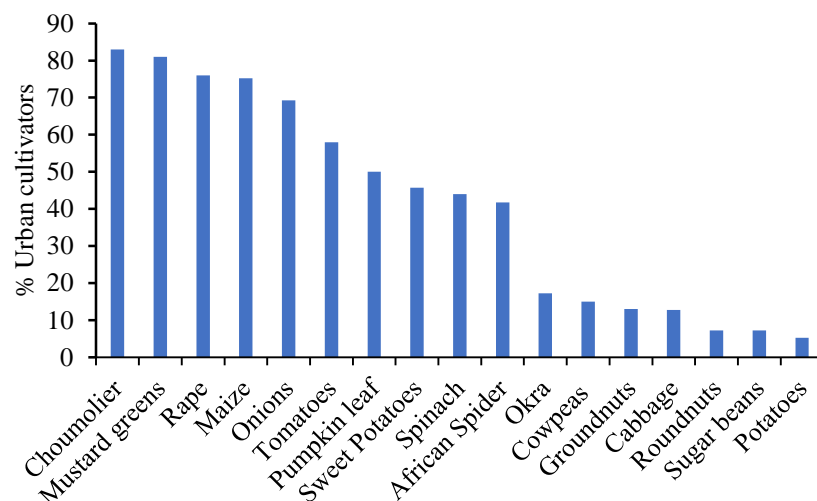


Figure 6. 3 Crop and vegetables produced by urban farmers

6.3.2 Stakeholder value on urban farmers and the practice of UPA

Cumulatively, 90.75% of urban farmers viewed citizen participation as an important tool in establishing the importance of the practice to their livelihoods and being actively involved in the crafting of decisions surrounding the practice. The remainder, 9.25% were split between those that were neutral (8.75%) and disagreed (0.5%). The fact that only 0.5% outrightly disagreed reflects the importance of households attached to being actively involved in the systems and processes governing the practice. However, as evidenced in the survey responses by all participants including key informants, platforms for citizen participation regarding UPA were none existent. While some stated that the Food and Nutrition Security policy that focused on the nutritional needs of both urban and rural areas, they re-confirmed there was no provision for self- production in cities. To assess the value placed on urban farmers, Figure 6.5 shows the relationship with stakeholders. More than four fifths of the urban farmers in Ushewokunze (81%), Hatcliffe (94%), Mabvuku (98%) and Epworth (94%) stated that they had no relationship with any stakeholders.

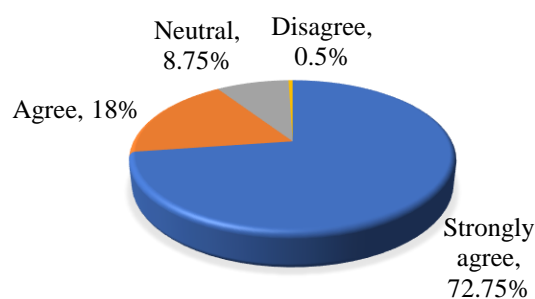


Figure 6. 4 Perceptions of households on the importance of citizen participation

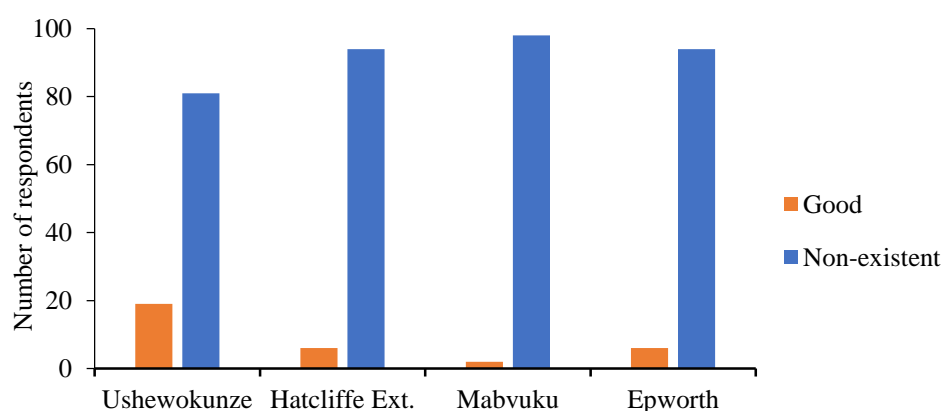


Figure 6. 5 Urban cultivator's relationship with UPA stakeholders

6.3.3 Localisation of food production and its implications for urban farmers

Results from FGD's and KII's indicate that the continued practice of urban cultivation reflects the need to control their food systems. Despite its "illegal status", key informants acknowledged that their resilience to restrictive by-laws indicates resilience and determination to enhance their food security statuses. One respondent underscored the importance of taking control of her household's consumptive needs by producing preference foods through UPA. The importance she attached to control was also echoed by multiple respondents;

Farming is important because we can add on to our household food basket. We also plant crops and vegetables that are important to us as a family.⁴³

⁴³ Excerpt 6- FGD conducted in Ushewokunze (4/07/2017)

Relatedly, those involved in community gardens supported by different organisations stated that growing food locally meant that they could avail vegetables and crops to within their communities and those surrounding them. In response to the question on decision making regarding their cropping systems and crop choices, they stated that all decisions were autonomous as they were growing food for their own use (sale and consumption). One respondent stated that; *“Each person has their own garden; they plant what they want. No one tells them, put this instead. Each person practices what they know.”* However, urban farmers failed to adhere to sustainable practices by cultivating at the edges of stream banks and road sides.

6.3.4 Developing knowledge base and skills of urban farmers

Through participant observation, the researcher detected seed sovereignty in one of the respondent’s gardens (see Plate 6a and 6b). By allowing her mustard greens to mature, she reserved the seeds and planted them in the adjacent garden. Thus, retaining its organic state and saving money she could have used to buy seeds or seedlings:

These are seeds that I am breeding for next year. The only seeds that we buy are rape seed because there is no means through which we can obtain it organically or otherwise⁴⁴



Plate 6.1 Seed multiplication in a community garden in Ushewokunze

6.1a Field with mustard greens left to mature. Seeds are sown an adjacent field Figure 6.1b

Photo credit: Researcher

⁴⁴ Excerpt 8 Informal discussion Ushewokunze 12/07/2017

The lack of support for urban food production is revealed through the dearth of services provided to support it. As highlighted above, support for the practice of UPA is somewhat minimal. This is reflected in the channels used by households to access information on to support their practice. Social networks, in the form of relatives or neighbours (52.75%) were frequently listed as the main source of information. This was followed by television and radio programmes (37.5%) (Table 6.2). Agricultural Extension Services (Agritex) was the least frequently used source of information because they were none existent in urban areas, those that used their services stated that they were assisting them in their personal capacity.

Table 6. 2 Primary source of agricultural information by urban households in Harare

Source of information	<i>n</i> (400)	%
Agritex	29	7.25
Radio/TV programs	150	37.5
Relative/neighbour	211	52.75
NGO	10	2.5
Total	400	100.0

6.3.5 Urban and peri-urban agriculture's impact on the environment

Cropping systems were diverse across all study sites. These variations were determined by land size and the application of conventional or agroecological methods. No or minimum tillage was a unanimous soil conservation practice used by all urban farmers. All respondents from the four sites stated that they practiced crop rotation to augment soil fertility and the quality of their produce. While all households practiced crop rotation, mixed cropping was less practiced in community gardens and off-plot cultivation. Fertiliser was used more frequently in community gardens and off-plot cultivation. For home production, compost, crop residue (Fig 6.7) and manure (cattle or poultry) were used if accessible and when there was enough money to purchase some. In an informal conversation conducted after a survey, one respondent stated that crop residues not only enrich the soil by providing additional nutrients to the soil through decomposition, but they cover the soil, minimising water evaporation. One respondent highlights the prohibitive costs that keep her from using it more frequently;

Fertiliser is the cheaper option for me. If I buy fertiliser for a dollar I can use it on all my beds. But manure, if I buy a dollar's worth, I can only use it on maybe two beds.⁴⁵

Conversely, one respondent pointed out that their community garden members have free access to manure and therefore, only used fertiliser sparingly

⁴⁵ Excerpt 9- FGD conducted in Ushewokunze (4/07/2017)

We use manure, we ask the leaders to get manure for us to use in our gardens. If we do not have manure, we use fertiliser. I prefer manure, most times, fertiliser is only crucial when we plant maize that we use for our own consumption.⁴⁶



Plate 6.2 Crop residue (maize stalks) in an open space garden in Hatcliffe

6.3.6 Adaption to climate change

Figure 6.6 shows a graphical presentation of perceptions on the impact of climate change of crop production and corresponding numbers of urban farmers who adapted to climate change. While 307 households perceived change, only 227 made changes to their food production systems. This means that 20% of the households that did perceive change failed to adapt. Table 6.4 provides a list of adaptation strategies used by urban households. Of those that adapted to climate change, 43.25% used water conservation techniques, more than two fifths (40%) practised crop rotation to enhance soil fertility, 35.5% changed their planting dates according to the changing seasons and 24.5% switched to organic fertilisers. A few households moved to a different site (8.75%) or switched to stream bank or wetland cultivation (5%) as an adaptation strategy.

As highlighted in Table 6.4, some households practiced UPA in stream banks and wetlands. While acknowledging the plight of the urban poor key informants highlighted their negative impact on biodiversity and human consumption if the water is contaminated with heavy metals. In practicing UPA, two key informants cited the need to adhere to environmental principles by which protect biodiversity;

⁴⁶ Excerpt 10- FGD conducted in Ushewokunze (4/07/2017)

The idea is good, but the execution is not because they end up practicing this UPA on ecologically sensitive areas like wetlands...like stream banks within.... literally within the river bed. Eventually it will affect our water sources through siltation.⁴⁷

The affluence, it gets picked up into the vegetables and the foods that people eat. They end up eating food that is contaminated with heavy metals.⁴⁸

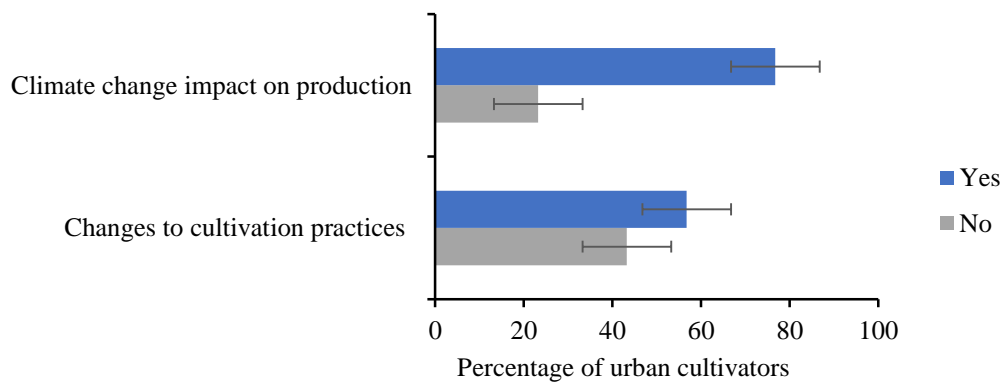


Figure 6. 6 Perception of climate change on food production and changes to agricultural practices

Table 6. 3 Adaptation strategies adopted by urban farmers

Adaptation measure	%
Change in crop/vegetable variety	10.3
Change in crop/vegetable type	17
Change from synthetic to organic fertilisers	24.5
Increase in the amount of land under production	5.3
Decrease in the land under cultivation	13.5
Implement soil management techniques	35
Move to a different site	8.8
Increase water conservation	43.3
Use of waste water	27
Crop rotation	40
Change planting dates	35.5
Stream bank/wetland cultivation	5

*Note: Multiple responses were permitted, so frequency does not add to (n=400)

6.3.7 Barriers to food sovereignty

All respondents experienced some form of barrier to food sovereignty. While all KII's adequately defined UPA, their comprehension of food sovereignty was either non-existent or limited. Table 6.6 displays a cross tabulation of

⁴⁷ Excerpt 11- KII (7/03/2018)

⁴⁸ Excerpt 11- KII (18/07/2018)

the barriers disaggregated by study site. Lack of attention to UPA, lack of seeds, lack of information, undervalued indigenous crops and inadequate land were the main barrier to food sovereignty faced by households. Lack of attention to UPA (30.75%) was the most frequently listed barrier, this was followed by lack of information (28.25%) and inadequate land (27.25%). According to FGDs, particularly those from Mabvuku and Epworth their attempts at being autonomous growers was hampered by insecure land tenure as undeveloped land was either reserved for construction or prohibited due to municipal regulations. The least important barrier to food sovereignty was the undervaluing of indigenous crops. Figure 6.2 shows that native or traditional crops or vegetables were not only limited but there was a low incidence of urban households that produced them. Despite its low significance as a barrier among respondents, one key informant underscored the gravity of undervaluing traditional crops to food sovereignty at the national level:

millet, *mutakura* (boiled mixture of maize kennels, ground nuts, groundnuts, cow peas)- when did you last eat it? [...] Consumption systems and policies don't promote food sovereignty. (They) promote value chain, processing and consumption. [...] *rupiza* (mashed cowpeas), black jack not so popular

Together, these results show that urban farmers received minimal support from stakeholders. Relatedly, barriers to UPA obtained from survey questions and recurrently mentioned in the FGDs lack of access to land, extension services, credit and water (Table 6.4). More pointedly, in describing their working relationship with UPA stakeholders, 91.75% 367 they stated that it was non-existent. Those that said it was good, were members of community gardens who were either sponsored by NGO's and/or cultivated on school premises.

Table 6. 4 Barriers to food sovereignty

Variable	%	Ushewokunze	Hatchliffe	Mabvuku	Epworth
		<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>
Lack of attention to UPA	30.75	26	38	32	27
Lack of seeds	10.5	7	12	16	7
Lack of information	28.25	37	27	24	25
Undervalued indigenous crops	3.25	5	0	0	8
Inadequate land	27.25	26	38	32	27

6.4 Discussion

Consistent with literature (Jones et al., 2014, Pellegrini and Tasciotti, 2014), respondents acknowledged that UPA was invaluable to household food security. Respondents produced a wide array of crops and vegetables mainly for household consumption. Notwithstanding constraints, UPA emerged as an important practice which moderated hunger and malnutrition for urban farmers. As illustrated in Fig 6.1 UPA was also reported as the key food source

for more than three-fifths (62.5%) of the households. The importance of UPA was reflected in benefits (healthy nutritious food, savings on purchases, access to income, increased food security and increased health benefits) obtained from engaging in the practice (Fig 6.2). The monotonous dietary patterns indicate inadequate nutrient intake which is congruent with production (Fig 6.3) confirms the importance of the practice to their sustenance. Excerpts from FGDs illuminate the importance of the practice, particularly in the sustained cash shortages and high unemployment (Dlamini and Mbira, 2017, Sachikonye, 2011).

In line with the first principle of food sovereignty which focuses on the right to adequate and healthy food (Carney, 2016, Heckelman and Wittman, 2015, Schanbacher, 2010). UPA offered households an avenue through which they could produce diverse preferred foods and only purchase what they could not produce. By doing so, they saved on purchases and siphoned to other household expenses. However, despite the wide range of crops and vegetables grown by households, they were primarily conventional which have been established (Ochieng et al., 2018, Schönfeldt and Pretorius, 2011) to contain lower nutritional composition than AIVs. This finding diverges with food sovereignty's promotion of the increased consumption of traditional or indigenous foods. With the exception of pumpkin leaf (*Cucurbita maxima*), black jack (*Bidens pilosa*), Cowpea (*Vigna unguiculata*), okra (*Abelmoschus esculentus*), which are rich in macro and micronutrients (Ochieng et al., 2018, van Rensburg et al., 2007, Schönfeldt and Pretorius, 2011) were produced and consumed by less than half of the respondents. This indicates that there is need to promote the production of AIVs. In view of the weak purchasing power of households and waning economic climate, supplementing diets with AIVs would enhance the composition of nutrients in their diets. Sufficient food that is deficient in recommended nutrients does not translate to food security

Households across all study sites experienced exceptionally high levels of food insecurity. Ordinal regression parameters show that Epworth recorded the highest incidences of severe food insecurity and low dietary diversity. A low dietary diversity may perhaps denote an insufficient food basket and vulnerability to food insecurity. A plausible explanation for this finding was attributed to cumulative constraints which reduced diet quality and quantity such as lack of sufficient capital to purchase healthy food and limited or unavailability of land for subsistence agriculture inadequate land and lack of Agritex Services.

Urban farmers were undervalued. This stemmed from the invisible nature of UPA (Crush and Riley, 2017, Sonnino et al., 2014). Consistent with findings from Yap (2013) lack of provision for UPA in the form of policies was a key barrier to food sovereignty. Exclusion of UPA made it difficult for households to actively sustain their livelihoods. This was confirmed in key informant interviews, where all respondents stated that there was no policy support for the practice of UPA. The poor relationship between stakeholders which also includes Agritex services and urban farmers (Fig 6.5) is also confirmed in other studies. The invisible nature of the practice in policy and practice in

urban spaces is a physical manifestation of urban food insecurity. This paper questions policy proclamations of achieving food security e.g. the Food Security and Nutrition Policy, in a context where agricultural productivity is declining (Martens, 2012, Rukuni, 2006) and production alternatives for urban dwellers are disregarded or at worst prohibited (Masvaure, 2016, Taru and Basure, 2013). Confirming assertions by Simelton et al. (2013) lack of dialogue and exclusionary attitudes translated to increased food insecurity due to maladaptation to climate change. Food sovereignty's second principle discards policies or legislative instruments that impede households from producing food. Similarly, the RTTC, critiques anachronistic and prohibitive institutional arrangements which reproduce inequalities (Lefebvre et al., 1996). The author calls for the reshaping of the livelihoods of urban residents, in ways that address their immediate needs. This is potent, particularly for households attempting to optimise food security in adverse socio-economic and climatic conditions. As posited by Premat (2009) Havana's acclaimed food sovereignty status is attributed to supportive UPA structures. Failure to value the practice through official structures and policies reduced the autonomy and amplified challenges faced by urban farmers. Consequently, there was no platform to engage any urban farmers in critical discussions on issues pertaining to production and sustainability. For key informants, although the need for distinct guidelines governing the practice of UPA was uncontested, the option to promote the practice remained debated. Regardless, as reflected in studies on UPA in Harare, failure to contain cultivation in urban areas over the past decades is a clear reflection of the significance of the practice to households (Masvaure, 2016, Taru and Basure, 2013).

The politics of food in urban spaces is evident in competing land uses. One striking observation was that the land constraint was refracted from diverging viewpoints. For respondents, open spaces were viewed as resourceful sites of food production. However, for KIIs cited that there was no 'open space', all spaces have designated zoning purposes. In line with RTTC, displayed autonomous behaviour by appropriating 'vacant' spaces (Lefebvre et al., 1996) to feed their families and sell surplus within and around their communities. Notably, realising the right to food through UPA competed with observing the technicalities of sustainability and aesthetic appeal. By the same token, the food sovereignty's fourth principle emphasises territorial control of resources which are ecologically sound. An important qualification in the principle is that while the right to food is key, it also emphasises sustainability. (Schanbacher, 2010) which was also a point of departure for most key informants. While all KII's acknowledged the importance of UPA as a supplement to household nutrition particularly in a resource constrained economy, there were divergent attitudes. Excerpts presented include highlighted that urban farmers contravened environmental protection laws by engaging in unsustainable practices. Due to land unavailability, urban farmers resorted to contravening land use regulations by cultivating a few metres from roadsides and stream banks. Comparable scholarship Sedze (2006) confirms the detrimental effects of such practices which lead to siltation and reduction in bio-diversity. While the resilience demonstrated by urban farmers by taking control of their foods systems in a bid to avert prohibitive markets (Ruel et al., 2017), cognisance of protecting the environment is fundamental.

Local knowledge is also a resource. Food sovereignty unlike food security extends itself by underscoring the importance of horizontal knowledge and skill production (La Via Campesina, 2007). This line of reasoning was reinforced through the unyielding determination by households to produce locally. Secondly, urban farmers, particularly those who participate in community gardens embraced seed sovereignty which builds on both knowledge and skills (Kloppenburger, 2014). As shown in Fig 6.6 one urban cultivator from Ushewokunze bred her seeds. Urban farmers had autonomy over seed production giving them access to localised varieties well-adapted to the context. By so doing, she also addresses the first principle in terms of the quality of her crops or vegetables. The exclusion of UPA from policy and practice, as highlighted above meant that support for UPA was at best, minimal. Based on the sources of agricultural information used by urban farmers, it is evident that Agritex services, which are key avenues for disseminating and sharing vital information was none existent. The 7.25% of urban farmers that cited them as a source stated that the Agritex officers were merely volunteering their services.

The last principle consists of two related qualifications which address food security concurrently. Adherence to agroecological practices which also augment resilience to climate change (Diacono and Montemurro, 2011, Altieri et al., 2012). Exploring perceived changes in rainfall and temperatures and how farmers respond to these provides an in-depth understanding of the ability of farmers to take control of their farming systems. Minimum tillage, minimal use of organic input, crop rotation were some of the techniques used by urban farmers. Such techniques involve limited use of synthetic inputs and minimal soil disturbance which promote the natural biological processes (Altieri et al., 2012). As alluded to by (Clapp, 2017) UPA was not synonymous with sustainable or agroecological practices. Instead, urban farmers used a mix of organic and conventional inputs. Minimum tillage was a universal practice across all sites. However, soil input management was not uniform. Inputs included synthetic fertiliser, manure, compost and crop residue (Fig 6.7). While households stated preference for manure, they cited reasons such as its prohibitive cost and accessibility as barriers. An underlying explanation is that accessibility to manure often served as a motivating factor for its use. Except for urban farmers in Ushewokunze who have access to free manure, most households used synthetic fertiliser. The excessive application of fertilisers and use of water contaminated with heavy metals (Katanda et al., 2007) devastating impacts on health.

UPA constraints are extended to food sovereignty constraints since UPA is a tool that supplements diets and is also pathway to food security (Boone and Taylor, 2016) As displayed in Table 6.6 frequently listed barriers to food sovereignty were lack of attention to UPA, lack of information and inadequate land. Only two of the eight key informants were aware of the term food sovereignty. Even so, those that did provided generalised explanations. This definitional gap reflects its lack of popularity and more importantly, its lack of primacy in programming and policy formulation. as stipulated by Noll (2017) ambivalent and archaic attitudes toward UPA reinforce the exclusion of strategies that have the potential to address food insecurity. Secondly, access to information was the cited as the key constraint across all the sites, this is a critical limiting factor since it prevented households from

critical information on controlling factors such as climate change, adaptive strategies and other agroecological practices that promote food sovereignty. While only 3.25% of the urban farmers mentioned the undervaluing of indigenous crops as a barrier. Insights by a key informant who questioned the lack of popularity of traditional foods in supermarkets denotes lack of food sovereignty at national level. This was also reflected in the minimal production and consumption of indigenous vegetables as explained in Section 6.1. Together, these confounding barriers deter households from producing and partaking in preferred and nutritious diets.

6.5 Conclusion

This study explored the salient features of food sovereignty principles and RTTC in the agricultural practices of urban farmers. By unearthing systemic barriers that buttress food insecurity and promoting ecologically grounded methods of production, this study not only extends food sovereignty as base from which urban farmers and UPA stakeholders can draw from. It provides an in-depth appreciation of the urban food problem and envisages a panoptic approach to addressing the modalities of urban food production and consumption challenges. Agricultural practices of urban farmers loosely approximate food sovereignty. The uptake of food sovereignty related principles by urban farmers is masked by ideologies and programming that is fixated in rural and conventional agriculture. On logical grounds, there is no compelling reason to argue that UPA cannot exclusively feed urban populations. However, as demonstrated by this paper but it is a modest pathway to alleviating household food insecurity. Its modest contribution to food security and nutrition was attributed to multiple constraints to food sovereignty that prevented households from drawing maximum benefits from the practice. Notably, key barriers include lack of attention to UPA, lack of seeds, lack of information, undervalued indigenous crops and inadequate land, all of which are couched in unsupportive institutional arrangements. UPA was not synonymous with organic or sustainable practices, however, most households resorted to synthetic inputs and unsustainable soil practices due to various constraints such as lack of capital and lack of information. The authors are of the conviction that it is only logical to start with acknowledging UPA and setting up structures to guide the practice. Such an orientation requires recasting institutional arrangements so that they are receptive to the needs urban farmers. Sustained prejudice against the practice deters improvements in household, national and subsequently regional food security.

References

- ALTIERI, M. A., NICHOLLS, C. & FUNES, F. 2012. The scaling up of agroecology: spreading the hope for food sovereignty and resiliency. *A contribution to discussions at Rio* [Online], 20. Available: <https://foodfirst.org/wp-content/uploads/2014/06/JA11-The-Scaling-Up-of-Agroecology-Altieri.pdf> [Accessed 12 July 2016].
- ALTIERI, M. A. & TOLEDO, V. M. 2011. The agroecological revolution in Latin America: rescuing nature, ensuring food sovereignty and empowering peasants. *Journal of Peasant Studies*, 38, 587-612.
- BESADA, H. & WERNER, K. 2015. An assessment of the effects of Africa's water crisis on food security and management. *International journal of water resources development*, 31, 120-133.
- BISWAS, M. R. & BISWAS, A. K. 1979. *Food, climate, and man*, John Wiley and Sons.
- BOONE, K. & TAYLOR, P. L. 2016. Deconstructing homegardens: food security and sovereignty in northern Nicaragua. *Agriculture and human values*, 33, 239-255.
- BORRAS JR, S. M., FRANCO, J. C. & SUÁREZ, S. M. 2015. Land and food sovereignty. *Third World Quarterly*, 36, 600-617.
- CARNEY, M. 2016. " Food Security" and" Food Sovereignty": What Frameworks Are Best Suited for Social Equity in Food Systems? *Journal of Agriculture, Food Systems, and Community Development*, 2, 71-87.
- CLAPP, J. 2017. Food self-sufficiency: Making sense of it, and when it makes sense. *Food Policy*, 66, 88-96.
- CRESWELL, J. W. & CLARK, V. L. P. 2011. *Designing and Conducting Mixed Methods Research*, Carlfonia, USA, Thousand Oaks.
- CRUSH, J., HOVORKA, A. & TEVERA, D. 2011. Food security in Southern African cities: the place of urban agriculture. *Progress in Development Studies*, 11, 285-305.
- CRUSH, J. & RILEY, L. 2017. Urban food security, rural bias and the global development agenda. In: PARTNERSHIP, H. C. (ed.) *Hungry Cities Partnership Discussion Paper No. 11*. Ontario, Canada: Wilfrid Laurier University.
- DESMARAIS, A. 2015. The gift of food sovereignty. *Canadian Food Studies/La Revue canadienne des études sur l'alimentation*, 2, 154-163.
- DIACONO, M. & MONTEMURRO, F. 2011. Long-term effects of organic amendments on soil fertility. *Sustainable Agriculture Volume 2*. Springer.
- DLAMINI, B. & MBIRA, L. 2017. The Current Zimbabwean Liquidity Crisis: A Review of its Precipitates. FAO, IFAD, UNICEF, WFP & WHO. 2017. The State of Food Security and Nutrition in the World 2017. Building resilience for peace and food security. Available: <http://www.fao.org/3/a-I7695e.pdf> [Accessed 20-02-2018].
- FOLEY, J. A., RAMANKUTTY, N., BRAUMAN, K. A., CASSIDY, E. S., GERBER, J. S., JOHNSTON, M., MUELLER, N. D., O'CONNELL, C., RAY, D. K. & WEST, P. C. 2011. Solutions for a cultivated planet. *Nature*, 478, 337.
- FOOD AND NUTRITION COUNCIL 2012. The Food and Nutrition Security Policy for Zimbabwe: Promoting Food and Nutrition Security in Zimbabwe in the Context of Economic Growth and Development. Harare: Food and Nutrition Council (FNC).
- GIUNTA, I. 2014. Food sovereignty in Ecuador: The gap between the constitutionalization of the principles and their materialization in the official agri-food strategies. *The Journal of Peasant Studies*, 41, 1201-1224.
- GODFRAY, H. C. J., BEDDINGTON, J. R., CRUTE, I. R., HADDAD, L., LAWRENCE, D., MUIR, J. F., PRETTY, J., ROBINSON, S., THOMAS, S. M. & TOULMIN, C. 2010. Food security: the challenge of feeding 9 billion people. *Science*, 327, 812-818.

- HECKELMAN, A. & WITTMAN, H. 2015. Food sovereignty: A framework for assessing agrarian responses to climate change in the Philippines. *Austrian Journal of South-East Asian Studies*, 8, 87-94.
- HOLT-GIMÉNEZ, E., SHATTUCK, A., ALTIERI, M., HERREN, H. & GLIESSMAN, S. 2012. We already grow enough food for 10 billion people... and still can't end hunger. *Journal of Sustainable Agriculture*, 595-598. .
- JENSEN, E. & LAURIE, C. 2016. *Doing real research: A practical guide to social research*, London, Sage.
- JONES, A. D., SHRINIVAS, A. & BEZNER-KERR, R. 2014. Farm production diversity is associated with greater household dietary diversity in Malawi: findings from nationally representative data. *Food Policy*, 46, 1-12.
- JONES, J. L. 2010. Nothing is straight in Zimbabwe – The rise of the kukiya-kiya economy, 2000-2008. *Journal of Southern African Studies*, 36, 285-299.
- KATANDA, Y., MUSHONGA, C., BANGANAYI, F. & NYAMANGARA, J. 2007. Effects of heavy metals contained in soil irrigated with a mixture of sewage sludge and effluent for thirty years on soil microbial biomass and plant growth. *Physics and Chemistry of the Earth, Parts A/B/C*, 32, 1185-1194.
- KLOPPENBURG, J. 2014. Re-purposing the master's tools: the open source seed initiative and the struggle for seed sovereignty. *Journal of Peasant Studies*, 41, 1225-1246.
- KOKERA, R. & NDOMA, S. 2016. Facing Drought, Can Zimbabwe Improve on History of Food Shortage, Poor Management. Available: <http://afrobarometer.org/publications/ad114-facing-drought-can-zimbabwe-improve-history-food-shortage-poor-management> [Accessed 18 November 2017].
- KUTIWA, S., BOON, E. & DEVUYST, D. 2010. Urban agriculture in low income households of Harare: an adaptive response to economic crisis. *Journal of Human Ecology*, 32, 85-96.
- LA VIA CAMPESINA 2007. Nyéléni declaration. Sélingué, Mali: Forum for Food Sovereignty. *Declaration of the Forum for Food Sovereignty*. Selingue, Mali.
- LA VIA CAMPESINA 2008. Food Sovereignty now! Unity and struggle of the people! Declaration of Maputo. *Fifth International Conference of La Via Campesina October 16th to 23rd, 2008* Maputo, Mozambique.
- LEFEBVRE, H. 1991. *The Production of Space*, Oxford, United Kingdom, Blackwell.
- LEFEBVRE, H., KOFMAN, E. & LEBAS, E. 1996. *Writings on cities*, Blackwell Oxford.
- MANJENGWA, J., MATEMA, C. & TIRIVANHU, D. 2016. Understanding urban poverty in two high-density suburbs of Harare, Zimbabwe. *Development Southern Africa*, 33, 23-38.
- MARSHALL, B., CARDON, P., PODDAR, A. & FONTENOT, R. 2013. Does sample size matter in qualitative research?: A review of qualitative interviews in IS research. *Journal of Computer Information Systems*, 54, 11-22.
- MARTENS, J. 2012. How Zimbabwe lost its food sovereignty and food security. Rosa Luxemburg Stiftung. Available: www.rosalux.co.za/wp-content/uploads/2012/09/2012-Zimbabwe-SD-012012.pdf.
- MASVAURE, S. 2016. Coping with food poverty in cities: The case of urban agriculture in Glen Norah Township in Harare. *Renewable Agriculture and Food Systems*, 31, 202-213.
- MCCLINTOCK, N., MIEWALD, C. & MCCANN, E. 2017. The politics of urban agriculture: Sustainability, governance, and contestation. *SAGE Handbook on Spaces of Urban Politics*. Thousand Oaks, California: SAGE.
- MUGANDANI, R., WUTA, M., MAKARAU, A. & CHIPINDU, B. 2012. Re-classification of agro-ecological regions of Zimbabwe in conformity with climate variability and change. *African Crop Science Journal*, 20, 361-369.
- NOLL, S. E. 2017. Food Sovereignty in the City: Challenging Historical Barriers to Food Justice. *Food Justice in US and Global Contexts*. Springer.
- OCHIENG, J., AFARI-SEFA, V., KARANJA, D., KESSY, R., RAJENDRAN, S. & SAMALI, S. 2018. How promoting consumption of traditional African vegetables affects household nutrition security in Tanzania. *Renewable Agriculture and Food Systems*, 33, 105-115.

- PEDZISAI, E., KOWE, P., MATARIRA, C. H., KATANHA, A. & RUTSVARA, R. 2014. Enhancing food security and economic welfare through urban agriculture in Zimbabwe. *Journal of Food Security*, 2, 79-86.
- PELLEGRINI, L. & TASCIOTTI, L. 2014. Crop diversification, dietary diversity and agricultural income: empirical evidence from eight developing countries. *Canadian Journal of Development Studies/Revue canadienne d'études du développement*, 35, 211-227.
- POTTS, D. 2011. Making a livelihood in (and beyond) the African city: the experience of Zimbabwe. *Africa*, 81, 588-605.
- PREMAT, A. 2009. State power, private plots and the greening of Havana's urban agriculture movement. *City & Society*, 21, 28-57.
- PURCELL, M. 2002. Excavating Lefebvre: The right to the city and its urban politics of the inhabitant. *GeoJournal*, 58, 99-108.
- RUEL, M. T., GARRETT, J., YOSEF, S. & OLIVIER, M. 2017. Urbanization, food security and nutrition. In: DE PEE, S., TAREN, D. & BLOEM, M. W. (eds.) *Nutrition and Health in a Developing World*. Springer.
- RUKUNI, M. 2006. Revisiting Zimbabwe's agricultural revolution. In: RUKUNI, M., TAWONEZVI, P., EICHER, C., MUNYUKI-HUNGWE, M. & MATONDI, P. (eds.) *Zimbabwe's agricultural revolution revisited*. Harare: University of Zimbabwe (UZ) Publications.
- SACHIKONYE, L. M. 2011. *Zimbabwe's Lost Decade: Politics, Development & Society*, African Books Collective.
- SCHANBACHER, W. D. 2010. *The politics of food: The global conflict between food security and food sovereignty*, ABC-CLIO.
- SCHÖNFELDT, H. & PRETORIUS, B. 2011. The nutrient content of five traditional South African dark green leafy vegetables—A preliminary study. *Journal of Food Composition and Analysis*, 24, 1141-1146.
- SEDZE, V. 2006. An Examination of a Community-Based Urban Agriculture Project: The Case of Musikavanhu in Budiriro, Harare. *City Farmer, Vancouver*.
- SHENTON, A. K. 2004. Strategies for ensuring trustworthiness in qualitative research projects. *Education for information*, 22, 63-75.
- SIMELTON, E., QUINN, C. H., BATISANI, N., DOUGILL, A. J., DYER, J. C., FRASER, E. D., MKWAMBISI, D., SALLU, S. & STRINGER, L. C. 2013. Is rainfall really changing? Farmers' perceptions, meteorological data, and policy implications. *Climate and Development*, 5, 123-138.
- SONNINO, R. 2016. The new geography of food security: exploring the potential of urban food strategies. *The Geographical Journal*, 182, 190-200.
- SONNINO, R., MORAGUES FAUS, A. & MAGGIO, A. 2014. Sustainable food security: an emerging research and policy agenda. *International journal of sociology of agriculture and food*, 21, 173-188.
- TARU, J. & BASURE, H. 2013. Conflicts, contestation and marginalization in urban agriculture: experiences from Kuwadzana Extension, Harare. *Russian Journal of Agricultural and Socio-Economic Sciences*, 18, 15-26.
- TASHAKKORI, A. & TEDDLIE, C. 2008. Quality of inferences in mixed methods research: Calling for an integrative framework. *Advances in mixed methods research*, 101-119.
- TAWODZERA, G. 2012. Urban household vulnerability to food security and climate change: Experiences from urban areas Zimbabwe. In: FRAYNE, B., MOSER, C. & ZIERVOGEL, G. (eds.) *Climate change, assets and food security in Southern Africa*. New York: Earthscan. New York, USA: Earthscan.
- TAWODZERA, G. Household food insecurity and survival in Harare: 2008 and beyond. *Urban Forum*, 2014. Springer, 207-216.
- TAWODZERA, G., ZANAMWE, L. & CRUSH, J. 2012. The state of food insecurity in Harare, Zimbabwe. Urban Food Security Series No. 13. Queen's University and AFSUN: Kingston and Cape Town.

- TEDDLIE, C. & TASHAKKORI, A. 2012. Common “core” characteristics of mixed methods research: A review of critical issues and call for greater convergence. *American Behavioral Scientist*, 56, 774-788.
- VAN RENSBURG, W. J., VAN AVERBEKE, W., SLABBERT, R., FABER, M., VAN JAARSVELD, P., VAN HEERDEN, I., WENHOLD, F. & OELOFSE, A. 2007. African leafy vegetables in South Africa. *Water sa*, 33.
- WHITE, S. A. & HAMM, M. W. 2017. A View from the South: Bringing Critical Planning Theory to Urban Agriculture. In: WINKLERPRINS, A. (ed.) *Global Urban Agriculture*. Oxfordshire: CAB International.
- Wittman, H. 2010. *Food Sovereignty: Reconnecting food, Nature & Community*, Winnipeg , Canada, Fernwood Publishing.
- YAP, C. 2013. *Urban Food Sovereignty: Food, Land and Democracy in Kampala*, Development Planning Unit, Bartlett, University College London.
- YIN, R. K. 2017. *Case study research and applications: Design and methods*, California, Thousand Oaks, Sage Publications.
- ZIMSTAT 2013. 2012 Population Census Results. Final Report. ZIMSTAT, Harare. Harare: Zimbabwe National Statistics Agency (ZimStat).

CHAPTER 7

CONCLUSION AND AREAS FOR FUTURE RESEARCH

7.1 Conclusion

Questions of how to effectively tackle food insecurity in sub-Saharan Africa have dominated regional debates. In response, food sovereignty has been proffered as an avenue through which the urban poor can organise their livelihoods. This claim is supported by empirical evidence in several countries in developing countries. On the back of growing urban populations and increasing poverty and food insecurity, the purported merits of applying food sovereignty principles remain largely unexplored in Zimbabwe. The pivotal argument of this thesis is that focus on urban and peri-urban agriculture (UPA) and food sovereignty which have been proffered as avenues to supplement the consumptive needs of households warrant critical consideration. More so, in resource constraint areas where households find it difficult to organise their livelihoods around unstable and neo-liberal based markets.

This chapter synthesises findings responding to research questions posed in Chapter 1. It also consolidates prospective areas for future research. The findings are collated into four distinct but intertwined lines of enquiry; a) examine the contribution of UPA to food security and nutrition b) a critical assessment of the influence of institutional arrangements on UPA c) to map the perceptions of urban farmers on climate change and identify agroecological practices employed d) to assess the extent to which the practices and processes embedded in the food systems of urban farmers resonate with principles of food sovereignty.

7.1.1 Urban and peri-urban agriculture's (in)significance to food security and nutrition

To understand the (in)significance of UPA this study investigated its contribution to food security. Beyond this, it evaluated the extent to which the practice influences the dietary patterns and quality of foods consumed by urban households. Overall findings point to the significance and invaluable nature of the practice, despite high food insecurity across all study sites. The benefits derived from the practice in terms of both quantity and quality were low owing to multiple constraints such as limited availability of land, water scarcity, lack of extension and poverty. As a result, the dietary composition of most households was mainly composed of carbohydrates and deficient in essential protein and vitamins. Despite its modest contribution to food security and nutrition, the invaluable nature of the practice presents itself through access to diversified nutritious food for direct consumption

or sale. Other key findings were that there was no significant association between income, crop diversity and food security. Although there were no discrete differences noted between settlements type and food insecurity status, temporal differences were noted. Food insecure households were prevalent in older settlements (Epworth and Mabvuku).

7.1.2 Institutional arrangements and their implications on urban food security

Institutional arrangements, which govern systems and processes have been cited in as laying along a continuum of enabling to prohibiting the practice of UPA Off-plot cultivation has been marginalised for decades. Despite the changing character of food provisioning due to urbanisation, institutional arrangements remain at best ambivalent to the concerns of urban farmers. Urban farmers demonstrated autonomy and resilience through appropriation of open spaces to supplement household consumptive needs. Notably, unavailability of land, lack of credit and extension services were key constraints. Together, these constraints mainly stem from colonial legislature related to land use within the boundaries of cities, antithetical goals between outmoded colonial ordinances and the right to food deadlock. Following the logic of Henri Lefebvre's RTTC, urban farmers rejected outmoded colonial by-laws to address their immediate consumptive needs. However, questions of sustainable agriculture, which are rightly defended by legislature and by-laws merit attention. In view of contextual challenges that plague urban dwellers, this thesis posits that without lasting economic transformation and cogent determination to set up structures for UPA food insecurity in urban spaces will remain a growing challenge. This points to a need to realign by-laws and policies shaping UPA with current socio-economic situation.

7.1.3 Perceptions of climate change and application of agroecological practices

Perceptions of urban farmers on climate change and corresponding adaptive capacities, confirmed that urban farmers perceived changes in both temperature and rainfall. Notwithstanding, not all urban farmers adapted to the effects of climate change. Plausible explanations for this were barriers such as access to information, capital and water. These same barriers also led to some urban farmers applying synthetic inputs to tier food systems. UPA practices reflected a mixture of agroecological and conventional principles based on scale and productivity of UPA, unsupportive institutional arrangements and waning economic situation negatively shape food provisioning. The combination of these stressors, points to the need for stakeholders to engage urban farmers and provide them with climate adaptation information and other relevant forms of support. We, not only underscore the magnitude

of the problem, but also indicate that harnessing local experiences of climate change hold promises for developing effective adaptive strategies that respond to the food security challenge.

7.1.4 Application of food sovereignty among urban farmers

By exploring the organising principles of food sovereignty within the food systems of urban farmers this study showed that the uptake of its principles was limited. Autonomy over productive and consumptive practices was predominantly mediated by unsupportive institutional arrangements in the form of lack of attention to UPA, lack of seeds, lack of information, undervalued indigenous crops and inadequate land. While households appreciated the rewarding effects of applying agroecological principles and actively taking control of their food systems many factors inhibited this. This study supports empirical evidence that the food sovereignty is a pre-requisite to addressing food insecurity in urban spaces.

Retracing the historical economic and agricultural fault lines in Zimbabwe which have punctuated its food provisioning capacities, necessitates an orientation towards food sovereignty. Given the magnitude of poverty and malnutrition in resource constraint urban precincts, we scarcely need to justify the much-needed focus of the urban dynamic in terms of food production. Carefully considered applications of the framework to both rural and urban dynamics could potentially strengthen food security at national level. In conclusion, it is important to note that this thesis by no means offers UPA and food sovereignty as panaceas to self-sufficiency. Instead, they are alternative avenues through which households can organise their sustenance and livelihoods.

7.2 Areas for future research

Potential propositions for future research are four-fold. Firstly, there is need for municipal authorities and policy makers to revise by-laws and policies align them with current context. The creation of structures and processes that govern the practice is critical. Only then, can meaningful strategies involving UPA be implemented. The continued use of by-laws drafted in the 1960's only serves to undermine the efforts of urban farmers.

Secondly, given the invisibility of UPA, there is need to create a solid scientific evidence base with that takes a multidimensional and multidisciplinary approach to food and nutrition issues. Also, such endeavours as stipulated in the second and fifth principle of the food sovereignty framework should be informed by local perspectives. Thirdly, it is vital to conduct longitudinal studies which rather than focusing on short-term impacts, take a protracted view of UPA's impact on food security and nutrition. Such an approach provides a more accurate

representation e.g. seasonal variation. This method responds to the stability dimension of food security alluded to in Chapters 1 and 3. Lastly, focusing on the rural dynamic would expand the knowledge base of food sovereignty and plausibly lead to increased uptake by various stakeholders and consequently more sustainable, agroecologically based food systems.